GLASGOW CALEDONIAN UNIVERSITY

THE ROLE OF FACILITIES MANAGEMENT IN THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS (HAI)

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ABSTRACT

A growing body of evidence now exist, which suggests that Healthcare Associated Infections (HAI) are a major cause of morbidity and mortality. There is, however, a paucity of empirical knowledge and evidence-base of the role of Facilities Management (FM) in the control of HAI. Therefore, the main aim of this research was to investigate the role of FM in the control of HAI. The focus of the study is on domestic services. The research methodology of the study employed both qualitative and quantitative approaches. Altogether, 81 interviews were carried out involving experts in the areas of FM and HAI in the National Health Service (NHS). The qualitative data collected was analysed using content analysis. The qualitative data sets were then augmented by 412 completed questionnaires. The quantitative data sets obtained were subjected to rigorous statistical analyses.

The study concluded that FM has a major role to play in the control of HAI, mainly in terms of cleaning, catering, waste management and laundry and linen services. However, FM is yet to feature prominently in the 'control of HAI agenda' in the NHS. There is evidence and lack of clarity on the roles and clear lines of communication between the major players in the control of HAI in FM services. There is a relatively low level of integration between the clinical teams and FM teams in the control of HAI. The roles and benefits of knowledge management and performance management are yet to be fully exploited in FM services in the control of HAI. A Performance Management Framework (PMF) for the control of HAI in FM services (particularly in domestic services) have been developed, tested and validated. The study recommends, inter alia, that FM should be made integral to the core services in hospitals for effective control of HAI. A national training and education framework for FM teams should be developed in order to enable them to carry out their work to the highest standards. There is also a need to adhere to a Performance Management Framework (PMF), which allows FM services to monitor and measure the performances in the control of HAI. The research methodology employed in this study could be replicated in different countries, including developing countries. There is also scope to research the key motivational constructs associated with effective knowledge sharing between the domestics and ICT teams in the control of HAI.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

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Finally, I am so grateful to my dear husband, Mishantha, for encouraging me to start this PhD and for helping me to finish it. Your patience and support was immense throughout these years. I am so grateful that I have you as my husband.

DEDICATION

I dedicate this thesis to my little baby, Chanul

You brought immense joy and real happiness to my life. I am so sorry for not being there for you as much as I should. I trust you will understand.

DECLARATION

This thesis is submitted to Glasgow Caledonian University for the Degree of Doctor of Philosophy. The work presented was carried out under the supervision of Prof. Charles Egbu and Dr. John Tookey, within the School of the Built and Natural Environment at Glasgow Caledonian University. Unless otherwise stated in the text, the work presented in this thesis is my own.

ABBREVIATIONS

BIFM	British Institute of Facilities Management
BSC	Balanced Scorecard
CFM	Centre of Facilities Management
CHAIN	Contact, Help, Advice and Information Networks
CMO	Chief Medical Officer
CSBS	Clinical Standards Board for Scotland
DoH	Department of Health
E-coli	Escherichia Coli
EFQM	European Foundation Quality Model
FM	Facilities Management
HAI	Healthcare Associated Infection
HBN	Health Building Notes
HDL	Health Department Letters
HEFMA	Health Facilities Management Association
HR	Human Resource
HRM	Human Resource Management
HSE	Health and Safety Executive
ICC	Infection Control Committee
ICD	Infection Control Doctor
ICN	Infection Control Nurse
ICNA	Infection Control Nurses' Association
ICT	Infection Control Team
IT	Information Technology
KM	Knowledge Management
KPI	Key Performance Indicator
MRSA	Methicillin Resistant Staphylococcus Aureus
NES	NHS Education Scotland
NHS	National Health Service in the United Kingdom
NHSS	National Health Service in Scotland
NIMHE	National Institute for Mental Health in England
NLH	National Library for Health
PA	Performance Appraisals
PAF	Performance Assessment Framework
PEFEx	Property and Environment Forum Executive
PFP	Performance Failure Point
PHLS	Public Health Laboratory Service
PM	Performance Management

PMF	Performance Management Framework
QIS	Quality Improvement Scotland
SCIEH	Scottish Centre for Infection and Environmental Health
SCOTMEG	Scottish Health Management Efficiency Group
SHFN	Scottish Health Facilities Notes
SHPN	Scottish Health Planning Notes
VRE	Vancomycin-Resistant Enterococci
WHO	World Health Organisation

IMPORTANT DEFINITIONS

- **Domestic Services:** For this study, domestic services relate **only** to cleaning and housekeeping services.

- **Domestics:** Non-clinical staff who carry out domestic duties in wards.

- **Facilities Management (FM):** The management of facility resources and services in support of the operations of an organisation (i.e. hospitals). The facilities managers in this study include General Managers (facilities), Hotel/Domestic Managers and Assistant Domestic/Hotel Services Managers.

- **Healthcare Associated Infection (HAI):** HAI by definition means 'infection which was neither present nor incubating at the time of admission, but has developed during the course of a stay in hospital or other facility'.

- **The control of HAI:** The control of HAI refers to policies and procedures used to minimise the risk of spreading infections, especially in hospitals and healthcare facilities. The specialised teams involved in the control of HAI are known as Infection Control Teams (ICT).

- **Staff:** Clinical staff (nurses) and non-clinical staff (domestics) who perform cleaning related tasks in wards.

- **Strategy:** For the purpose of this study, a strategy is considered as a 'framework within which to plan/work in order to achieve the goals of an organisation'.

- **Involvement and Integration:** Even though the words 'involvement' and 'integration' go hand-in-hand; for the purpose of this study; the two are discussed as separate issues. Involvement is considered as 'engaging as a participant' while integration is considered as 'their communication and coordination'.

- **Knowledge Management (KM):** KM is a systematic process for acquiring, creating, integrating, sharing and using knowledge to make the right business/organisational decisions and achieve organisational goals.

- **Performance goal:** A target level of an activity expressed as a tangible measurable objective, against which actual achievement can be compared.

- **Performance Management (PM):** PM is a systematic process of planning, monitoring and measuring inputs, activities and outputs of an organisation, which will eventually help to assess whether the organisation has met its goals. Different techniques can be used to measure and manage performance.

- **Performance measurement:** A process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into outputs, the quality of those outputs and outcomes (the results).

CHAPTER 1 : INTRODUCTION

1.1   BACKGROUND TO THE RESEARCH STUDY

Studies throughout the world document that Healthcare Associated Infections (HAI) are major causes of morbidity and mortality (Ayliffe et al, 1992; Bennet and Brachman, 1998; Scottish Executive Health Department, 1998; Damani, 2003). HAI have also been recognised as presenting a significant problem in terms of quality of care and cost for hospitals, governments and consumers in most countries (Department of Human Services – Australia, 1998a). HAI by definition means "*infections which were neither present nor incubating at the time of admission but have developed during the course of a stay in hospital or other facility*" (Comptroller and Auditor General - England, 2000; Scottish Executive Health Department, 2002a; World Health Organisation, 2002; Amberg, 2003).

According to Ayliffe et al (1999) the acquired infection rate is approximately 5-10% in the UK and other developed countries. This means that about 5-10% of patients in hospitals at any one time have acquired an infection from hospitals (see Table 1.1). MacDonald (2002) suggests that, in the UK, twice as many beds are blocked by patients with HAI as those blocked for social reasons. A recently published report on rates of infection by the Health Protection Agency Communicable Disease Surveillance Centre for the Department of Health (2005) suggests that the total number of MRSA (Methicillin Resistant Staphylococcus Aureus – a common type of HAI) bacteraemias across the UK from October 2004 to March 2005 was 4012. The corresponding figure for the same time period in the previous three years was 3651 (2001), 3799 (2002) and 3940 (2003). Rough data also suggests that the number of other infections have risen from 7247 (2001/2002), 7372 (2002/2003), 7684 (2003/2004) to 7912 (2004/2005).

Table 1.1: **Estimated prevalence of healthcare associated infection (Source: Department of Health, 2003)**

Country	Infection rate
USA	5 – 10 %
Australia	6 %
Norway	7%
England	9%
Denmark	8%
France	6 – 10 %
Netherlands	7 %
Spain	8 %

As the Scottish Executive Health Department (2002a) notes, HAI directly affect the patients, their carers and employees due to the resultant severe or chronic illnesses, pain, anxiety, depression and longer stay in hospital. It also reduces productivity, earnings and sometimes causes death. In addition, it is a major burden on hospitals. Treating HAI imposes a burden on hospitals and results in additional costs to healthcare and community services. Plowman et al (1999) state that ineffective control of HAI has direct cost implications from increased bed occupancy, increased nursing and medical time and the extra use of pharmaceuticals and medical equipment. Ayliffe et al (1999) describe the main costs of HAI as the increase in length of stay and additional specific treatment, service or materials, e.g. antibiotics, disinfectants, protective clothing, and dressings. However, the indirect costs of HAI are more difficult to quantify (Damani, 2003) and include costs for cleaning, additional clinical waste, microbiology and surveillance. Patients' and carers' pain and productivity losses due to the illness are also potential costs which are difficult to quantify (Department of Health, 2002 – Getting Ahead of the Curve).

The National Audit Office estimated the cost of HAI at £1 billion per year (Department of Health, 2003) and in 2005 the annual cost of HAI to the NHS in Scotland was estimated to be about £100M; which corresponds to a 1000-bed hospital running continuously throughout the year, just to handle HAI (Hinks et al, 2003). Data available from the United States shows that the costs of maintaining one hospital bed for a year would support full hospital control of an HAI programme in a 250-bed hospital (see Figure 1.1).
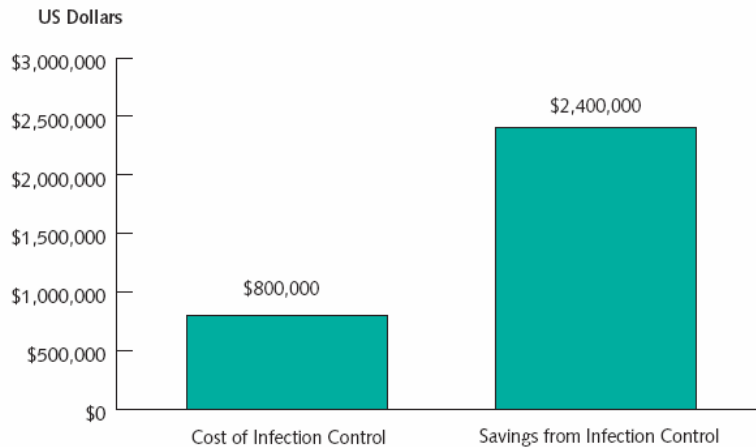
Figure 1.1: **Estimated annual cost of the control of HAI compared with a 32% reduction in baseline rates of HAI (Source: Department of Health, 2003)**

One of the control of HAI related projects, carried out in the United States from 1975 to 1985, showed that up to a third of HAI are preventable (Haley, 1985 as cited in Department of Health, 2003). Similarly, another survey carried out by the Hospital Infection Working Group of the Department of Health UK (Department of Health, 1993), asserts that about 30 percent of hospital acquired infection could be prevented by better application of existing knowledge and implementation of realistic control of HAI policies. Unfortunately, many HAI are difficult to eradicate, and are often drug resistant (Beggs, 2003) so, despite advanced technology, rigorous cleanliness standards, and professional staff, HAI continues to puzzle many healthcare professionals (Plowman et al, 1999).

Given all the statistics of HAI rates and cost implications, it is not surprising that healthcare authorities around the world are concerned about HAI, and are continuously seeking new ways to control it. Although patients are especially vulnerable because of their existing conditions, they are not the only ones at risk of contracting infection in a healthcare facility (Gundlapalli and Eutropius, 2004). Healthcare workers are often exposed to infectious agents via airborne, droplet, and person-to-person transmission (Joint Commission, 2005). Therefore, the National Health Service in any country has to adopt appropriate and effective control of HAI strategies in order to protect patients, healthcare workers and other stakeholders from HAI.

1.2   OUTLINE OF THE RESEARCH STUDY

1.2.1   Statement of the research problem

Healthcare organisations are searching for new and effective strategies to tackle the issue of HAI. There are many reasons why patients develop HAI, some related to the immunocompetence of the patient, while others reflect the environment in which the patient is nursed, or the skills of the surgeon and the team conducting patient care (Ayliffe et al, 1992). HAI is predominantly considered as a clinical issue by many researchers (Mehtar, 1992; Horton and Parker, 2002) and healthcare managers. However, careful consideration would suggest that Facilities Management (FM) has a vital role to play in this regard (Joint Commission, 2005). In this study, FM is defined as a support service in healthcare organisations. It entails <u>design, construction, management and maintenance of the healthcare facilities</u>. These are vital to maintain a 'risk-free' healthcare environment for the users (refer to section 2.9).

According to Comptroller and Auditor General (2004), a significant problem with HAI is that robust comparable data on rates of HAI, other than on hospital wide MRSA bacteraemia, is not currently available in the NHS, UK. Therefore, it is impossible to quantify with certainty if there have been any changes in the rates of HAI throughout the years, and also difficult to recognise the critical areas which have an impact on HAI rates (National Audit Office, 2004). A review of literature suggests that errors in clinical practices dramatically contribute to the emergence of HAI (Maki, 1989; Bennet and Brachman, 1998), therefore, attention has been paid to clinical practice over FM issues. However, Ayliffe et al (1992), Meers et al (1997), Horton and Parker (2002), Queensland Health (2002) and Damani (2003) highlight that, if HAI is to be controlled effectively, it is essential to focus on FM issues as well (Chapter 2).

The main idea of this research study, therefore, was to identify, *inter alia*, the role of FM in the control of HAI with a view to providing plausible solutions for the control of HAI from an FM perspective.

The domestic service is considered as one of the main areas of FM in hospitals (NHS Estates, 2003a). According to a systematic literature review carried out by

Dettenkofer et al (2004), about 236 articles have highlighted the importance of domestic services on the successful control of HAI. As Florence Nightingale perceived, during her time, domestic service was the 'Cinderella' of control of HAI (Dancer, 1999), and surprisingly, continues to be so, even today. Therefore specific attention was drawn, in this research, to the issue of raising the standards of domestic services in the control of HAI (refer to section 4.7).

A workshop for the NHS in Scotland Estates Directors in the year 2002 concluded that all the key components of the solution to the control of HAI are already known, but the issue lies in better communication and implementation among the stakeholders in the NHS (Hinks et al, 2003). According to one of the workshop recommendations, the priority should be on coordinating and disseminating the knowledge amongst the stakeholders involved in the control of HAI. This issue has also been taken into consideration during the research study, i.e. managing knowledge in the control of HAI (Chapter 7).

According to the Comptroller and Auditor General (2000), Performance Management (PM) has seldom been recognised as the main component in the control of HAI. As some of the literature suggests (Auditor General for Scotland, 2000 and 2003; Department of Health, 2004a and 2004c) PM can be used as an effective tool to detect pros and cons of practices of control of HAI in-use, and can then support strategic decisions in taking the issues the next step forward. It identifies mistakes and can assist in deciding remedies to be taken. Put differently, it enables the organisation to manage performance by measuring performance. However, this requires the identification of performance indicators, which reflect the exact performance levels of the system (Donabedian, 1980). One of the major weaknesses in the control of HAI is the absence of proper performance indicators (NHS Estates, 2004a). The present study, therefore, extended its focus to performance management in the control of HAI as well (Chapters 8 and 9).

1.2.2   Research aim, objectives, research questions and research hypotheses

From the rationale for the research, the research aim and objectives; a set of research questions and hypotheses were formulated to guide the research. The

main aim of this research study is to identify the role of FM in the control of HAI and then to provide possible solutions in the control of HAI from an FM perspective. In particular, specific consideration was given to domestic services out of all FM services. Fulfilling this research aim was done by achieving six research objectives. These objectives are:

1. To explore and document the main causes of HAI and areas associated with the control of HAI

2. To ascertain and investigate the role of Facilities Management (FM) services in the control of HAI in hospital wards

3. To develop a conceptual framework for the control of HAI in FM services

4. To examine the current situation with regard to the control of HAI in domestic services

5. To investigate, assess and document the Performance Management (PM) approaches in-use

6. Develop, refine and validate a Performance Management Framework (PMF) for the control of HAI in domestic services

The related research questions and research hypotheses examined in the study are given in Table 1.2 (also see Figure 1.2).

Table 1.2:   Research objectives, research questions and research hypotheses

Research objectives	Research questions	Research hypothesis
1. To explore and document the main causes of HAI and areas associated with the control of HAI.		
2. To ascertain and investigate the role of FM services, in the control of HAI in hospital wards.		
3. To develop a conceptual framework for the control of HAI in FM services	I. What are the critical issues associated with the effective control of HAI in FM services?	
4. To examine the current situation of control of HAI in domestic services	II. Do domestic services in hospitals have any strategies to address critical issues relating to the control of HAI in their services? III. How do the domestic services ensure successful implementation of strategies?	
	IV. What is the level of involvement and integration of key players in the control of HAI in the successful implementation of strategies adopted for the control of HAI in domestic services?	A. The level of involvement of key players varies according to their job role in the control of HAI B. The level of involvement of key players varies according to the type of domestic service provision C. The level of integration between the domestic managers and ICT members in the control of HAI in domestic services is low when the level of 'outside control' of the domestic service is high
	V. To what extent do domestic services effectively manage knowledge in the control of HAI? VI. What are the key factors that promote/inhibit effective knowledge management in the control of HAI in domestic services?	D. The key factors that promote effective Knowledge Management differ according to the type of domestic service provision E. The key factors that inhibit effective Knowledge Management differ according to the type of domestic service provision

Research objectives	Research questions	Research hypothesis
5. To investigate, assess and document the Performance Management (PM) approaches in-use	VII. What are the common performance management approaches in-use in the control of HAI in domestic services? VIII. What are the critical issues that affect the level of performance in the control of HAI in domestic services?	F. The types of performance management approaches used differ according to the type of domestic service provision G. There is a positive correlation between the effectiveness and frequency of use of performance management approaches in the control of HAI
6. Develop, refine and validate a Performance Management Framework (PMF) for the control of HAI in domestic services.	IX. Is there a need for developing a framework for performance management in the control of HAI in domestic services?	

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┌────────────────────────────────────────────┐
│      The problem – Increasing rates of HAI   │
└────────────────────────────────────────────┘

┌────────────────────────────────────────────┐
│          Solution – Control of HAI           │
└────────────────────────────────────────────┘
                    How

┌────────────────────────────────────────────┐        ╭─────────────╮
│      1ˢᵗ step – identify causes of HAI       │········│ Objective 1 │
└────────────────────────────────────────────┘        ╰─────────────╯

┌──────────────────────┐    ┌──────────────────────┐
│ External causes -    │    │ Internal causes –     │
│ cannot be controlled │    │ some can be controlled│
└──────────────────────┘    └──────────────────────┘

      ┌────────────┐    ╭─────────────────────╮
      │  Clinical  │    │ Non-clinical         │→  Main area of the
      └────────────┘    │ (identified as FM)   │        study
                         ╰─────────────────────╯

┌────────────────────────────────────────────┐        ╭─────────────╮
│  Identify the role of FM in the control of   │········│ Objective 2 │
│                  HAI                         │        ╰─────────────╯
└────────────────────────────────────────────┘

┌─────────────────────┐  ┌────────────────────────────────────────────┐
│ Attempt to reduce   │  │  Control of HAI through effective            │
│ incidences of HAI   │  │  management of performance of FM             │
│ through managing    │  └────────────────────────────────────────────┘
│ performance of      │
│ domestic services   │  ┌────────────────────────────────────────────┐        ╭─────────────╮
└─────────────────────┘  │  Develop a conceptual framework to           │········│ Objective 3 │
                          │  understand the main issues to be            │        ╰─────────────╯
                          │  considered in the control of HAI from an    │
                          │  FM perspective                              │
                          └────────────────────────────────────────────┘
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Limiting the scope to only domestic services

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┌────────────────────────────────────────────┐
│  Identify the current situation in domestic  │
│  services with regard to the issues          │
│  highlighted in the conceptual framework     │        ╭─────────────╮
└────────────────────────────────────────────┘········│ Objective 4 │
                                                        ╰─────────────╯
┌────────────────────────────────────────────┐
│ What is happening? What has gone wrong?      │········
└────────────────────────────────────────────┘

┌────────────────────────────────────────────┐        ╭─────────────╮
│  Identify the current PM approaches in-use   │········│ Objective 5 │
│  in the control of HAI in domestic services  │        ╰─────────────╯
└────────────────────────────────────────────┘

┌────────────────────────────────────────────┐        ╭─────────────╮
│  Develop a Performance Management            │········│ Objective 6 │
│  Framework (PMF)                             │        ╰─────────────╯
└────────────────────────────────────────────┘
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Figure 1.2:   The study flow process, research objectives, key study focus and deliverables

1.2.3 Scope and limitations of the research study

There was only a handful of literature (i.e. books and journal papers) on the subject of control of HAI and FM services. In addition, very little empirical evidence was available to identify the association between HAI and FM. As a result, it was initially difficult to develop research questions and objectives. Efforts were taken to overcome this limitation to some extent, by conducting informal interviews with some experts in the NHS in Scotland.

The environment of a ward is completely different as opposed to an isolation room/single room. There can be different types of patients with different types of susceptibility in the same ward. In addition, there can be several tasks functioning simultaneously in a ward. In such a surrounding, there is a high possibility for HAI to occur rapidly. Therefore, the study was limited to FM services in wards as opposed to isolation rooms in hospitals (refer to section 2.9).

Due to time constraints, the focus of the research was limited to domestic services, within the context of FM services. The rationale for choosing domestic services is given in section 4.7.

During the case study approach carried out as part of the study (refer to section 3.7), the two case studies were chosen from two hospitals in the NHS in Scotland. This was mainly because of the researcher's personal contacts. The two hospitals were taken from only two types of domestic service provisions, i.e. an In-house service and a PFI service. This was mainly due to the increased concern and adoption of these type of contracts by the NHS. These limitations were reduced to a considerable extent by choosing the NHS (England and Scotland) scenario and choosing all types of domestic service provisions for the questionnaire survey.

Even though there are an array of parties involved in the control of HAI in domestic services, only the key players were chosen (especially the domestic managers and ICT members) for the research study. Choosing all the parties could overshadow the real issues and could made the research more complex. During the case studies, however, an effort was also made to collect data from domestic supervisors, ward nurses/matrons and domestics.

1.2.4　The research programme

The programme for this PhD research consisted of four stages as shown in Figure 1.3. Details of these stages are elaborated further in Chapter 3 and the findings of the stages are given in subsequent chapters (Chapters 4, 5, 6, 7, 8 and 9).

OBJECTIVES	METHOD	DESCRIPTION	STAGE

Objective 1:
To explore and document the main causes of HAI and areas associated with the control of HAI

Objective 2:
To ascertain and investigate the role of FM services in the control of HAI in hospital wards

Literature Review

- A detailed literature review to address the first 3 objectives.
- The literature is in the areas of control of HAI, and in FM

Objective 3:
To develop a conceptual framework which allows for a better understanding of the key issues associated with the control of HAI from an FM perspective

Informal Interviews

- Informal interviews with the experts in the control of HAI and in FM from the NHS (in Scotland).

Stage 1

Objective 4:
To examine the current situation of FM practices with regard to the control of HAI

Case Study Approach

- Semi-structured interviews across two cases.
- The two cases are; an in-house domestic service and a PFI domestic service.
- A content analysis approach employed to analyse the data

Stage 2

Objective 5:
To investigate, assess and document the Performance Management (PM) approaches in-use in the control of HAI in domestic services.

Questionnaire Survey

- A questionnaire survey across the NHS England and Scotland.
- Target groups – NHS experts in the control of HAI and FM
- Statistical analysis using SPSS to analyse the data

Stage 3

Objective 6:
Develop and refine a Performance Management Framework (PMF) for the control of HAI in domestic services.

Structured Interviews

- Development of the PMF using the findings of the previous 3 stages
- Structured interviews used to elicit information to refine and validate data
- Target groups – academic experts; and experts from the NHS (UK) in the control of HAI and FM
- Statistical analysis

Stage 4

Figure 1.3: The research programme

1.3 CONTRIBUTION TO KNOWLEDGE

The study of the control of HAI is widely recognised in healthcare literature, predominantly through clinical services. However, the understanding of the control of HAI from an FM perspective has received relatively little attention, along with a lack of research conducted in the management of facilities services in the control of HAI. Simultaneously, the research intended to provide the following outputs:

- Development of a Performance Management Framework (PMF) together with performance goals, Key Performance Indicators (KPIs) and performance measures for control of HAI in FM services (domestic services in particular)
- Improvement, awareness and understanding of the role of Knowledge Management practices (KM) in the control of HAI
- Improved knowledge and understanding of the varied roles and contributions of FM in the control of HAI
- The successful employment of an appropriate methodology to investigate the various issues associated with FM and HAI, and the development of a framework for better understanding of these complex and inter-related issues.

The intended outcome is to allow infection control experts and facilities managers to adopt a pro-active approach in the control of HAI in FM services (domestic services in particular). The expected outcome from the research will add to the body of knowledge in Facilities Management, Knowledge Management and Performance Management as well as in the control of HAI. Up and coming researchers would benefit from the research methodology used in the study.

1.4 STRUCTURE OF THE THESIS

The thesis consists of 10 chapters.

The main purpose of Chapter 1 is to outline the background for the research study. Chapter 1 discusses the aim, objectives and research questions for the

research. The scope of the research, its limitations and the contribution to knowledge are also highlighted.

Chapter 2 identifies the importance of control of Healthcare Associated Infections (HAI) for both community and healthcare. It mainly describes the key issues associated with the control of HAI. This provides the base to recognise and discuss the role of FM in the control of HAI. Chapter 2, overall, endeavours to address first and second objectives of the research study (see Table 1.2).

Chapter 3 outlines the research methodology and research methods adopted in the study. Firstly, epistemological and methodological characteristics of the research area are outlined, which have an impact on the research design. Chapter 3 then describes the methods used throughout the course of the research project. Modes of data analysis used for the study are also discussed in detail in this chapter.

Chapter 4 presents the conceptual framework developed for the control of HAI. This takes an FM perspective. The main purpose of developing the framework was to highlight the issues to be investigated during the next stages of the research study. The study has given particular attention to domestic services in the control of HAI. Therefore, the rationale for selecting domestic services as the focus of the study is also presented at the end of Chapter 4.

Chapter 5 presents some of the findings of the case study approach. The findings are related to the type of strategies adopted in the two case studies selected, in the control of HAI. Chapter 5 elaborates implications of, and inferences drawn from, the findings. Overall, Chapter 5 addresses part of the fourth objective of the research study (see Table 1.2).

Chapter 6 presents some of the findings of the case study approach relating to level of involvement and integration of key players in the control of HAI. The findings are further elaborated using some of the results gleaned from the questionnaire survey, carried out as part of the research. Chapter 6 elaborates implications of, and inferences drawn from, the findings. Overall, Chapter 6 addresses part of the fourth objective of the research study (see Table 1.2).

Chapter 7 presents some of the findings of the case study approach relating to Knowledge Management in the control of HAI. The findings are further elaborated using some of the results of the questionnaire survey. Chapter 7 elaborates implications of, and inferences drawn from, the findings. Overall, Chapter 7 addresses part of the fourth objective of the research study (see Table 1.2).

Chapter 8 initially identifies definitions of Performance Management (PM) and different concepts of PM. It then details some of the common performance management approaches in-use in organisations in general. Some of the findings of the case studies have also been used to identify the above, in particular to the control of HAI. The findings are then generalised using the questionnaire survey findings. Chapter 8 also presents key issues relating to PM in the control of HAI. Overall, Chapter 8 addresses objective 5 of the research study (see Table 1.2).

Chapter 9 presents the Performance Management Framework (PMF) developed for the control of HAI in domestic services. It is the final output of this research study. The chapter also discusses the results of the structured interviews carried out to refine and validate the PMF. Overall, Chapter 9 addresses the sixth and final objective of the research study (see Table 1.2).

Chapter 10, finally, summarises the research process and presents the key research findings. It presents the conclusions derived from the overall research findings. It also provides recommendations to improve practices of control of HAI in FM services (domestic services in particular). Areas for further research are also given at the end of this chapter.

CHAPTER 2 : THE AREAS ASSOCIATED WITH THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

2.1 INTRODUCTION

Healthcare Associated Infections (HAI) cause severe problems to the community and healthcare. One of the main priorities in the control of HAI is to understand its components. The 'chain of infection' has evolved as a popular way of describing this. It describes different types of chains of infection presented in different sources of literature. Chapter 2 describes the areas associated with the control of HAI using the chains of infection. The areas of FM, which are associated with the control of HAI, are also discussed through the importance of design and maintenance of the built environment (hard FM) together with areas such as cleaning, catering, laundry and waste disposal (soft FM). Overall, Chapter 2 addresses objective 1 and 2 of the research study (see Table 1.2).

2.2 WHAT IS HEALTHCARE ASSOCIATED INFECTIONS (HAI)?

HAI by definition means "*infections which were neither present nor incubating at the time of admission but have developed during the course of a stay in hospital or other facility*" (Comptroller and Auditor General - England, 2000; Scottish Executive Health Department, 2002a; World Health Organisation, 2002; Amberg, 2003). HAI stand particularly for Healthcare Associated Infections, although they can be described as Hospital Acquired Infections or Healthcare Acquired Infections. HAI could occur in any healthcare setting such as general practice, day surgery centres, residential care for the elderly, long-term care facilities, child care centres, nursing homes, and community services other than hospitals. Besides, *infections can manifest themselves during the stay in hospital or in the period following the hospital stay* (Horton and Parker 2002). Therefore the term 'Healthcare Associated Infections' is more pertinent for the term 'HAI'.

'Nosocomial Infections' is also a synonym for HAI. The Department of Human Services – Australia (1998b) define nosocomial infection as a localised or systemic condition that results from adverse reaction to the presence of an infectious agent or toxin, and that was not present or incubating at the time of

admission to the hospital. The definition includes infection acquired in hospital that becomes evident after hospital discharge and newborn infection that is the result of passage through the birth canal. Dornald (1998; as cited in Filetoth, 2003) gives a cut-off period for HAI. According to his research, HAI are so called if developed after admission to hospital, and the patient was not in the incubation period on admission, or if they develop 48 hours or more after admission. But this two-day period cannot be taken as an exact cut-off point, since the time for growth of infections can vary from one infection to another.

The most common types of infections are those affecting the urinary tract, lower respiratory tract, surgical sites and skin (Emmerson and Ayliffe, 1996; World Health Organisation, 2002). The predominant organisms causing infections are Escherichia coli (E-coli), Pseudomonas Aeruginosa, coagulase-negative staphylococci, Vancomycin-Resistant Enterococci (VRE) and Methicillin-Resistant Staphylococcus Aureus (MRSA) (Ayliffe et al , 1999; Gundlapalli and Eutropius, 2004).

2.2.1 The importance of control of HAI

The Scottish Executive Health Department (2002a) indicates HAI as particularly important and adverse events in healthcare due to following reasons:

- Its frequency and scale: infection in hospital not only affects an individual but it can, and too frequently does, transmit to others.
- Its impact on delivering service: HAI have impeded good outcomes from treatments (e.g. infection following surgery), increased length of stay and often, e.g. when outbreak occurred, lead to more resources being required to maintain levels of service and/or temporary closure of services.
- Its bearing on public expectations: many understand that historically, health has been improved by measures to prevent infections and they count on the same level of protection in healthcare, as is the case for food, water and air quality control.
- Its negative image: HAI are partly a reflection of poor hygiene standards and unsuitable environments for healthcare. These two factors have a negative influence on the overall quality of NHS.

2.2.2   The control of HAI – a brief history

The control of HAI can be traced back many decades and even centuries ago. Evidence shows that there was a major necessity for the control of HAI during war periods (Medical Research Council - UK, 1944, 1945 and 1951; Ministry of Health - UK, 1959; Department of Health and Social Security – DHSS, 1979). According to Medical Research Council – UK (1944), during wars from as far back as the eighteenth century, large numbers of soldiers who survived death on the battlefield, lost their lives to wound infections later with very serious military consequences. Due to the high mortality associated with military hospitals, a number of significant advances in the control of HAI strategy were instigated.

HAI is becoming harder to control (Mercier, 1997), and so the modes of control have increased dramatically, worldwide, over the years. Control of HAI is becoming more difficult, mainly because of the changing nature of healthcare, the advancement of technologies and sciences, and because of the development of new antibiotics. *'The prevalence of staphylococcal infections in hospitals is giving rise to growing concern. The fact that such infections continue to occur, in spite of increased understanding of the measures necessary for their control, may be attributed to various causes. ……'.* (Central Health Services, Council, 1959. Three Scottish NHS Boards/Trusts have launched investigations into the high numbers of patients contracting MRSA, also known as the superbug, in their hospitals. The Scottish Centre for Infection and Environmental Health (SCIEH), a key organisation in the NHS Scotland, which does surveillance on HAI, has started to investigate why hospitals are struggling so hard to control its spread (SCIEH, 2002a and 2002b). As the Joint Commission (2005) reveals health services in many countries are suffering from MRSA and other types of HAI. Despite general improvements in healthcare arising from medical advances, it has been shown that the incidences of HAI have remained unchanged over the past 20 years (Mertens, 1996); with approximately 1 in 10 patients acquiring an infection during a hospital stay (refer to section 1.1 and Table 1.1). This shows that hospitals are still struggling to control the issue of HAI, and the need for this study.

2.2.3   The chain of infection

The use of a 'chain of infection' has evolved as a popular way of describing the sequence of events necessary for an HAI to occur (Beggs, 2003). Many researchers (Horton and Parker, 2002; Damani, 2003; May, 2000; College of Audiologists and Speech Language Pathologists of Ontario Edition, 2006) have presented the chain of infection in different ways. However, all present the same rationale. The chain of infection introduced by Bennet and Brachman (1998) is the simplest form of the various chains of infections (Figure 2.1). There are three requisites for an infection to occur. Transmission of micro-organisms with the potential to cause infection requires the presence of three elements; a susceptible host, a source (the root which releases the infectious agent) and an environment facilitating the interaction between host and agent (this interaction is known as transmission).
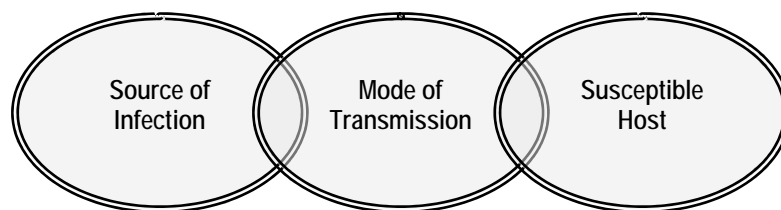
Figure 2.1:   Chain of infection – main links (Adapted from Bennet and Brachman, 1998)

The source of infection is the root that releases the infectious agent - the micro-organism capable of transferring to a colonising or susceptible host, with or without subsequent invasion and infection (Queensland Government, 2001a). Ayliffe et al (1992) identify persons, equipment, fluids and food as sources, or reservoirs of infection. Commonly the source of infection is categorised into three areas, i.e. endogenous, exogenous or environmental (Meers et al 1997; Scottish Executive Health Department, 1998; May, 2000; Queensland Health, 2001b; Horton and Parker, 2002; Filetoth, 2003). Endogenous infection can occur through patients own normal flora/micro-organisms and exogenous can occur through other people such as healthcare workers, patients or visitors. Environmental infection occurs when a patient is infected through contaminated equipment, surfaces, food or clothes.

Since only about 30% of the infections are preventable (refer to section 1.1) the health service has only a limited control over the chain of infection. Therefore, it is important to identify the mode of transmission aptly for effective control of HAI. As Beggs (2003) suggests, the mode of transmission is often the easiest 'link' to break in the chain of infection. According to Brachman (1998) transmission of HAI can occur by four common routes: contact, common-vehicle (e.g. food, water, etc.), airborne, and vector-borne (e.g. insects or vermin).

The infectious agent transmitted by any route identified above can enter to a susceptible host through broken skin, mucous membranes or respiratory/urinary tracts (Ayliffe et al, 1999). The susceptibility of the host varies due to various factors such as age, immune system, medical interventions or physical wellbeing. For an example an immuno-suppressed patient is far more susceptible to catch an infection than a person who has a good immune response (Damani, 2003).

These three interrelated factors, i.e. the source, transmission and the susceptible host, represent the chain of infection. As the Infection Prevention and Control Manual (2002) states, the control of HAI simply means breaking one of the links of the chain by actions appropriate to each link.

2.3   RISKS INVOLVED IN HAI

To instigate effective practices of control of HAI, it is essential to identify the risks involved. The Department of Human Services (1998), and Horton and Parker (2002) have divided risk factors involved in HAI into two groups; *intrinsic and extrinsic*. Some patients are at greater risk than others of acquiring an HAI, due to the presence of certain risk factors, which alter their susceptibility to infection. Intrinsic risk factors are the factors inherent to the patient and include the presence of acute medical/surgical disease, and severity of illness. Extrinsic, in contrast, relates to the types of medical practice performed at individual staff or hospital level and the mix of patients within hospitals. Filetoth (2003) has classified the risk factors related to HAI into four distinguishable groups, i.e. endogenous objective, endogenous subjective, exogenous objective and exogenous subjective. Herein, endogenous risk factors are those that originate in a patient in whom a disease develops, and such factors contribute to

an increased risk of development of the disease, whereas exogenous risk factors are those factors originating from a source external; such factors are often called 'environmental' factors. Both endogenous and exogenous risk factors can be either objective or subjective. Objective risk factors are mainly independent of humans, and are determined by nature while subjective risk factors are the factors dependent on human decisions and interventions based on human behaviour. A few examples of these risk factors are:

- Endogenous objective risk factors: age, severity of underlying disease; length of hospitalisation can contribute to an increased susceptibility to infections.

- Endogenous subjective risk factors: behaviour and cooperation of a patient (psychiatric cases, conscious negligence) also influence the occurrence of HAI at the individual level.

- Exogenous objective risk factors: the structure and technical capability of a healthcare system, and the development of medicine in general, to prevent and influence the occurrence of diseases, which also applies to HAI.

- Exogenous subjective risk factors: staff practices, attitudes and knowledge which influence the occurrence of HAI.

As mentioned throughout this chapter, the prevention of HAI is a difficult task. The difficulties are mainly due to all the risk factors stated above. Therefore, minimising these risks is 'key' in the effective control of HAI.

2.4 CONTROLLABLE AND UNCONTROLLABLE FACTORS

Control of HAI principles are derived from the epidemiology of infectious disease transmission, involving the interaction between host, agent and environment (the chain of infection – refer to section 2.2.3). The health service and the hospital management have only a limited control over the chain of infection.

The main purpose of the control of HAI is to reduce the risk for patients and healthcare workers (West, 1995). The risk factors presented by Filetoth (2003; refer to section 2.3) can be divided as shown in Figure 2.2, where the controllable factors are the structure and technical capability of a healthcare

system, the development of medicine in general, staff practices, attitudes and knowledge which influence the occurrence of HAI. However, this is not a good model because all endogenous factors are depicted as uncontrollable and all exogenous as controllable, but, some exogenous factors are uncontrollable because of antimicrobial resistance and the extent of medical interventions, etc. Therefore, the controllable and uncontrollable factors depicted in Table 2.1 (Department of Health, 2003) have been used.
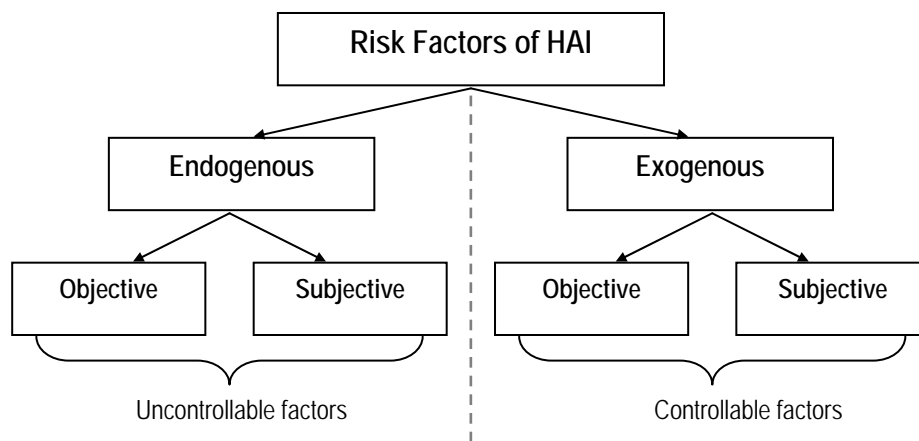
Figure 2.2: **Controllable and uncontrollable risk factors (Source: adapted from Filetoth, 2003)**

Table 2.1: **Controllable and uncontrollable risk factors – a healthcare point of view (Adapted from Department of Health, 2003)**

Controllable factors	Uncontrollable factors
▪ organisational	▪ patient related
▪ behavioural	▪ therapeutic
▪ structural	▪ other factors external to
▪ environmental	healthcare

Taking the above into consideration, the areas associated with the control of HAI can be regarded as healthcare structure, environment, staff practices and healthcare management. The uncontrollable factors are not considered because they are beyond the remit of health service or healthcare management. According to Mehtar (1992), the areas associated with control of HAI are as follows:

- ▪ sterile services (includes hand hygiene)
- ▪ disinfection
- ▪ antibiotics

- waste disposal and handling
- sharps disposal
- isolation facilities for patients
- kitchen and catering
- planning and development (includes management responsibilities)
- purchasing of new equipment
- decontamination of equipment servicing

Boyle (2001) also offers his view as to the area associated with the control of HAI and these are presented in Table 2.2.

Table 2.2:   Areas associated with control of HAI (Source: Boyle, 2001)

What to control	Areas associated with control of HAI
Staff contact	Handwashing, protective clothing and aseptic techniques
Air	Building Ventilation
Water	Design, Temperature, Hypochlorite
Infectious Patients	Isolation
Domestic Equipment	Cleaning
Staff Carriers	Screen tests
Food	Good hygiene and temperature control
Equipment	Sterilisation and disinfection

As Horton and Parker (2002) suggest, the control of HAI is all about leadership and management, which direct the workers to accomplish what is needed in the right way to create a 'safe environment'. 'Safe environment' is a broad term used frequently in healthcare settings to signify a secure surrounding within which people are not harmed (Horton and Parker, 2002). The components of a safe environment (in the control of HAI) are depicted in Figure 2.3.
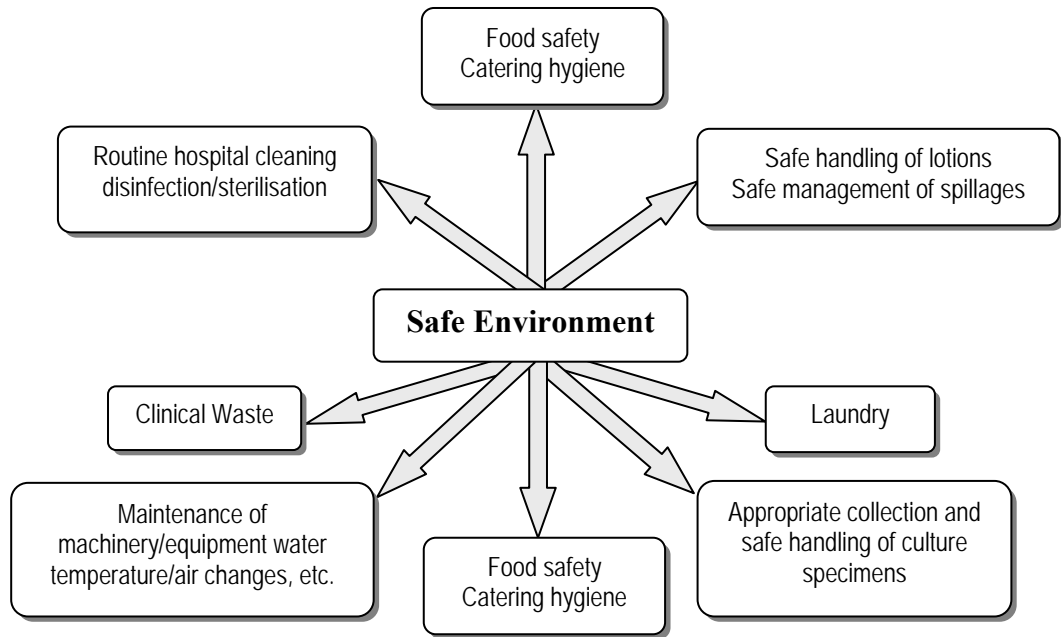
Figure 2.3:   The principles of a safe environment (Source: Horton and Parker, 2002)

From what Mehtar (1992), Boyle (2001) and Horton and Parker (2002) have presented above, it could be seen that many of the areas associated with the control of HAI come under the category of Facilities Management (FM).

2.5   PARTIES INVOLVED IN THE CONTROL OF HAI

To make control of HAI effective it should be embedded into the everyday practice of healthcare whilst being supportive at an organisational level (Tannahill, 2003). Leadership is essential to influence and persuade staff that the control of HAI has high priority. Practices must change (Phillips, 2001). The management should develop high quality surveillance systems, setting clear standards for the control of HAI, and making HAI a key feature of quality and patient safety programmes (Department of Health, 2003). There should be a system-in place to monitor the progress whilst taking corrective actions. Due to the need to address the impact of HAI in all countries, including the UK, there have been changes made to organisational structures in healthcare. The introduction of Infection Control Teams (ICT), Infection Control Committees (ICC) and infection control doctors/nurses has been a major step towards addressing management and the control of HAI (see Figure 2.4).
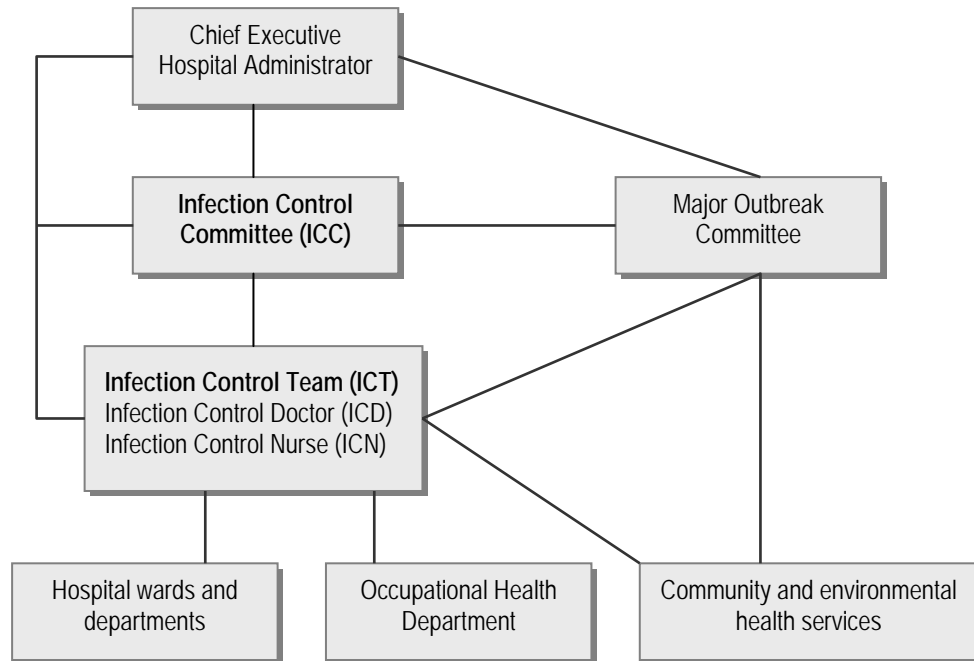
Figure 2.4:   The organisation of control of HAI (Source: Ayliffe et al, 1999)

It was identified that the healthcare environment is a secondary reservoir of organisms with the potential for infecting patients. The Property and Environment Forum Executive, Scotland (2002) has recognised that if HAI are to be reduced, it is imperative that the control of HAI is 'designed-in' at the planning and design stages of a healthcare facility (new build or renovation project). The 'designed-in' control of HAI means that designers, architects, engineers, facilities managers and planners work in collaborative partnership with ICT members to deliver facilities in which the necessary controls of HAI have been planned for, anticipated and met. It demands input from healthcare managers and clinical professionals to identify HAI related issues and standards of control of HAI. Their input is crucial for a design, which enhances staff practices such as hand hygiene and domestic cleaning.

It was put forward in a Scottish conference (by Property and Environment Forum Executive, Scotland) held in November 2003 (in Hilton Hydro, Dunblane) that control of HAI is everybody's business. 'Everybody' in this respect is the government/policy makers, healthcare management, clinical staff, non-clinical staff and the general public. As the conference highlighted, the control of HAI is a collective effort of everybody. Organisations such as surveillance organisations, professional bodies, suppliers and government bodies that are

associated with healthcare, also have a considerable role to play in the control of HAI.

2.6   THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS – A DIAGRAM

Considering what has been discussed in the above sections, A diagram for control of HAI can be drawn as shown is Figure 2.5. The uncontrollable factors (named as external) are the factors, which cannot be controlled by the health service. The factors, which can be controlled from a healthcare point of view, are named as 'internal' due to being related to healthcare. These internal factors are the areas associated with control of HAI (marked in grey colour – see Figure 2.5). Overall, the diagram shows there is a great need for FM issues to be integrated into a holistic approach for the control of HAI.
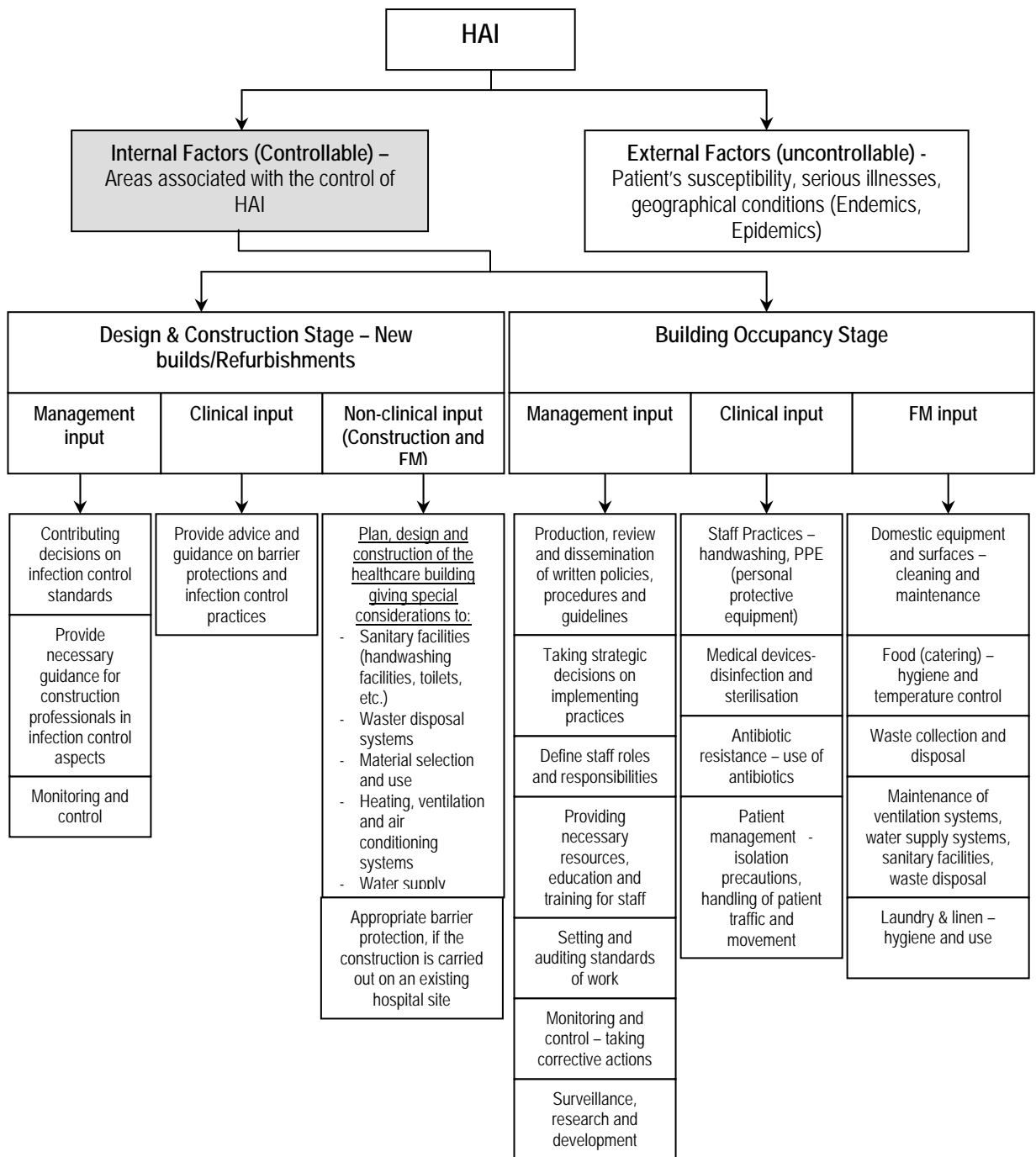
Figure 2.5: Control of HAI – a diagram (Source: Liyanage and Egbu, 2004)

2.7   WHAT IS FACILITIES MANAGEMENT (FM)?

The growth of FM practices has been accompanied by continuing uncertainty in the definition of FM (Bruijn et al, 2001). It is commonly accepted that FM has a strong tendency to be technically oriented and reactive (Barrett, 1995). This is in stark contrast to the proactive service orientation of a service that creates a conducive environment for the achievement of core business objectives.

The traditional view of FM is of a non-core or pure support function, which is often at an arm's length to the organisation. Now in the best operation mode, the facilities function could be described as the 'glue' that holds the organisation together and enables it to provide its output in a seamless manner (Payne, 2002). Atkin and Brooks (2000) state that, no matter how well focused an organisation might be on its core business, it cannot lose sight of the support services, i.e. non-core/FM services, and these are gaining greater recognition and acceptance as significant influences upon organisational success and goal achievement.

According to the Centre for Facilities Management (Alexander, 1994), FM is the process by which an organisation delivers and sustains a quality working environment and delivers quality support services to meet the organisational objectives at best cost. Similarly, Barrett and Baldry (2003) describe FM as 'an integrated approach to maintaining, improving and adapting the building of an organisation in order to create an environment that strongly supports the primary objectives of that organisation'. Therefore, the discipline of Facilities Management (FM) can greatly influence the physical environment in ways which can satisfy the organisational core objectives.

As Then (1999) describes, FM is a hybrid management discipline that combines people, property and process management expertise to provide vital services in support of the organisation. According to the British Institute of Facilities Management (BIFM, 2005), FM is the integration of multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace. Therefore, the role of FM is broader than the design of the product and production of the physical workplace. It entails the integration of people, technology and support services to achieve the organisation's mission. Therefore, FM can be defined as the process by which an organisation ensures that its building, systems and services support core operations and processes, as well as contribute to achieving its strategic objectives in changing conditions (Alexander, 1996). Here, the context of change is described as creating 'new organisations' or improving business processes.

2.7.1   What should facilities management entail?

As Fielder (2003) states, facilities managers have extensive responsibilities for providing, maintaining and developing a number of services, which range from property strategy, space management and communications infrastructure to building maintenance, administration and contract management, including catering, cleaning and security. FM at a corporate level contributes to the delivery of strategic and operational objectives, while providing a safe and efficient working environment, which is essential to the performance of the concerned business, on a day-to-day level. Robathan (1996) presents FM services in an organisation in three levels. First at the 'lowest' level – the day-to-day support of operations such as maintenance, security, photocopying services and telephone services. Next, it is the planning function. It includes space planning, building projects, building management systems, resource management, health and safety and continuity planning. At this level the facilities manager acts on strategic demands, and develops tactical plans in line with the strategy. The final level is at board level – the director of facilities – that the buildings, plant and services of a business need to be managed as assets that generate return on investment. According to the British Institute of Facilities Management (2005), effective facilities management, at a planning and management level, contributes to the delivery of strategic and operational objectives. On a day-to day level, effective facilities management provides a safe and efficient working environment, which is essential to the performance of any business; whatever its size and scope.

According to Williams (1994 and 2001) FM involves three facets (see Figure 2.6). As shown in Figure 2.6, facilities sponsorship implies the ownership of responsibility for the facilities provision, the stewardship of the organisation's policy for the provision, maintenance and allocation of resources for the accommodation, and services required to facilitate corporate objectives. The 'intelligence' facet denotes understanding and monitoring of the facilities management function with regard to core business requirements. Facilities service management is the overall direction and co-ordination of all the services such as cleaning, distribution, etc (Williams, 1994).
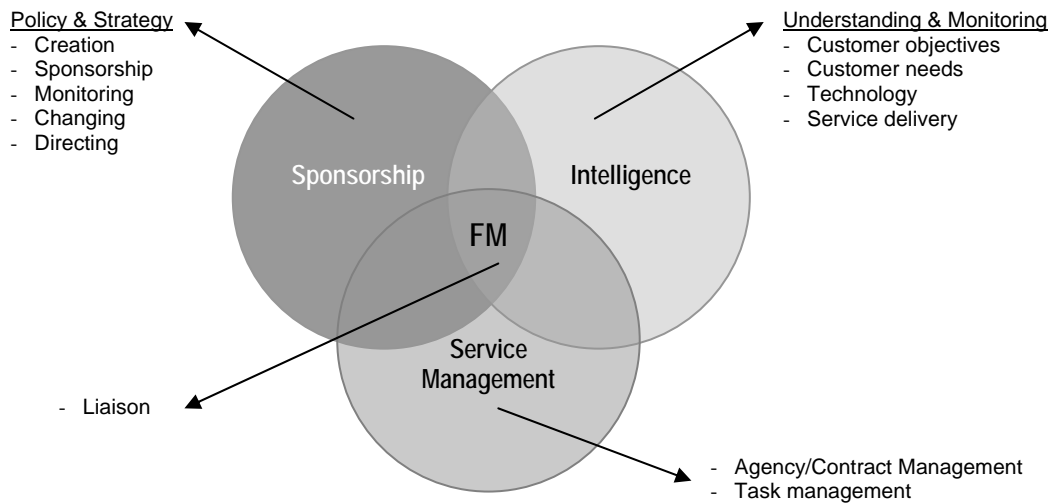
Figure 2.6:   Three facets of FM (Source: Williams, 1994)

Park (1998) defines FM as the structuring of building plant and contents to enhance the creation of the end product. Hence, FM mainly includes space planning and costing, maintenance, and operational services such as maintenance and cleaning. However, this is a narrow description of FM services. By definition, FM means the function, which supports the core operations of a business (Barrett, 1995; Payne, 2000; Reuvid and Hinks, 2002; Alexander, 2003; Barrett and Baldy, 2003). As suggested by Fielder (2003), FM includes property management, space management, communication infrastructure, building maintenance, administration, and contract management including catering, cleaning and security. William (1994) has presented FM services in three broad divisions, i.e. premises, support services and information technology (refer Figure 2.7). The Centre of Facilities Management (CFM) divides FM services into seven categories as depicted in Table 2.3. Overall, FM services include building operations and management, property management, infrastructure management, environmental management, management of support services (cleaning, catering, security, etc.), information technology, etc.
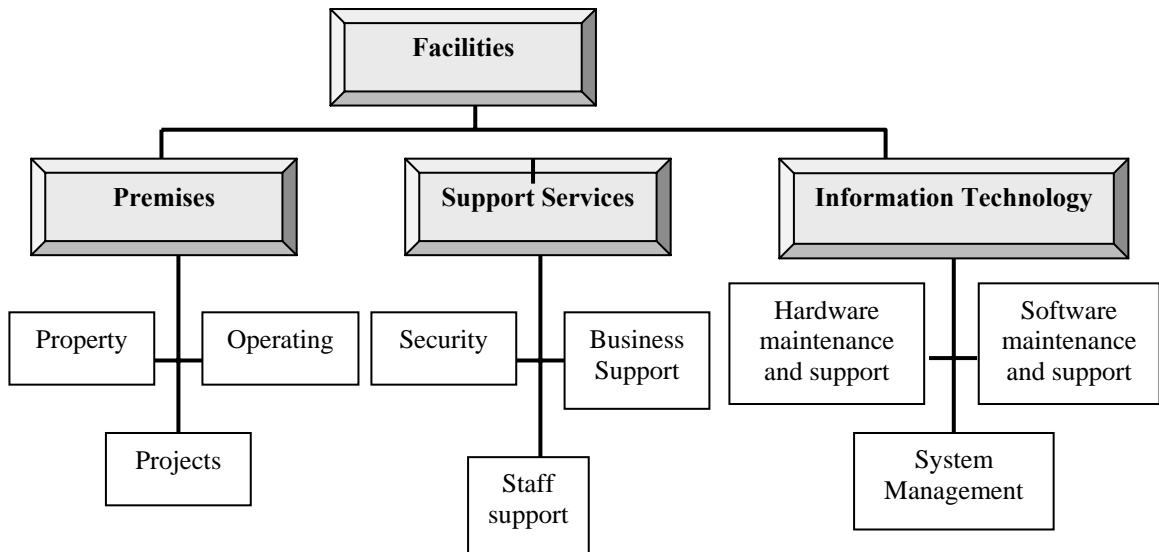
Figure 2.7:   Scope of FM services (Source: Williams, 1994)

Table 2.3:   FM Services (Source: CFM, 1994)

FM Service	Examples
Building Operations & Management	Electrical, Fabric, Grounds, Mechanical, Special Equipment
Support Services	Catering and vending services, cleaning, courier services, furniture management, internal landscaping, laundry, office support services (e.g. printing), reception, security, travel, library
Information Technology and Telecommunications	Information services, IT advisory services, IT research and development, management information systems, technical services, network services and management, cable management, telecommunication services
Transport	Fleet management, site transportation, vehicle renting and leasing
Property Management	Space planning, asset management, project management, design/construction, relocation management
Infrastructure	Utilities (gas, water, electricity), road
Environmental Management	Energy management, health and safety, hygiene services, waste management

Hinks et al (2003) and BIFM (2005) have divided the aforementioned explicit forms of FM services into two categories; hard FM and soft FM. Hard FM relates to management and maintenance of property, while soft FM includes the management of support services. The built environment, including infrastructure facilities such as estate and property, indoor air, structure and fabric, water supply, electricity and telecommunication systems come under the first category (hard FM); and catering, cleaning, waste management, security, and laundry

describes the latter (soft FM). However, these are not strict definitions, and there are some FM services that might be classified in either way.

Considering the context of the research an operational definition has been developed to describe Facilities Management in the control of HAI perspective:

"FM is a support service in healthcare organisations. It entails, <u>design and construction of healthcare facilities</u> and <u>management and maintenance of the said facilities</u>. In this context, firstly, design and construction of healthcare facilities is important to create a 'designed-in the control of HAI' healthcare environment. 'Designed-in the control of HAI' implies that the parties involved in design and construction (i.e. designers, architects, engineers, facilities managers and planners) work in collaborative partnership with the ICT members to deliver facilities in which the vagaries of issues associated with the control of HAI have been planned for, anticipated and met. Secondly, management and maintenance of healthcare facilities is vital to maintain a 'risk-free' healthcare environment for the users. At this point, 'risk-free' environment implies an environment, which does not hinder user's work from incidences of HAI. Herein, 'users' mainly include the healthcare management, staff, patients and visitors. Design, construction, management and maintenance of the healthcare facilities are also significant to enhance the core processes of healthcare, i.e. clinical care. Since facilities managers are the key personnel responsible for coordinating the built environment with the staff, they must ensure that they are not creating hazardous hospitals in the point of view of HAI."

Discussions related to the above are given in the following sections.

2.7.2   Healthcare facilities management

Facilities Management (FM) in healthcare is no different from FM in other organisations/or other sectors (NHS, 2003). According to Rees (1998) *"a safe environment (the estate), clean surroundings and an appropriate diet (hotel services) are integral parts in the diagnosis, treatment and recovery of those who are ill"*. Hence, while effective FM in other sectors helps to reach or maintain the competitive edge as a support function; effective FM in healthcare assists in the provision of a better environment for staff and patients.

Healthcare buildings, supported by fixed services and their life support services, are the essential base from which actual patient healthcare and essential life support provisions are given by the 'first line/hands on' medical, nursing and paramedic staff (Rogers, 1999). Besides, many activities without an apparent direct facilities management connection will be influenced indirectly by various facilities management constrains. For example, care factors such as clinical skill, assessment of healthcare needs, facilities quality, open and readily accessible services, integration of clinical services, effective clinical support staff and effective non-clinical support staff can be influenced either directly or indirectly by the facilities, its utilisation and suitability. Therefore, FM is an essential function in healthcare, in the provision of a well-designed, well-maintained, good quality environment in hospitals, in order to improve the overall healthcare quality (Richardson, 2001). From the NHS Estates (2002) point of view, the core business of any NHS Trust is the delivery of patient care whilst the facilities in which the non-clinical patient care (i.e. FM services) is provided, is an integral part of the patients' journey. It is because the first impression formed from the efficiency and effectiveness of the building environment (the facility) is often the patient's most lasting perception of the National Health Service.

2.8 THE ROLE OF FACILITIES MANAGEMENT IN THE CONTROL OF HAI

There are many Healthcare Associated Infections (HAI) caused due to improper management of facilities services (refer to Appendix 1). As identified in section 2.7.1, these FM services can be divided into two categories:

- Hard FM : built environment (design, construction and maintenance)
- Soft FM : cleaning, catering, waste management, laundry and linen

Even though FM includes a myriad of services, the aforementioned areas are considered as the principle areas of FM in the control of HAI. There is a growing debate among experts as to where 'cleaning' should be placed in the aforementioned two sections. Since it is all about environmental hygiene one can argue that it is a 'built environment' (hard FM) issue. However, as it is a day-to-day operation and does not deal with the physical property/structure of the

building as 'maintenance' does, 'cleaning' can be set aside as a soft FM issue. The same argument can be used for the 'management of waste disposal'. Although design and maintenance of waste disposal systems are grouped under hard FM, the disposal/management of waste can be considered as a soft FM service.

2.9 'HARD FACILITIES MANAGEMENT' – THE BUILT ENVIRONMENT

Hard FM, from a control of HAI perspective, refers to the built environment. The built environment is the human-made spaces that we live and work in (Damani, 2003). Research and investigation have consistently confirmed that the built environment (healthcare environment) is a secondary reservoir for organisms with the potential for infecting patients (NHS Estates, 2001c). It includes all the physical surroundings of patients and staff, i.e. structure, fittings, fixtures, furnishings, equipment and supplies (Ayliffe et al, 1999). The built environment in which healthcare is delivered plays an essential part in the overall quality of the patient's experience (NHS Estates, 2002). From a control of HAI perspective, the primary objective of the 'built environment' is to ensure that patients and other occupants (healthcare workers and visitors) are at no greater risk of HAI within the hospital than outside (Noskin and Peterson, 2001). The following explains the importance of the built environment in the control of HAI.

HAI can be controlled by interrupting (i.e. breaking) the chain of infection introduced in section 2.2.3 (see figure 2.8).
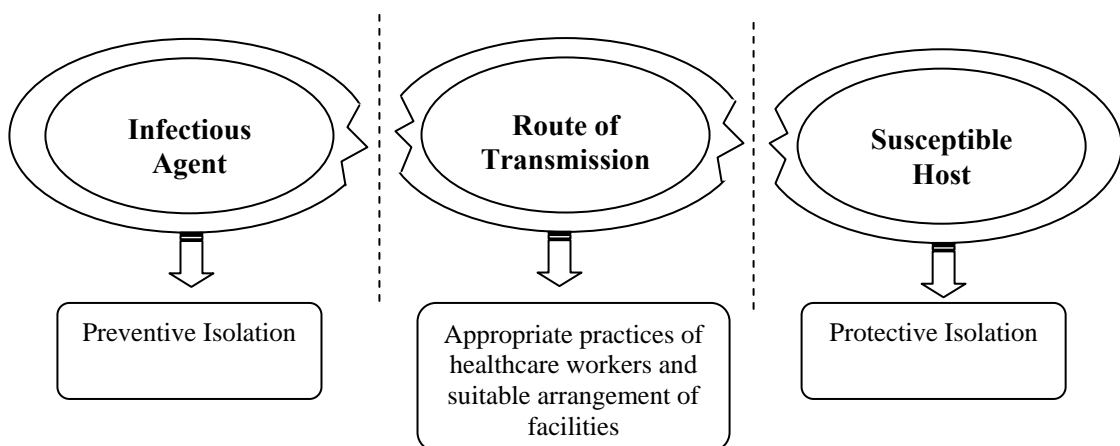
Figure 2.8: **The control of HAI - Interrupting the chain of infection**

The most effective way of interrupting the chain of infection is by separating either the agent from the host or host from the agent. According to Ayliffe et al (1999), separating agent from the host is commonly known as 'preventive isolation'. The preventive isolation not only protects the said 'host' but other susceptible hosts as well. Separating host from the agent is 'protective isolation'. This protects only the concerned host from the infectious agent. Isolation is a means of keeping away the host or agent in a detached, controlled environment where they normally do not have a connection with the environment outside their room (Masterton et al, 2003). The Standing Committee on Infection Control - Melbourne (1999) noted that there are many disadvantages in isolating patients, such as;

- Added cost for construction, equipment and staff time
- Inefficient use of hospital space
- Staff stress due to nursing of isolated patients
- Jeopardy to patient care through restriction on staff access; and
- Detrimental psychological effect on patient, patient's relatives and visitors

The NHS Estates (2003c) report on 'Privacy and Dignity of Patients' also raised the issue of isolation rooms.

The environment of a ward is completely different to an isolation room. According to Ayliffe et al (1988), the spread of HAI is more likely to occur in large open wards. There can be different types of patients with different types of susceptibility in the same ward. In addition, there can be several tasks functioning simultaneously. In such a surrounding, there is a high probability for an HAI to occur speedily. Frequently, it occurs either through contact or through airborne transmission. According to the Queensland Health (2001a), the number of people in the area (healthcare workers, patients, visitors), activity level, amount of moisture, presence of material capable of supporting micro-organism growth (dust, water, body substances) and orientation of surfaces (horizontal vs. vertical) in the facility will influence the degree of environmental contamination. Therefore, the design, construction and maintenance of facilities in wards have a significant role in the control of HAI. Therefore, 'wards' as opposed to isolation

rooms were investigated in this study due to their significance in the spread of HAI (refer to section 1.2.3).

According to the Property and Environment Forum Executive - Scotland (2002), at the inception of a new-build or refurbishment project, the control of HAI and its implications for planning and design have all too often been overlooked, leading to, in some cases, costly alterations and delays further down the line. Herein, refurbishment denotes bringing the building, or part of the building, back to the original state or bringing back the building or part of the building, to a good state by rebuilding or repairing. 'New-builds', in healthcare terms, often refers to construction of new healthcare buildings. However, it also includes adaptations or extension of an existing building (Property and Environment Forum Executive, 2002).

Du Moulin (1989) asserts that the design and construction of wards has a direct effect upon the potential occurrence of HAI. Engineering and architectural elements, which will ultimately contribute to minimum risks of HAI, are deemed included in hospital designs. Despite design and construction, during the building occupancy stage, there is a need for appropriate maintenance of healthcare facilities in order to improve the state of the built environment so as to ensure minimum or no rates of HAI. Poorly maintained environment will be a pool for the micro-organisms to grow and multiply (Masterton et al, 2003). Common infectious diseases such as 'Legionella' can occur through water supply systems while 'Aspergillus' can arise through ventilation systems, which are not maintained properly (refer to Appendix 1). Appropriate maintenance results in the creation of a safe environment and will prevent deterioration of surfaces and equipment (Department of Human Services – Australia, 1998b).

The following are the key areas of the built environment that are significant in terms of the control of HAI:

1. Design, construction and maintenance of water supply systems: Legionella is a micro-organism, which causes infection to patients through contaminated water. Bartley (2000) avers that the highest concentrations of Legionella are found in hot water storage tanks, cooling towers, and condensers. Sources of

contaminated water and the amplification mechanisms need to be addressed and minimised during the design stages (Du Moulin, 1989).

Some consideration should also be given during the refurbishment of projects. The Auditor General for Scotland (2000) informs us that the age of the plumbing system often hamper effective control of HAI. Good practice in the control of HAI with water-borne micro-organisms should be towards removing reservoirs and sources supporting their survival and proliferation. Hence, water reservoirs should be designed to enable proper maintenance using chemical and/or thermal means (Mehtar, 1992). Shekhawat et al (1992) proved through a survey that hospital water systems have a high total bacterial count. According to Shekhawat et al, the hospital tanks they surveyed were very dirty. Thus, they recommend regular maintenance of water systems in order to help reduce the incidences of HAI.

2. Design and construction of healthcare facilities for minimal dust accumulation and easy cleaning: Minimising opportunities for dust and moisture accumulation and maximising opportunities for cleaning of inanimate surfaces (and animate surfaces, e.g. hands) are key considerations in planning and design of new facilities (Queensland Health, 2001b). As Mehtar (1992) avers, it is important to design an environment that is easy to clean and dry since 'cleaning' is crucial in avoiding HAI (the importance of cleaning is separately covered under section 2.10.1).

   According to the National Health and Medical Research Council, UK and the Australian National Council on AIDS (1996), routine cleaning of the healthcare premises can be carried out much more efficiently if the design of the building is adapted to its function. In other words, functional design of healthcare facilities allows effective cleaning of facilities. Surfaces, including walls, must be smooth, easy to clean and protected from damage. Layout of wards, especially space between beds, the surface finishes and state of fabric are all essential for efficient and effective cleaning.

3. Design of bed space: Some microbiologists suggest that there is a strong correlation between bed spacing and cross infection (Scher, 2003). The spread of infection increases when patients with existing infections are in

close proximity to the susceptible patients (Meers et al, 1992). To minimise this risk of cross-infection, hospitals should restrict, wherever possible, the number of beds per room/bay (Phillips, 2001). As suggested by the NHS Estates (2002) there should be at least 3.6 m between the centres of adjacent beds (i.e. bed space). Several other authors/reports have suggested different bed spaces such as 2.1 m, 2.4 m, 2.7 m, etc. (NHS Estates HBN 57, 2003a: SHPN 04, 2000; Watt Report, 2002; War Memorandum No.11, 1944; Ayliffe et al, 1992). However, none of the authors has substantiated the 'recommended bed space' with scrupulous evidence.

A survey done by Kibbler et al (1998) has explored the criticality of the space between beds. An 18-month survey was performed to examine the effect of adding a five-bed to four-bed bays in three acute medical wards. The original inter-bed distances (from bed centres) in the four-bed bays were 2.3 to 2.5 m. By placing one bed against the side wall and equally spacing the other two, the inter-bed spaces on one side of the bay were reduced to between 1.93 to 2.02 m. All patients newly colonised with infections were visited, and their bed location determined. Data from the five-bed bays were compared with those from four-bed bays in similar wards. All the risk factors remaining equal, the simple process of adding an extra patient to those potentially exposed, increases the probability of colonisation. The final conclusion was '*increasing the number of beds in a fixed area heightens the risk of cross-infection*'. Thus, it is necessary to have an 'adequate' space between the beds to carry out both clinical (nursing the patients) and non-clinical activities (e.g. cleaning around the beds).

4. Design, construction and maintenance of ventilation systems: Uncontrolled air movements due to faulty natural and mechanical ventilation design, combined with ill-positioned heat emitters spreads infectious organisms widely (Scher, 2003). There is a risk of cross-infection from inhaled contaminated air. Eickhoff (1994) affirms that airborne transmission appears to account for about 10% of all endemic nosocomial infections. Shiomori et al (2001) have proven that airborne route plays a major role in the spread of HAI. Therefore, hospitals should take measures to prevent the spread of airborne infections. Ventilation and air-conditioning systems should be

designed to control and maintain temperature, humidity and purity of the air, within the prescribed limits, to control airborne infections (Phillips, 2001). This will ultimately lead to a reduction in the number of airborne micro-organisms in the healthcare environment and limiting opportunities for their entry into susceptible people (Queensland Health, 2001b and 2001c).

5. Design, construction and maintenance of handwashing facilities: Reducing infection rates depends on a variety of factors, notably staff procedures (Scottish Executive Health Department, 1998). Staff handwashing practices are without a doubt the most important intervention in the control of cross-infection (Property and Environment Forum Executive, 2002). Apart from training and educating the staff on appropriate hand washing practices, the hospital management must ensure that they have provided sufficient hand washing facilities for the staff to adhere to hand hygiene practices efficiently. Therefore, the levels of provision of wash hand basins and facilities are key factors, which have an impact on HAI rates (Ayliffe et al, 1992).

6. Design, construction and maintenance of waste disposal systems: According to the Scottish Executive Health Department (1998), the safe disposal of clinical waste, whether produced in the hospital or the community, is a matter of concern to infection control professionals, managers and the general public. It requires effective design, construction and maintenance of apposite safe disposal systems in hospitals. As the Centre for Disease Control and Prevention – Atlanta (2003) suggests, this should be done according to government regulations and policies, since handling and disposal of waste requires special attention and precautions.

2.10 'SOFT FACILITIES MANAGEMENT'

Research and investigation has consistently confirmed that cleaning, catering, laundering and waste management have a key role in the control of HAI (NHS Estates, 2001d). The following sections will explain the importance of these areas in detail.

2.10.1 Cleaning – domestic services

For the purpose of this study, domestic service is considered as a synonym for cleaning service, although some identify areas covered under domestic services in different ways. According to a report published by the Legislative Analyst's Office - California (2004) on 'In-home support services', domestic services entails cleaning and catering. Atkin and Brooks (2000) and the National Council on Compensation Insurance (2003) identify cleaning and security as the areas covered under domestic services. However, according to the Scottish Executive Health Department (2003a), the Environmental Services Working Group (2001) and the NHS Estates (2001a and 2001d), domestic service covers only cleaning. However, the latter further suggests that 'domestics have a great deal of contact with patients and many organisations have explored the opportunity to add other duties to the traditional domestic task of cleaning'. This has resulted in the inclusion of housekeeping services (e.g. making of beds, delivering messages, etc) into the domestic service component in the NHS, in addition to cleaning.

From the perspective of control of HAI, the activity 'cleaning' should entail maintaining a hygienic environment, which is free from dust, impurities, and infections (Horton and Parker, 2002). As Ayliffe et al (1992) describe, thorough cleaning removes the majority of infections present in the environment. Taguchi et al (1992) have suggested, through a survey, that sanitation and cleanliness are necessary to prevent the dissemination of HAI such as MRSA in hospitals. Therefore, the British Infection Control doctors argue that instead of attempting to apply limited control of HAI measures, which are impossible to achieve, there is a duty to press for investment in cleaning (Murphy, 2002). This backs up Dancer's (1999) survey results, which concluded that 'there was a sustained decrease in HAI, when cleaning was included as a major part of an aggressive infection control programme'. Domestic services are taken as the central focus of this research study, therefore, the significance of domestic services in the control of HAI is further discussed in section 4.7.

2.10.2 Waste disposal

There are different types of clinical waste and different classifications, which determine how the waste should be treated. According to Ayliffe et al (1999) and

the Auditor General for Scotland (2000), hospital waste is classified into two main categories, i.e. domestic waste (also known as household waste) and clinical waste. Domestic waste, as the name implies, is made up of the same types of items found in waste from any household. Definitions of clinical waste vary in different countries, but usually refer to materials, which are potentially hazardous and associated with patient or animal diagnosis or treatment or medical research. Clinical waste consists of waste not deemed safe for disposal along with domestic waste.

Healthcare waste is a potential reservoir of pathogenic micro-organisms, and requires appropriate handling (World Health Organisation, 2002). Both domestic and clinical wastes are likely to contain moisture and nutrients, which allow micro-organisms to grow to large numbers in the environment (Ayliffe et al, 1999). The Auditor General for Scotland (2001) informs us that the effective management of hospital waste is essential for the health and safety of patients, staff and the general public. The safe storage, transportation, treatment and disposal of hospital waste are important in ensuring that environmental standards are met, while the standards themselves continue to be raised by government at both national and local levels (Scottish Executive Health Department, 1998). The importance of waste segregation is vital since there are frequent reports of injuries caused by sharps concealed in domestic wastes. As indicated by Mercier, (1997) the real hazard is cross-infection following a 'sharps' injury with a needle contaminated with blood.

A research conducted by Blenkharn (1995) reveals that the disposal of clinical wastes are often poorly conducted and inadequately supervised despite the publication of clear and definitive working guidelines and the introduction of increasingly stringent legislative control. Facilities managers have a crucial role to play in this respect, since the disposal of waste is one of their main duties. Increased resources must be directed to improvements in waste disposal practices whereby all facilities staff have a clear responsibility to ensure correct disposal of waste without risk to themselves, their colleagues and others, or to the environment (Blenkharn, 1995).

2.10.3 Laundry and linen

Each patient or healthcare worker requires linen on an 'as needs' basis. According to Health Canada (1998), there are only a handful of reports suggesting soiled linen as a cause of cross infection. However, as the NHS Estates (2001a) suggests, potential transmission of infection from soiled linen will be negligible only if handled in a proper way by the facilities staff. Any used linen, which includes both soiled and fouled, may be contaminated with potential pathogens. The risk of these organisms infecting a healthy person is small if reasonable care is taken, even when items are visibly fouled, provided they are handled with care. (MacDonald, 2002; Ayliffe et al, 1999).

According to the Scottish Executive Health Department (1998), segregation of clean and used linen throughout the laundering, transport and storage processes reduces the risk of cross-infection. Therefore, the primary concern of facilities staff should be to handle linen in a safe manner according to the guidelines given by the healthcare management or the infection control committee (Damani, 2003). This will lead to safe practices for the delivery of clean linen and a reduced risk of contamination from used linen.

2.10.4 Catering

A survey done by Thurm and Gericke in 1994 showed that the role of foods in the transmission of hospital infections should not be underestimated. This is also evident from the 'Watt Report' published by the Scottish Executive Health Department (2002b). The said report was commissioned as a result of an outbreak of salmonella infection at the Victoria Infirmary, Glasgow, UK in December 2001. In this outbreak, the main route of transmission of Salmonella was food. There are many other food-borne infections in addition to Salmonella (refer to Appendix 1). Ayliffe et al (1992) point out that an effective catering service for patients in hospitals is vital, as hospitalised patients are more susceptible to food-borne infections and are more likely to suffer serious consequences from such infections than healthy members of the community. Thus, in healthcare, catering stands as a key service amongst facilities management services (Auditor General for Scotland, 2003). Herein, catering mainly concerns adequate cooking, salad, vegetables and fruit, segregation of

cooked and uncooked food storage, food preparation surfaces, crockery and cutlery and hand washing (Australian National Council on AIDS, 1996).

A Hazard Analysis of Critical Control Points (HACCP) suggests that food preparation and handling should be mandatory. It also notes the importance of identifying any particular problems at any stage of the food preparation and handling chain (Ayrshire and Arran Acute Hospitals NHS Trust – NHS in Scotland, 2000). According to the Scottish Executive Health Department (1998) the provision of safe food and catering services in hospital for patients and staff is a major undertaking; achieved by having a combination of good management, staff trained in safe hygiene practices and catering skills, and appropriate quality controls. Thus, facilities managers who are responsible for catering should ensure that everyone who handles, prepares, processes and distributes food has the knowledge of the principles of both food hygiene and good food handling practices (Thurm and Gericke, 1994).

Overall, the aforementioned sections explored and documented the main causes of HAI and key areas in the control of HAI. In addition, it also ascertained and investigated the role of FM in the control of HAI. Thus, objectives 1 & 2 have been addressed (see Table 1.2).

2.11 SUMMARY

Healthcare Associated Infections (HAI) continue to be a worldwide problem. They cause problems to the patients, to the community and to healthcare workers. There are many reasons why patients develop HAI. Some of these relate to the immunocompetence of the patient, while others reflect the environment in which the patient is nursed or the skill of the surgeon and the team conducting their care. If the environmental issues are taken into consideration, FM services have a significant role in the control of HAI. The design and maintenance of the building is important to provide a risk-free environment for the patients, as well as for the healthcare workers. Design considerations include ventilation requirements, patient accommodation, and facilities such as hand washbasins, toilets, and materials to be used for the surfaces. There is also a need to consider soft FM areas such as cleaning,

catering, laundry and waste disposal to reduce the risk of transmission of infection. FM professionals and staff are required to fully comprehend the nature of their role and the way they should perform their work, in order to limit the risk of HAI.

From the discussions drawn throughout the chapter, the following conclusions can be made:

- FM has a major role to play in the control of HAI.
- The role of FM in the control of HAI extends from the design and construction stage to the building occupancy stage.
- Despite FM's rapid development as an important function in organisations, FM still suffers from an identity crisis. This issue remains critical in healthcare as the place and contributions of FM remain unclear and are still to feature prominently in the 'control of HAI agenda'. This is a significant problem, which needs prompt attention.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1   INTRODUCTION

The aim of this chapter is to outline the research methodology and research methods adopted for this study. This chapter, hence, is two fold. The first part of the chapter outlines the epistemological and methodological characteristics of the research area, which have an impact on the research design. The second part of the chapter describes the way the aforementioned methods have been used for the study. The research study, overall, consisted of four stages. The first stage of the research study involved a thorough review of literature and informal interviews. The second stage adopted a case study approach, while the third stage took a questionnaire survey approach. The final stage of the research study focused on developing a performance management framework. Chapter 3 discusses these stages in detail, including the methods of data analysis employed for the study.

3.2   RESEARCH DESIGN

There are many definitions of research, some narrow, others broad. Simply, research is the systematic investigation of a problem, area of issue and is undertaken to increase knowledge (Bailey, 1997).

The healthcare sector is one of the most important sectors in a country and hence has numerous players and consumers, ranging from government bodies to the general public. An error in one process in healthcare could make an impact on so many other processes. This could ultimately result in loss of human lives. Healthcare Associated Infections (HAI) are simple but key examples of this. Healthcare research, therefore, has become well established and increasingly important over the years, due to the sensitivity of health processes.

The choice of research methodology and research methods is equally important in healthcare research. This is more so due to the relatively high levels of ethical issues (Richards and Schwartz, 2001) involved, such as the need to protect the confidentiality of the patients participating in research studies (Batchelor et al, 1994). It could also be due to the level of prudence needed in the nature of

information to be collected, depending upon the type of research. There is a great deal of scope for terminological ambiguity in the topics of research methodology and research methods. For the purpose of this study, research methodology refers to a system of explicit rules and procedures, upon which research is based and against which claims for knowledge are evaluated (Frankfort-Nachmias and Nachmias, 1996). Research methods refer mainly to the specific method/s of data collection and analysis (Creswell, 2003). According to Gittins (1997), choosing the appropriate research methodology is important, as it determines the research methods to be adopted in a research study. As Remenyi et al (1998) state, there are two main factors to be considered when choosing an appropriate research methodology:

- The topic to be researched
- The specific research question/s

This research study focuses on the Facilities Management (FM) area, while healthcare is the overarching issue (refer to section 1.2.3). FM, which was previously considered as a mere support service, is increasingly gaining more recognition as an important non-core service in organisations (Payne, 2002). FM related research is also on the increase. However, research studies in FM have been criticised by their anecdotal approach when interpreting real world phenomena (Amaratunga et al, 2002). Thus, FM research has reached a stage that demands the validation of its heuristic principles within different 'real world' situations, in order to refine and integrate them (Amaratunga et al, 2002).

Many examples can be given to describe the types of research methodologies/methods chosen by many other researchers in similar areas of study. Kotzé and Nkado (2003), Chrusciel and Field (2003) and Amaratunga (2001) have chosen a combination of quantitative and qualitative methods for their FM related research studies. Mackenzie (1995), Carey (1993) and Morgan (1998) suggested a similar mixed method approach for healthcare research. Peursem et al (1995) have adopted a qualitative methodology to review measures and indicators in health performance management. Arnold et al (1987) also noted, the importance of observations and employee interviews in healthcare research. Gastmeier et al (2003) have done an exhaustive review of the literature

to achieve their research objectives on '… does disinfection of environmental surfaces influence nosocomial infection rates?' Mallak et al (2003) adopted a qualitative paradigm, using a case study approach to identify the association between culture and built environment in healthcare organisations. Similarly, Okoroh et al (2001) adopted a qualitative case study approach for their healthcare FM study on 'adding value to the healthcare sector - a facilities management partnering arrangement'. Proctor and Campbell (1999) have also followed a qualitative methodology, using semi-structured interviews for their '… developmental performance framework for primary care' study. On the contrary, Mackenzie (1995) has utilised a survey method to collect data on organisational culture in an NHS Trust. The difference between these different methodologies will be discussed in section 3.4.

Likewise, some researchers have used a single method, while others have used a mixed method approach for their research studies. As many of them articulate, no matter what or how many methods are used, what is chosen should be good enough to fulfil the aim and objectives of the particular research study.

3.3   RESEARCH PARADIGMS AND SCHOOLS OF THOUGHT

As Damian (2001) asserts, the research methodology draws upon a research paradigm. The nature of the outputs of a given research, or 'school of thought', is largely determined by its research paradigm. By 'research paradigm' van Aken means the combination of research questions asked, the research methodologies allowed to answer them and the nature of the pursued research output/s (van Aken, 2004). As Easterby-Smith et al (1991) state, deciding on suitable methodologies and research methods depends on research paradigms and their assumptions. Considering the wide-ranging nature of the information to be collected in this research, it was, therefore, necessary to examine the existing research paradigms. They are particularly useful in helping researchers to clarify alternative designs and methods for a particular research, and identifying which are more likely to work in practice (Easterby-Smith et al, 1991).

The term paradigm was first used by Thomas Kuhn (Bailey, 1997). According to Thomas S. Kuhn, paradigms are "universally recognised scientific achievements

that for a time provide model problems and solutions to a community of practitioners" (Nabudere, 2002). A research paradigm, as Denzin and Lincoln (1994) suggest, is the philosophical stance taken by the researcher that provides a basic set of beliefs that guides action. Denzin and Lincoln further call this 'the net' that contains researcher's epistemological, ontological and methodological premises (assumptions). Creswell (1998), however, extends this 'net' to include axiological and rhetorical assumptions. Philosophically, researchers make claims (knowledge claims) about these assumptions: what knowledge is (ontology), how we know it (epistemology), what values go into it (axiology), how we write about it (rhetoric), and the processes for studying it (methodology).

Schultz (1976; as cited in Kuehne and Kaplan, 2001) has identified two major schools of thought in research methodologies. One school of thought holds that the methods of the natural sciences, which have brought about such magnificent results, are the only ones, and that they alone, therefore, have to be applied in their entirety to the study of human affairs. The other school of thought feels that there is a basic difference in the structure of the social world and the world of nature.

According to Schultz (as cited in Kuehne and Kaplan, 2001), the methodology practiced in the natural sciences was at variance with that of the social sciences, because the subject matter itself was so very different, with the former being concerned with inanimate matter, and the latter with conscious interactive behaviour. This has led to the categorisation of research into two broad types, which will influence how a research is undertaken:

- Positivist, also referred to as quantitative
- Interpretive, also referred to as qualitative

Amaratunga et al (2002) have also identified two schools of thought: positivism (quantitative) and phenomenological (qualitative) paradigms:

- Positivism searches for causal explanations and fundamental laws. It generally reduces the whole to its simplest possible elements in order to facilitate analysis

- Phenomenological inquiry uses qualitative and naturalistic approaches to inductively and holistically understand human experience in context-specific settings. This approach tries to understand and explain a phenomenon, rather than search for external causes or fundamental laws

Amaratunga et al (2002) also describe the latter as the 'realism paradigm'. As Fielding and Schreier (2001) postulate, "realism is a position which has gone out of fashion in the post-modern times". According to Lincoln and Guba (2000), positivism also has 'naïve realism'. This holds that reality is both real and apprehendable.

Creswell (2003) offers a broad set of schools of thought:

- Post-positive: also called quantitative, positivist, post-positivist, empirical science and post-positivism (refers to thinking after positivism). Developing numeric measures of observations and studying the behaviour of individuals becomes paramount for a post-positivist.
- Constructivism: the constructivist researcher often address the processes of interaction among individuals.
- Advocacy: these researchers believe that inquiry needs to be intertwined with politics and a political agenda.
- Pragmatic: there are many forms of pragmatism. Instead of methods being important, the problem is most important, and researchers use all approaches to understand the problem.

In addition, Gittins (1997) introduces another two paradigms: interpretive and critical theory. Interpretive implies how human beings interpret and make sense of reality. Critical theory, on the other hand, takes the view that human beings are able to critically assess and change society and become emancipated. This can be identified as a combination of constructivism and realism (constructivist realism). Cupchik (2001) defines constructivist realism as

'the extent that it is precisely these personally and socially relevant realities which constitute the subject matter of the social sciences, the social sciences deal with phenomena which are real—hence constructivist realism'.

49

According to Gittins (1997), taking a feminist standpoint, action research and phenomenology are influenced to some extent by critical theory.

In the context of this research study, three major paradigms can be documented as follows:

- Post-positivism (quantitative only)
- Constructivism (qualitative only)
- Pragmatism (combination of quantitative and qualitative - mixed method)

Pragmatism is simply identified as the combination of post-positivist and constructivist paradigms. As Cupchik (2001) describes, combining positivism and constructivism is possible. Nevertheless, a reconciliation of positivism and constructivism can only be accomplished by eliminating the arbitrary boundaries and assumptions that separate them. According to Easterby-Smith et al (1991), many researchers adopt a pragmatic view of combining the two.

Having dealt with the basic questions of methodology, paradigms and schools of thought, the following sections will elaborate on the type of research methodology chosen for this research study.

3.4 CHOICE OF RESEARCH METHODOLOGY AND RESEARCH METHODS

As discussed in section 3.3, two common 'labels' are often used for research methodologies within the research paradigms, i.e. *qualitative and quantitative*. Those terms are normally used to describe the nature of the data that is gathered in empirical research (e.g. van Maanen 1979; Marshall & Rosman 1984; Miles & Hubermann 1984; Cash & Lawrence 1989; Patton 1990). The traditional view about these 'qualitative' and 'quantitative' approaches is that, while the first examines narrative data, the latter examines numeric data (Easterby-Smith et al, 1991). Much of qualitative research is based on an interpretative epistemology, whilst quantitative methodology is more impersonal and objective (Kato, 2002). Table 3.1 further explicates the difference between two.

Table 3.1: **Quantitative vs. qualitative methodology (Adapted from Creswell, 1994; Casebeer and Verhoef, 1997; Hill and Wright, 2001; Kato, 2002)**

Characteristics	Qualitative methodology	Quantitative methodology
Definition	The non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships	The numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect
Main philosophical assumptions	Constructivist	Post-positivist
Nature of research	Provides information as to "which beans are worth counting"	"Count the beans"
Type of reasoning	▪ Inductive - a theory building process ▪ Subjective ▪ Meaning	▪ Deductive - a theory testing process ▪ Objective ▪ Causation
Strategies of enquiry	▪ Phenomenology ▪ Grounded theory ▪ Ethnography ▪ Case study ▪ Narrative	▪ Surveys ▪ Experiments
Methods used for data collection	▪ Open-ended questions ▪ Emerging approaches ▪ Text or image data	▪ Close-ended questions ▪ Predetermined approaches ▪ Numeric data
Sample size	Sample size is not a concern; seeks information rich sample	Should be more than 30 at least
Nature of problem	▪ Exploratory research ▪ Context important ▪ Variables unknown ▪ May lack theory base for study	▪ Explanatory research ▪ Body of literature exists ▪ Know variables ▪ Existing theories
Advantages	▪ Can generate new theories ▪ In-depth examination of phenomena ▪ Not limited to rigidly definable variables ▪ Examine complex questions that can be impossible with quantitative methods ▪ Deal with value-laden questions ▪ Explore new areas of research ▪ Helps people see the world view of those studies – their categories, rather than imposing categories ▪ Attempts to avoid pre-judgements	▪ Aggregate data from large samples ▪ Compared to qualitative methods, can be easily generalised ▪ Objective ▪ Impersonal ▪ Uses variables which can be measured ▪ Economical
Disadvantages	▪ Less easily generalised ▪ Difficult to aggregate data and make systematic comparisons ▪ Subjectivity leads to procedural problems ▪ Researcher bias is built in and unavoidable ▪ In-depth, comprehensive approach to data gathering limits scope	▪ Limited to rigidly definable variables ▪ Less helpful in generating theories ▪ Attempts to make pre-judgements, at times (hypothesis testing) ▪ Impose researcher's own categories to build questions ▪ Mostly deal with close-ended questions

Qualitative and quantitative methodologies differ in the ways in which data are collected, the nature of the data itself, the methods used to analyse the data and the ways in which results are interpreted (Haas, 2002). Qualitative methodologies often require the personal interaction of the researcher and those people whose experiences are the subject of the research, and involve the use of interviews, observation or analysis of documents. In contrast, a quantitative researcher may never see his or her subjects or respondents, since quantitative methods require the use of standardised measures, in which responses are assigned to pre-determined categories to which numbers are assigned (see Table 3.1).

Janetzko (2001) states that, taking a qualitative or quantitative methodology alone can each have their own pros and cons, but combining both together can be complementary. Taking pragmatic and philosophical reasons into consideration, and the wide-range of information to be collected, it was decided to use the mixed method approach for this research study.

3.4.1   The rationale for choosing a mixed method approach

Mixed method approach is formally defined as the class of research where the researcher mixes or combines quantitative and qualitative methodologies, methods, concepts or language into a single study (Johnson and Onwuegbuzie, 2004). Recent research studies support the assertion that in healthcare and FM services, much more research should be conducted under the auspices of the mixed method approach (refer to section 3.2).

According to Casebeer and Verhoef (1997), the success of health and FM services research lies in the shared application of both qualitative and quantitative methodologies. Similarly, Amaratunga (2001) asserts that FM research needs to be focused on both qualitative and quantitative studies. Further, Haas (2002) postulates that:

> "combining qualitative and quantitative research methods is becoming more popular and acceptable in health services research as researchers learn to appreciate the strengths and weaknesses of both methods and to discover ways in which the results from one method can be used to strengthen, complement or provide input to the other"

Likewise, many researchers have recommended the combination of quantitative and qualitative methodologies in the study of the same phenomena, to achieve triangulation and to improve the study design (Denzin, 1978; Patton, 1990; Fielding and Schreier, 2001; Janetzko, 2001; Kelle, 2001). What is important, here in triangulation, is not the combination of different kinds of data *per se*, but rather an attempt to relate different sorts of data in such a way as to counteract various possible threats to the validity of an analysis (Hammersley and Atkinson, 1983; Fielding and Fielding, 1986). In this context, quantitative and qualitative methodologies may be viewed as different ways of examining the same research problem (Gray and Densten, 1998). The main advantage of combining qualitative and quantitative methodologies is that it combines independent yet complementary research methods, which will ultimately result in a stronger research design and more valid and reliable findings (Jacobsen, 1999). The idea behind the combination of methodologies should not be to choose whatever seems adequate. It is purely a matter of choosing what is most appropriate. Hence, it should be based mainly on the context of the research, research questions and sometimes the time availability; only if the research is bound only by time limitations. The use of a mixed method approach also strengthens the researcher's claims for the validity of the conclusions drawn, where mutual confirmation of results can be demonstrated (Bryman, 1988, as cited in Gray and Densten, 1998).

A set of key assumptions were given due consideration in the choice of a mixed method approach for this research study. The first assumption is the issue of ontology. This is the philosophical assumption about the nature of reality (Creswell, 1994). The ontology proposed here embraces the concept of multiple realities, hence, identifying the need for combining methods, in order to 'add more depth and breadth to the analysis' (Fielding and Fielding, 1986)'. In some ways, the differences between quantitative and qualitative methods involve trade-offs between breadth and depth (Patton, 2002). As Patton further explains, qualitative methods permit inquiry into selected issues in great depth, with careful attention to detail, context and nuance; such that data collection needs to be constrained by predetermined analytical categories, which contribute to the potential breadth of qualitative inquiry. In contrast, he claims that quantitative

methodologies ask standardised questions that limit responses to predetermined categories (less breadth and depth).

However, this could be seen as quite the opposite, where the quantitative methodology is concerned. According to its definition, quantitative methodologies broadly relate to an approach that expands the breadth of a research study, mainly using a comparatively larger sample, whilst a qualitative approach allows a research study to explore in depth. However, as Fielding and Schreier (2001) suggest, adding more depth and breadth does not necessarily add accuracy.

The second philosophical issue governing the choice of a mixed method approach is that of a suitable epistemology. This epistemological question simply describes the nature of the relationship between the researcher and the subject of the research (Creswell, 1994). Given the literature available to understand the research study, there will be a need for the researcher to interact closely with the subjects of the study. However, the epistemological perspective stresses that analysis of each domain or problem requires one or more appropriate methods that allow the researcher to investigate phenomena of interest (Janetzko, 2001). Combining qualitative and quantitative methods may be fruitful, since they are likely to bring to the fore various aspects of the phenomenon being researched (Creswell, 2003).

The third assumption is the axiological issue. This simply identifies the values that go into the research study. It is accepted here that the researcher and the participants of the study have their own values and biases, in addition to any other information actually gathered. Therefore, the researcher attempts to minimise the error, which can be caused through personal bias, by employing both qualitative and quantitative methods. This can be seen as the best option to counteract any bias.

The fourth assumption is the rhetorical assumption. This means the language used to report the findings of the study. The language of the research analysis and reporting is the third person impersonal in the passive voice (e.g.: 'this was done') rather than first person (e.g. 'I did this'). The ontological, epistemological,

axiological and rhetorical standpoints outlined here, influenced the selection of mixed methods used for this research study. The next influence is the methodological stance, which dictates the data gathering approaches (Hill and Wright, 2001). According to Creswell (1998), the methodological assumption conceptualises the research process in a certain way.

As described in Table 3.1, the combination of qualitative and quantitative approaches entails the use of both inductive and deductive approaches for reasoning. As Hyde (2000) explains, inductive is a theory-building process, while deductive is a theory-testing process, which commences with an established theory or generalisation. In essence, this means that the mixed method approach can use a myriad of approaches in its research process. It can be, first, an approach which investigates the research question in depth, e.g. case studies, phenomenology, or ethnography, followed by an approach which will corroborate and generalise the findings of the above, e.g. a survey approach, or *vice versa*.

3.5   THE RESEARCH FRAMEWORK

Section 3.4.1 provided a background for choosing a combination of both qualitative and quantitative methodologies for this particular study. The question to be asked next is – which one should be the first or what should be the order/sequence. Creswell (2003) provides a clear explanation of the options for choosing the order of qualitative and quantitative methodologies in a mixed method approach:

1. Non-sequential or concurrent: qualitative and quantitative methods are carried out at the same time
2. Sequential – Qualitative first
3. Sequential – Quantitative first

In the case of sequencing, qualitative and quantitative methods are employed within the same study, albeit in different phases of the research process, whereas in non-sequential the methods are employed simultaneously.

Since this study adopted a mixed method approach, no matter how inductive and deductive the approach is, there was a need to have a prior indication of the issues the researcher intend to study, and their relationships, if any. Miles and Huberman (1994) suggested doing this through the construction of a conceptual framework that could underlie the research. Such a framework explains, either graphically or in narrative form, the main issues to be studied, key factors, constructs or variables and presumed inter-relationships. Building a conceptual framework forces the researcher to think carefully and selectively about the constructs and variables to be included in the study (Miles and Huberman, 1994). Besides, the developed framework would also provide a base for the researcher to limit the scope of the research study to some extent (refer to sections 1.2.3 and 4.3). The identification of problems, through the review of literature (refer to section 3.6.1) and informal interviews (refer to section 3.6.2), facilitated this process of developing a conceptual framework (refer to Chapter 4).

Even though the framework was useful in identifying the key issues to be considered under the area of research study, at first, there was still too little theoretical basis to build up rigid measures or constructs in order to conduct a quantitative methodology. Casebeer and Verhoef (1997) recommended that the most generally accepted use of combined methods is to begin with a qualitative exploration of some little-studied problem, so that measurement instruments can be developed for later quantitative research. This recognised the importance of carrying out a qualitative approach at first, followed by a quantitative approach. Using the qualitative methodology first also supports the ontological assumption mentioned in the previous sections. Qualitative methodology allows for an understanding of multiple realities at the outset, followed by a quantitative methodology, with the aim of expanding the breadth, i.e. to generalise the findings. Creswell (2003), however, highlights that this approach requires a substantial length of time to complete both the data collection phases, which can be a drawback for some research situations.

Considering the above, the research framework adopted for this study is depicted in Figure 3.1 (also see Figure 1.3 to see how it fits with the research programme).
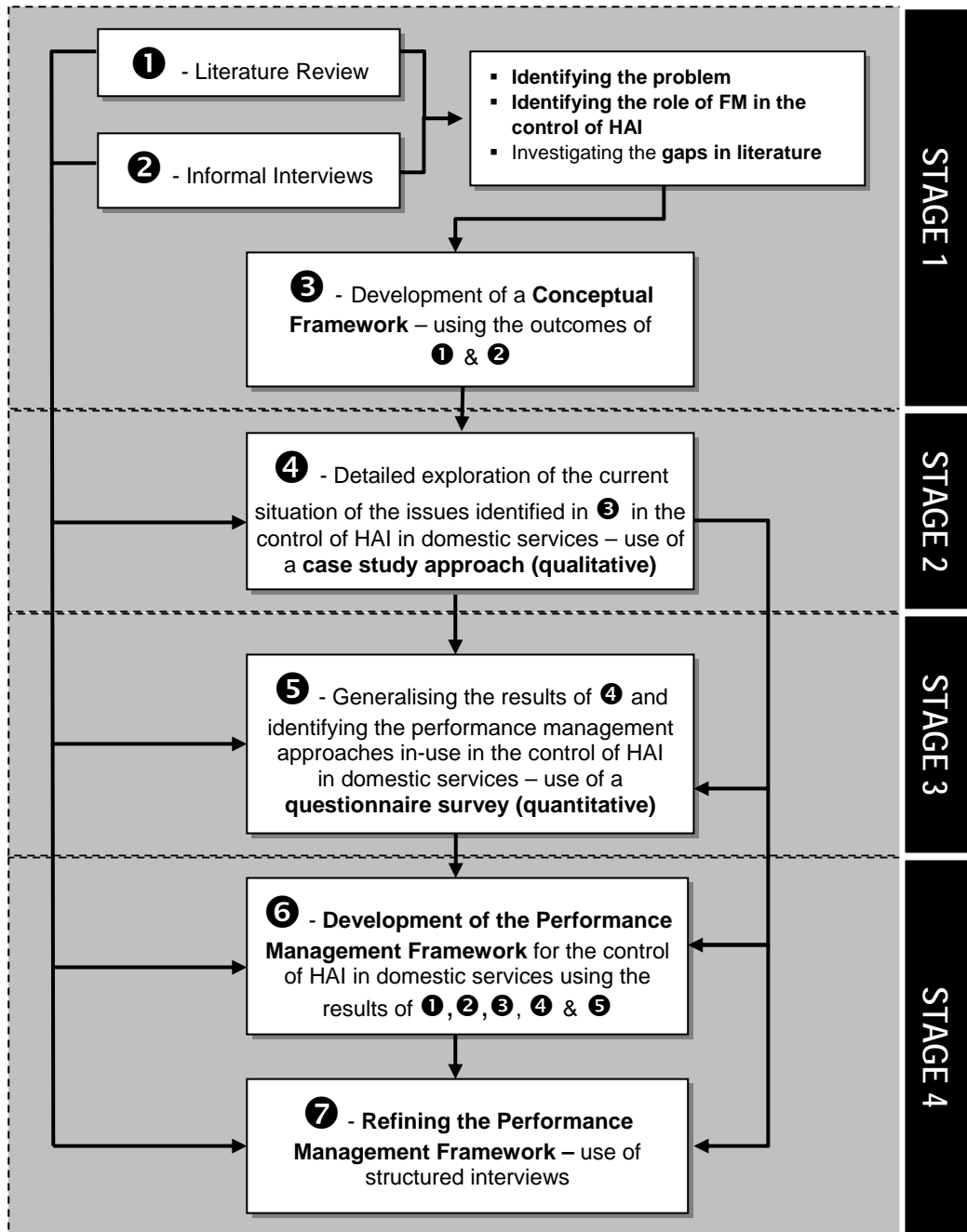
Figure 3.1: **The research framework**

At the outset, the intention was to involve as many professionals and staff as possible in the research study, in order to obtain a holistic view of the issues associated with the control of HAI in FM services (particularly domestic services, refer to section 4.7). Therefore, the target groups used for the research study were:

- Strategic level:: Directors of facilities

- Tactical level:: Facilities managers who are responsible for managing domestic services (e.g. domestic managers, hotel services managers), ICT members, matrons
- Operational level:: Domestic supervisors, domestics, ward nurses

The subsequent sections of this chapter discuss the stages in the research framework in detail.

3.6   STAGE 1 – LITERATURE REVIEW AND INFORMAL INTERVIEWS

3.6.1   The literature review

As Creswell (2003) describes, determining the questions that are most significant for a topic and gaining some precision in formulating these questions require much preparation. One way is to review the literature on the topic. Note that such a literature review is therefore a means to an end and not, as many people have been taught to think, an end in itself (Creswell, 2003). Novices may think that the purpose of a literature review is to determine the answers about what is known on a topic; in contrast, experienced investigators review previous research to develop sharper and more insightful questions about the topic (Creswell, 2003).

A review of literature is, therefore, an important part of the research. It not only provides a basis for a research study, but also helps in identifying the gaps in the available literature on the particular subject. This pinpoints the key areas to be researched. Based on the availability of literature, at times, it also assists in deciding the type of research methods to be utilised for the research study.

As previously mentioned, a review of literature was carried out during the first stage of the research. During the literature search, the topics examined were broadly categorised into three areas as follows:

- Literature search on HAI: what HAI is, its impact and severity, how it can be controlled, history of HAI, areas associated with control of HAI.
- Literature search on FM: what FM is in general and FM related to healthcare, its importance, and the components of FM.

▪ Literature search on HAI and FM: association between HAI and FM, how HAI can be controlled through FM, what the main components to be considered are under FM in the control of HAI.

The following materials were then accessed and gathered to examine the aforementioned areas:

1. Journals: priority was given to search peer reviewed journal articles

2. Books

3. Conference proceedings

4. Key word searches through the Internet: The new *'Google scholar'* web search was an efficient way of pinpointing relevant materials, especially in terms of searching on-line journal articles.

5. Internet sources created by healthcare organisations: A vast amount of literature was accessed through the e-library website developed by the NHS in Scotland. Many professionals from the NHS in Scotland, mainly professionals from the Property and Environment Forum Executive (now known as Health Facilities Scotland), assisted in accessing the appropriate materials. The knowledge management portal developed by the NHS Estates (in England) was also a very useful resource to acquire up-to-date materials on the control of HAI and healthcare FM. World Health Organisation websites were the other useful Internet sites accessed by the researcher.

6. Other computerised sources and Internet articles: computer sources and Internet articles (other than journals) were substantial timesavers. However, there were some instances where it was difficult to identify the date of origin, author or the publisher of the Internet documents. These deficiencies sometimes caused problems in terms of originality and credibility of the documents, when quoting the literature materials in research publications.

7. Reports – reports herein means the documents published by the NHS in Scotland, NHS in England, and healthcare organisations in other countries (e.g. U.S.A, Canada, Australia, Germany).

8. Handbooks provided for the staff by the hospitals in NHS in Scotland/England. Many of the hospitals provide booklets, in the form of guidelines, for the staff members to understand the issues of control of HAI.

The handbooks/booklets are written using simple language for ease of understanding, which were helpful, at the initial stages of the research, to become familiar with the HAI terminologies.

9. Meeting minutes: The researcher was fortunate to obtain the experience of members of two of the NHS in Scotland Task Force groups. These Task Force groups were formed by the Scottish Executive Health Department to take actions against HAI. The minutes of the Task Force meetings were therefore a valuable source of current literature. These provided useful insights, in particular into specific HAI problems, and allowed the possibility of obtaining different viewpoints from different professionals.

The lack of sufficient literature materials written on FM, relating to the control of HAI, was one of the difficulties during the literature review. However, there was some evidence of improved change in the availability of literature on FM and HAI during the period of the research (2003 – 2006). Particularly in the UK context, there was a sudden increase in the number of guidance documents, reports and research materials published by the NHS (UK) and other interested parties, including universities and hospitals. This was a result of the recent priority given to the control of HAI by the NHS (UK).

3.6.2   Informal interviews

Due to the paucity of literature materials on FM relating to the control of HAI, informal interviews were carried out to identify, in detail, the role of FM in the control of HAI. This was also carried out as part of stage one of the research. In accordance with the guidance offered by Welch (1985), in the informal interviews, open-ended questions were asked around a specific topic or topics but in a flexible manner to allow other issues to be addressed.

Interviews were carried out with some experts from the NHS in Scotland (NHSS). The experts were those actively involved in the areas of control of HAI and FM (see Table 3.2). The variety of experts selected for this stage of the study ranged from healthcare managers, microbiologists, infection control nurses, and facilities managers to construction professionals. These discussions offered useful insights and were useful in identifying the following:

- The importance of FM in the control of HAI

- Challenges/issues associated with the control of HAI in FM services

Table 3.2:   Participants involved in the informal interviews

Professional Category	Number Interviewed
Facilities Managers	5
Infection Control Nurses	6
Microbiologists	3
Healthcare Managers	5
Managers from the NHS in Scotland support organisations*	4
Architects who are involved in hospital projects	2
Total	**25**

* The support organisations – Scottish Centre for Infection and Environmental Health (SCIEH) and NHS Education Scotland (NES)

The findings of the informal interviews elaborated the key issues elicited from the literature review (research question I of the research study – see Table 1.2). Furthermore, the findings of the informal interviews were also useful in the development of a conceptual framework highlighting the key issues of the research study (objective 3). Chapter 4 discusses the findings of the informal interviews and the review of literature.

3.7   STAGE 2 – THE CASE STUDY APPROACH

The research process of this stage is presented in Figure 3.2. Discussions on this stage are given in subsequent sections.

Purpose of this stage of the research study	What is the current situation of the control of HAI in domestic services?
Research questions	• What are the strategies adopted by domestic services in the control of HAI? • How do they ensure successful implementation of strategies? • What is the level of involvement and integration of key players? • To what extent do they effectively manage knowledge? • What are the performance management approaches they use?
Research strategy	Qualitative - case studies
Sample	Domestic and Infection Control Team members from two domestic services – one is an in-house domestic service and the other is a Private Finance Initiative domestic service
Data collection	Semi-structured interviews
Data analysis	Content analysis
Derivation of results	Main findings of the research

Figure 3.2:   The research process – second stage of the research study

3.7.1   Purpose of stage 2 – the case study approach

This stage of the study concentrated on domestic services, as the unit of analysis, and focused on finding the current situation of domestic services in the control of HAI in wards (objective 4 – see Table 1.2). In addition, existing issues associated with the control of HAI in domestic services were scrutinised. It was also necessary to clarify how the main players involved in the control of HAI in domestic services (e.g. domestic teams, ICT members, etc.) endeavour to address the issue of control of HAI.

3.7.2   Research questions – stage 2

Stage 2 of the research was undertaken to examine research questions II to VII of the study (see Table 1.2). These are:

• Do domestic services in hospitals have any strategies to address critical issues relating to the control of HAI in their services?

- How do domestic services ensure successful implementation of strategies?

- What is the level of involvement and integration of the key parties in the control of HAI, if any, in the successful implementation of strategies adopted for the control of HAI in domestic services?

- To what extent do domestic services manage knowledge effectively in the control of HAI?

- What are performance management approaches in-use in the control of HAI?

3.7.3 Research strategy – stage 2

Deciding on the research questions then led to consideration of the type of research strategy to be chosen. A research strategy has to be good enough to probe the research questions and appropriate in fulfilling the aim and objectives of the research.

There are several research strategies within the qualitative methodology, which can be chosen to explore a research subject in depth. Phenomenology, ethnography, grounded theory and case study are widely discussed research strategies in the social sciences (Glaser and Strauss, 1967; Strauss and Corbin, 1990; Moustakas, 1994: Wolcott, 1994; Yin, 1994; Hammersley and Atkinson, 1995; Myers, 1997; Harris and Johnson, 2000; Baldwin et al, 2002). In addition, Gittins (1997), in his paper on 'qualitative research', included action research as one of the definitive types of qualitative strategies. The descriptions of these strategies are given below:

1. Phenomenology: Phenomenology is the study of structures of consciousness, as experienced from the first-person's point of view. The central structure of an experience is its intentionality, its being directed toward something, as it is an experience of, or about, some object. An experience by virtue of its content or meaning together with appropriate enabling conditions (Creswell, 1998).

2. Ethnography: Ethnography is a written description of a particular culture – the customs, beliefs and behaviour – based on information collected through fieldwork (Harris and Johnson, 2000). McCleverty (1997) defines ethnography as a traditional method of sociology and cultural anthropology.

According to her, ethnography involves the study of people performing activities and interacting in complex social settings, in order to obtain a qualitative understanding of these interactions. Further, the goal of an ethnographic study is to identify routine practices, problems and possibilities for development within a given activity or setting.

3. Grounded theory: Grounded theory strategies were first reported by, and attributed to, Glaser and Strauss in 1967. Glaser and Strauss (1967) described the method of grounded theory as a means of enabling the systematic discovery of theory from the data of social research. Byrne (2001) states that, the researcher's purpose in using the grounded theory method is to explain a given social situation, by identifying the core and subsidiary processes operating in it. The core process is the guiding principle underlying what is occurring in the situation and dominates the analysis because it links most of the other processes involved in an explanatory network.

4. Case studies: Case studies are an empirical investigation into contemporary phenomena operating in a real-life context. It is particularly valuable where the kind of control present in a laboratory is not feasible and not even ethically justifiable (Yin, 1994). In essence, the term 'case studies' refer to the collection and presentation of detailed, relatively unstructured information from a range of sources, about a particular individual, group, or institution, usually including the accounts of subjects themselves (Hammersley, 1989).

5. Action research: Myers et al (1999) state that "to make academic research relevant, researchers should try out their theories with practitioners in real situations and real organisations". According to them, action research combines theory with practice, practitioners with researchers, together in an iterative process, within a cycle of activity that includes problem diagnosis, action intervention and reflective learning.

The aforementioned approaches were taken into account in order to choose an appropriate research strategy for this particular study. Considering the definitions of research strategies, the context of this research study and the research questions, both action research and grounded theory were excluded during the selection process of the research strategy. This was due to the fact that grounded

theory is more suitable when deriving a theory of a process, action or interaction, grounded in the views of participants in a study (Strauss and Corbin, 1990), while action research is useful in understanding and managing the relationship between theory and practice, between the researcher and what is being researched (Ottosson, 2003). Ethnography was also excluded, since it especially relates to a portrait of a group of people who share a common culture (McCleverty, 1997).

Out of the remaining two methods, i.e. the case study approach and phenomenology, the case study approach was selected, as, by definition, it is an in-depth investigation of an event or series of related events (Hammersley, 1989). The main difference between phenomenology and the case studies is that phenomenology tries to focus on understanding the essence of experiences about a phenomenon, while the case study approach attempts to develop an in-depth analysis of a single case or multiple cases. As Rowley (2004) explains, case studies are a useful research approach for answering why and how questions, as when it is useful to seek to understand a situation. For the purpose of this study, the case study has been identified as a qualitative strategy, albeit, as Yin (1994) asserts, case studies are not limited to qualitative research. According to Rowley (2004), case study research starts with an analysis and description of the situation in one organisation. Employing a case study approach is useful, as it has the capability of uncovering causal paths and mechanisms and, through richness of detail, identifying causal influences and interaction effects, which might not be treated as operationalised variables in a statistical study. Case study research is more often recommended as part of a mixed method approach, in which the same dependent variable is investigated using multiple additional procedures, e.g. survey research, ethnography, etc (Hammersley, 1989).

The need for case study research was also supported by the previously mentioned (refer to section 3.4.1) ontological, epistemological and methodological assumptions. For example, there is a need to study the actual context of HAI control practices in domestic services, and these issues need to be investigated in great depth to uncover the realities that exist.

Deciding on the research strategy was also strengthened by the research questions. For the reason that there was very little empirical evidence, the research questions used for the study were broad. Given the large number of parties involved in the control of HAI practices, and the inter-related nature of the activities performed by all the players, the issues to be studied were complex. According to Keen and Packwood (1995), case study evaluations are valuable where broad, complex questions have to be addressed in complex circumstances.

As mentioned above, deciding on the type of research strategy to be used was strengthened by the research questions developed at the beginning of this study. However, Robson (1993) articulates a variety of ways to see the link between the research strategy and research questions. One view is that the research strategy enables a researcher to frame research questions. This approach may also be helpful in framing research questions when designing experiments and surveys. In contrast, some find it easier to develop research questions initially and work back from that to the research strategy (Robson, 1993); which is the method adopted in this study. According to Robson, it is, of course, possible to have a mixed strategy, in which the researcher develops a set of questions, works out the type of research strategy, and then revisits the research questions according to the type of research strategy. As Robson (1993) suggests, this mixed strategy is important to ensure consistency between the research questions and the research strategy.

A common criticism of the case study is its lack of generalisability (Yin, 1994), sometimes called external validity. The harder someone tries to find an explanation, which fits a specific situation, the more likely it is to differ from what would suit a different situation (Dick, 1993). This drawback was however overcome by conducting a quantitative methodology as the next stage of the research.

3.7.4   Sample chosen for the case study approach

For the purpose of this study, domestic services in hospitals were categorised into three broad types as shown in Figure 3.3.
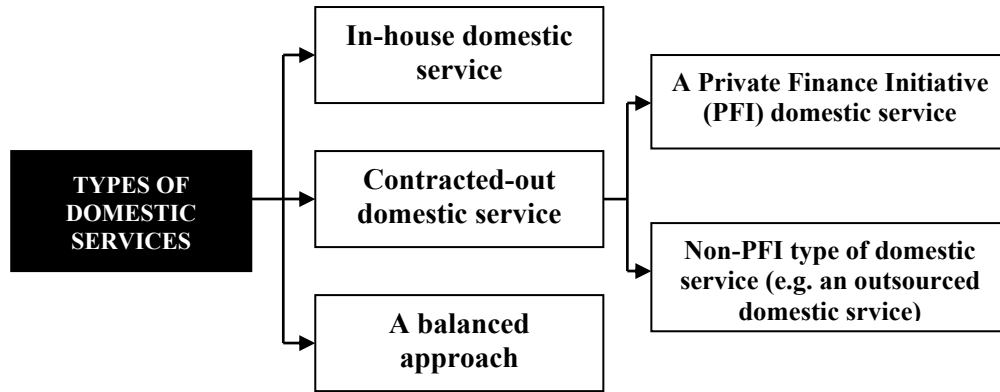
Figure 3.3:   Types of domestic services

The classifications of FM services provided by the NHS Estates (1998) were taken into consideration when categorising the domestic services. The classifications are based on the way the FM service is provided. The three broad types of domestic services, identified for the purpose of this study, are as follows (adapted from NHS Estates, 1998):

- In-house domestic service: a traditional approach where all the services are managed in-house.

- Contracted-out domestic service: for the purpose of this study, the contracted-out services were divided into two subsets as follows:

  ↳ A Private Finance Initiative (PFI) domestic service – a PFI model, where the complete FM package (including the domestic service) is out-sourced through a management contract, with an external facilities manager acting on behalf of the NHS Trust.

  ↳ Non-PFI type of domestic services (e.g. an outsourced domestic service) - an entirely out-sourced domestic service package, using either one major contractor or a limited number of small contractors.

- A balanced approach: a combination of in-house and out-sourced functions of the entire FM package (including the domestic service)

Using the above classifications, two different types of domestic services were chosen for the case study approach; as it helps to establish cross-case conclusions during the data analysis stage. Yin (1994) affirms that a cross-case methodology is generally more robust than a single case study. Using two or more case studies

also provides the means to identify patterns and trends and to gain insights into potential differences or similarities between case studies (Yin, 1994).

The two cases were chosen from an in-house domestic service and a PFI domestic service. This was useful to identify any similarities or differences in types of domestic services. The selection of cases inevitably involved discretion and judgement, selecting from those which could provide convenient access, whilst exhibiting the appropriate area under study. The organisational characteristics, such as the size of the hospital (more than 100 beds), type of the hospital and, more importantly, the type of domestic service provision (the service provider) were taken into consideration during the case study selections.

Choosing an in-house and a PFI domestic service (contracted-out service) was also strengthened by the increased concern given by the NHS to such type of services. As for many informal interview participants, in terms of control of HAI, performance of most of the contracted-out domestic services (outsourced and PFI) is lower than in-house domestic services. According to them, the two main reasons for having low performance of control of HAI in contracted-out domestic services are: cost-cutting and lack of internal control, since the service is managed by an external party. This was also evident from some of the literature.

The NHS is a bespoke sector which cannot afford 'trial and error' approaches or service failures where patients are concerned, and, as a result of this, most Trust Executives refrain from outsourcing their non-clinical services. One of the reasons is that the management and monitoring of outsourcing is often very complex (Okoroh et al, 2002).

According to Murphy (2002), in the UK, strategies to improve hygiene standards have included bringing domestic services in-house, employing additional cleaning staff, and increasing the frequency of cleaning. In the Auditor General, Scotland (2003) report on 'hospital cleaning', the average staff turnover was found to be higher amongst contracted-out services than in-house. In addition, contracted-out services were more likely to have traditional, narrowly defined and inflexible roles for domestics, as compared with in-house services, which

were more likely to have expanded, more flexible job descriptions. Murphy (2002) shows the falling standards of contracted-out domestic services using an equation as follows:

Contracting-out = ↑ staff turnover, ↓ service flexibility, and ↓ quality of service

According to UNISON, domestic services often form part of PFI schemes or are covered in wider support services, or FM contracts, within a PFI. Information on the number of contracted-out domestic services across the NHS is not held centrally (Hansard, 2000), although Unison estimates it to be 30% of domestic services. UNISON (2005) reports that there is a growing number of PFI contracts in the NHS. However, the cleaning standards of such hospitals seem to be very low. A review by the Patient Environment Action Team shows that four of the five Trusts running the ten hospitals, identified in their study as having the worst standards of cleanliness in the NHS (UK), are run by private contract cleaners (Butler and Batty, 2001).

All the above reasons, therefore, prompted the need to select a PFI domestic service as one of the case studies. Choosing an in-house service was also needed to ascertain and compare the level of standards between the two services. The two domestic services were selected from two hospitals in the NHS in Scotland. Selecting the Scottish context was partly due to the facilitation provided by personal contacts. Although this could be seen as a source of bias in the study, every attempt was taken to minimise bias. Involving different categories of staff and managers (see Table 3.3) was one technique. The selected managers were also chosen from different levels (see Table 3.3). The sample chosen for the case studies is given in Table 3.4. A few group interviews were conducted during this stage, to extract a bigger sample from the population concerned. Altogether, twenty-six (26) interviews were carried out across the two cases.

Table 3.3:   Job roles of the participants involved in the case studies

Management/Staff level	Job Role
Top level Domestic Managers	Chief Executive of the Trust/Facilities General Manager
Middle level Domestic Managers	Hotel Services Manager/Domestic manager/Assistant Domestic Managers/Assistant Hotel Services Managers
Supervisory level Domestic Managers	Domestic Supervisors
Domestics (operational level)	Domestics
Supervisory level Nursing Staff	Ward Sister/Matron/Ward Manager
Top level ICT members	Infection Control Doctor/Microbiologists
Middle level ICT members	Infection Control Nurses

N. B: The phrase 'domestic managers' is used to identify the managers who are involved in domestic services, either directly (e.g. Hotel Services Manager, General Manager-facilities) or indirectly (e.g. the Chief Executive of the Trust).

Table 3.4:   Sample chosen for the case study approach

Type of Case	Job Category	Type of Management/ staff Level	No. of interviews conducted
In-house case	Facilities Managers	Top	1*
		Middle	2
		Supervisory	2*
	Infection Control Team Members	Top	2
		Middle	1*
	Facilities Services Staff	Operational	3*
	Nursing Staff (ward based)	Supervisory	2*
PFI case	Facilities Managers (Trust side)	Top	1
		Middle	1*
	Infection Control Team Members (Trust side)	Middle	2
	Facilities Managers (PFI Contractor's side)	Top	1*
		Middle	1*
		Supervisory	2*
	Facilities Services Staff	Operational	3*
	Nursing Staff (ward based)	Supervisory	2
			26

* group interviews

For ease of reference, the two case studies selected are coded as '*In-house case*' and '*PFI case*'. Details of the cases are given in the following sections. However, since the two cases are based in the NHS in Scotland, it is worthwhile mentioning a little bit about the structure of the NHS in Scotland. This will elucidate how the organisational structures of both cases are laid out.

The new reforms of NHS in Scotland, given in 'Our National Health: Plan for action, plan for change', is intended to improve governance and accountability in

the health service (Scottish Executive Health Department, 2000a). One of the major structural changes was the development of a unified NHS Board system (see figure 3.4), wherein the acute and primary care Trusts come under the same NHS Board (altogether there are currently fifteen NHS Boards across the NHS in Scotland).
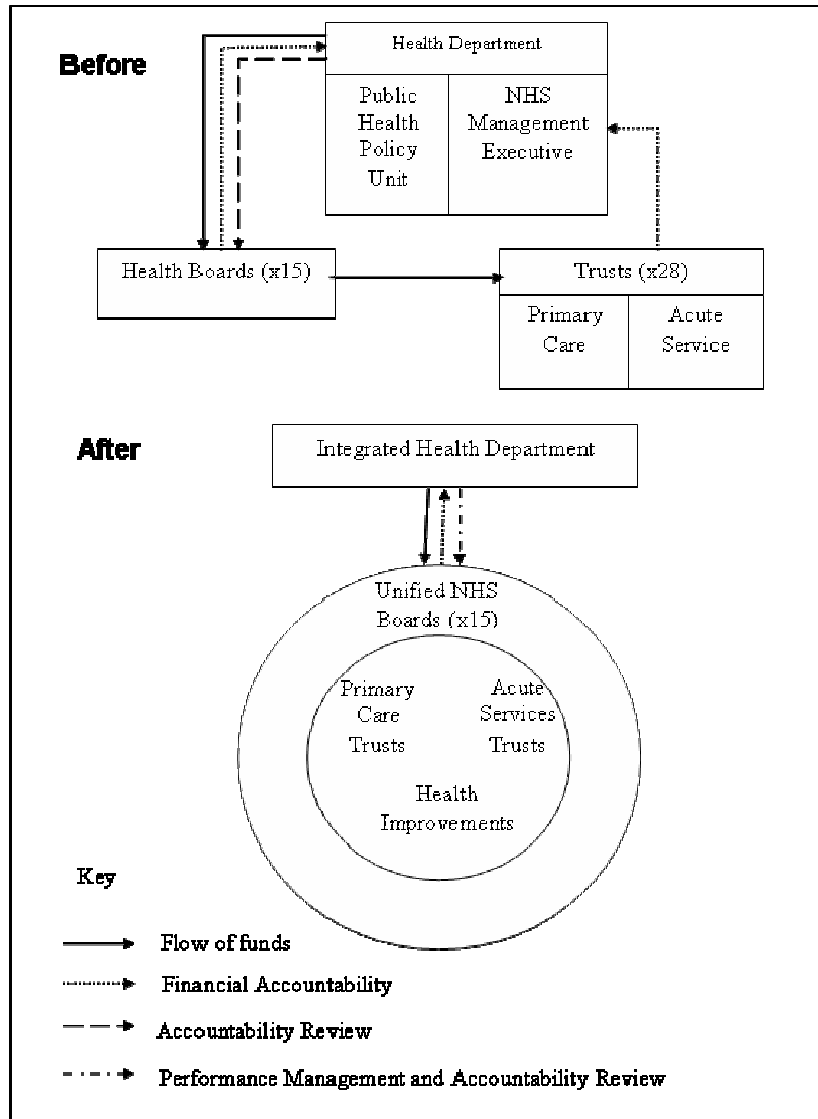
Figure 3.4:   Structure of the NHS in Scotland – before and after the reformations (Source: Our National Health: Plan for action, plan for change, 2000)

At the time of conducting the case study interviews (from April to July 2004), the relevant NHS Trusts of the *In-house case* and *PFI case* were still operating under the old system. Both NHS Trusts were acute Trusts. It was revealed, during the interviews, that the NHS Trusts of both the cases are to be operationalised, under the new reforms of the unified NHS Board system before

the end of 2004. The following sub-sections present the descriptions of the two cases in detail.

3.7.5 Case study 1 (*In-house case*)

As the name implies, the *In-house case* is a domestic service, run by an in-house team, which is part of the hospital management. The hospital of the *In-house case* is the main hospital in one of the biggest acute Trusts in the NHS in Scotland. The number of interviews conducted for the *In-house case* is given in Table 3.5.

Table 3.5:   Number of interviews conducted for the *In-house case*

Job Category	Type of Management/ staff Level	No. of interviews conducted	Codes for the Interviewees (for the content analysis method)
Facilities Managers	Top	**1***	**FMGR (CS1) 1**
	Middle	**2**	**FMGR (CS1) 2, FMGR (CS1) 3**
	Supervisory	**2***	**FMGR - SUP (CS1) 1, FMGR - SUP (CS1) 2**
Infection Control Team Members	Top	**2**	**ICT (CS1) 1**
	Middle	**1***	**ICT (CS1) 2, ICT (CS1) 3**
Facilities Services Staff	Operational	**3***	**STAF (CS1) 1, STAF (CS1) 2, STAF (CS1) 3**
Nursing Staff (ward based)	Supervisory	**2***	**NURS (CS1) 1, NURS (CS1) 2**
Total number of interviewees		**13**	

* group discussions

3.7.5.1   The *In-house case* - profile

The profile for the hospital of the *In-house case* is as follows:

Table 3.6:   *In-house case* profile

Item	Details
Number of beds (in the Trust)	1200
Number of beds (in the hospital)	615
Type of wards (in the hospital)	Mostly 4-bed wards 6-bed wards are also common
Number of managers responsible for the *In-house case* (except supervisory level)	4
Number of staff (including supervisory level)	230
Total floor area	81, 000 m^2
Domestic budget	(did not disclose)

3.7.5.2   The *In-house case* – vision and aims

The *In-house case* does not have a separate mission/vision statement but has an overall statement for the whole FM service. It is as follows:

▪ The vision: To deliver high quality support services and contribute to the Trust's aims and objectives

▪ The aims: to deliver high quality support services in a professional manner, on time and within the given budgets; to constantly improve quality standards and efficiency in all areas of activities; and to create a motivated workforce through promoting opportunities for personal growth and development.

3.7.5.3   The organisational structure of the *In-house case*

The organisational structure of the *In-house case* is hierarchical (see Figure 3.5).
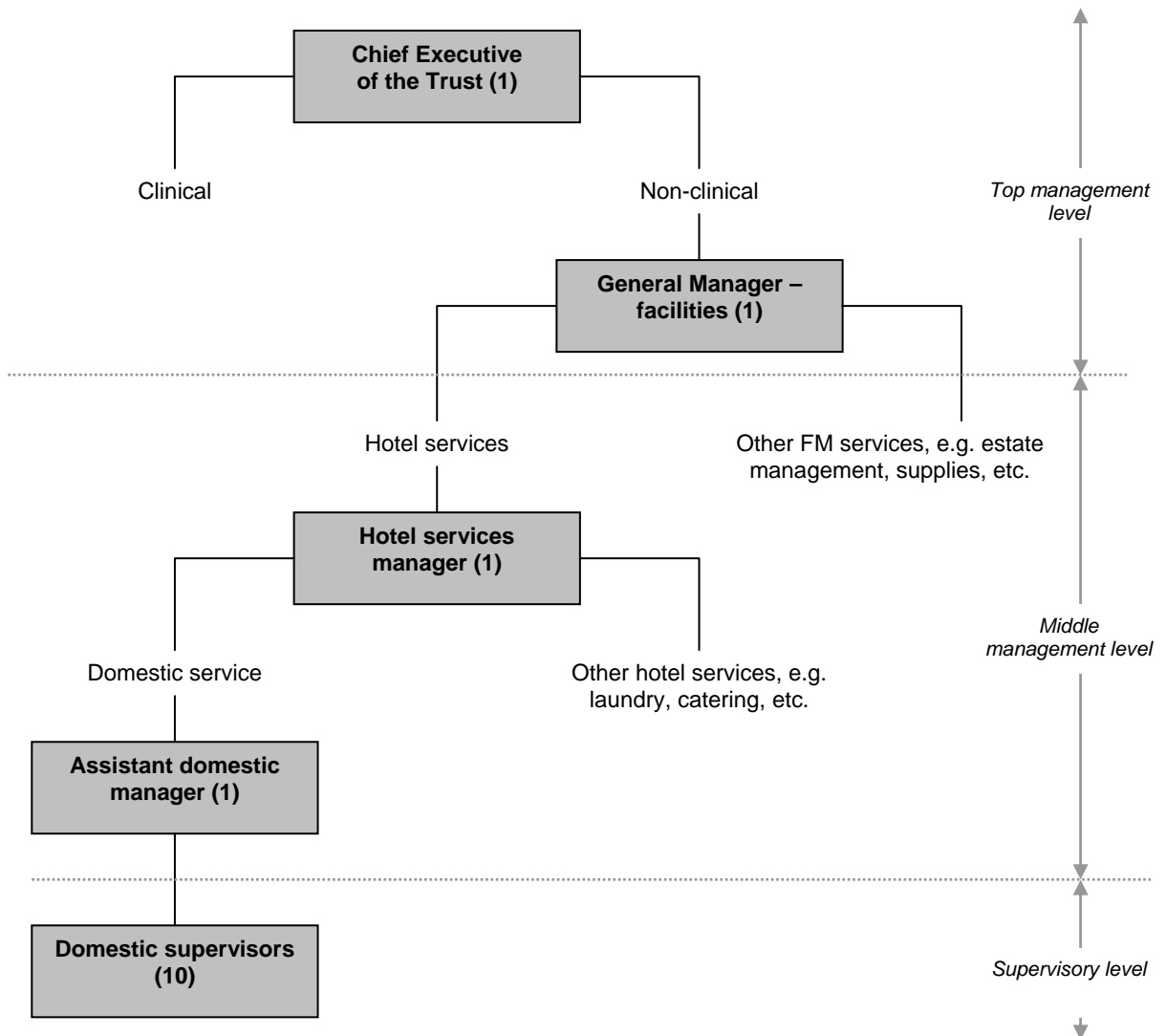
Figure 3.5:   Organisational structure of the *In-house case*

A comparative analysis of the organisational structure of the In-house case with the PFI case is discussed in detail in section 5.3.7.

3.7.5.4   Clinical input of the *In-house case*

It was mentioned in section 2.5 that various parties are involved in the control of HAI. Amongst them, the Infection Control Committee (ICC) and the Infection Control Team (ICT) appear to have the key role in the said process, as follows (Quality Improvement Scotland, 2003):

1. ICC: It endorses all infection control policies, procedures and guidelines. It also provides advice and support on their implementation and monitors the progress of the annual Infection Control Programme. The ICC manages all aspects of infection control at the Trust level. The membership of the ICC normally includes a senior manager, who represents the Chief Executive of the Trust, a nurse executive director, microbiologist/s, representatives from the FM services and the risk management coordinator.

2. ICT: The ICT is responsible for the day-to-day implementation of the Infection Control Programme and provides advice on infection control problems and the management of patients with infections. Each organisation has a responsibility to staff the ICT adequately with appropriate members to ensure that it is capable of carrying out its agreed functions. The ICT manages all aspects of control of HAI at the hospital level. Membership of the ICT includes microbiologists, Infection Control Nurses (ICNs) and Infection Control Doctors (ICDs).

The ICT of the *In-house case* meets every first Wednesday of the month and discusses issues relating to the control of HAI, in both clinical and FM services (including domestic services). Apart from that, the ICT members make visits to hospital wards, to ensure that clinical and FM practices fulfil the requirements for control of HAI.

The ward nurses are also considered as one of the main clinical teams, as some of their roles and responsibilities are related to cleaning and, besides, the ward matrons (or the ward managers) are expected to play a co-ordinating role for both domestic services and nursing practices carried out in wards.

3.7.6   Case study 2 (*PFI case*)

As the name implies, the second case study, i.e. the *PFI case*, is a domestic service managed under a Private Finance Initiative (PFI). The domestic service is provided by an external party, i.e. a private finance partner, which is different from an outsourced domestic service (see figure 3.3). When a domestic service is contracted-out, it means that the domestic service of the hospital is given to a contractor (for a comparatively shorter period), to manage the domestic service on behalf of the hospital/Trust. The PFI scheme involves creating partnerships between the public and private sectors. According to the NHS Executive (1999), PFI is about building long-term and mutually beneficial partnerships between the public and private sector partners. The PFI scheme of the *PFI case* is DBFO (design, build, finance and operate), and is a major PFI scheme. This means that the private sector partner is responsible for designing and building the facilities, financing the capital cost and operating the said facilities.

The *PFI case* hospital is the main hospital in one of the acute Trusts in the NHS in Scotland. The private sector partner of the *PFI case* is a consortium (the special purpose vehicle, i.e. SPV), whose members include a construction company and a principal service provider. The client is the particular NHS Trust. The construction company and the principal service provider are the main contractors. The principal service provider has sub-contractors to manage both clinical and support services (FM). The support service provider (i.e. the FM provider) manages all FM services, including domestic services (which is the *PFI case*). The *PFI case* is led, managed and checked by the following teams respectively:

- On behalf of the consortium:
    - A representative from the consortium, who oversees support services (including domestic services) provide by the FM provider
- On behalf of the FM provider:
    - The general manager of facilities, who manages the total facilities management services (including domestic services) on behalf of the FM provider

- A domestic manager who is directly responsible for domestic services (e.g. catering) in the hospital

- An assistant domestic manager who is directly involved in domestic services in the hospital

- Eight domestic supervisors who will independently look after the domestic service in different parts of the hospital.

- On behalf of the Trust, the following representatives monitor the *PFI case*:

  - Director of estates and facilities

  - Assistant director of estates and facilities

  - Domestic manager

Each domestic supervisor (under the FM provider) supervises at least 25 domestics. The number of interviews conducted for the *PFI case* is given in Table 3.7.

Table 3.7: **Number and categories of interviewees involved in the *PFI case***

Job Category	Type of Management/ staff Level	No. of interviews conducted	Codes for Interviewees (for the content analysis method)
Facilities Managers (Trust side)	Top	1	FMGR (CS2) 1
	Middle	1*	FMGR (CS2) 2
Infection Control Team Members (Trust side)	Middle	2	ICT (CS2) 1, ICT (CS2) 2
Facilities Managers (PFI Contractor's side)	Top	1*	FMGR - OUT (CS2) 1
	Middle	1*	FMGR - OUT (CS2) 2
	Supervisory	2*	FMGR - SUP,OUT (CS2) 1, FMGR - SUP,OUT (CS2) 2
Facilities Services Staff	Operational	3*	STAF (CS2) 1, STAF (CS2) 2, STAF (CS2) 3
Nursing Staff (ward based)	Supervisory	2	NURS (CS2) 1, NURS (CS2) 2
Total number of interviewees		**13**	

* group discussions

The following sub-sections introduce the *PFI case*.

3.7.6.1 The *PFI case* - profile

The profile of the hospital and *PFI case* is shown in table 3.8.

Table 3.8:   The *PFI case* profile

Item	Details
Number of beds (in the Trust)	1650
Number of beds (in the hospital)	530
Type of wards (in the hospital)	Mostly 4-bed wards 6-bed wards are also common
Number of managers responsible for the *PFI case* (except supervisory level) – from the FM provider and consortium	4
Number of managers who overseeing the *PFI case* – on behalf of the Trust	3
Number of staff (including supervisory level)	210
Total floor area	66,534 m^2
Domestic budget	(did not disclose)

3.7.6.2   The mission statement

The overall mission statement of the *PFI case* is:

> "To deliver high quality, efficient patient care in collaboration with the Trust's
> purchasers and, through leadership and support, create an environment in
> which the Trust's staff are committed to, and contribute to the Trust's aims and
> objectives"

3.7.6.3   The organisational structure of the *PFI case*

Figure 3.6 illustrates the contractual relationship between the NHS Trust and the
PFI partner. Due to this complex relationship, the organisational structure of the
PFI case is also complex. According to one of the consortium representative, the
way *PFI case* is managed is described below:

> ".. simply the way this works is the client is X (the NHS Trust). They have a
> contract with Y (the SPV). Y then passes the principle services contract to Z
> (the principal services provider). But the specifications and the contract
> requirements are identical between X & Y and Y & Z. We have direct
> communication anyway with X and specifically with the estates and support
> services department (FM department) of X. This department monitors what
> we are doing in terms of domestic services and other FM services."

The role of the consortium representative is more advisory, while the Trust representative acts as a monitor. The FM service provider delivers a hands-on service in the *PFI case* and they are accountable to the PFI consortium.
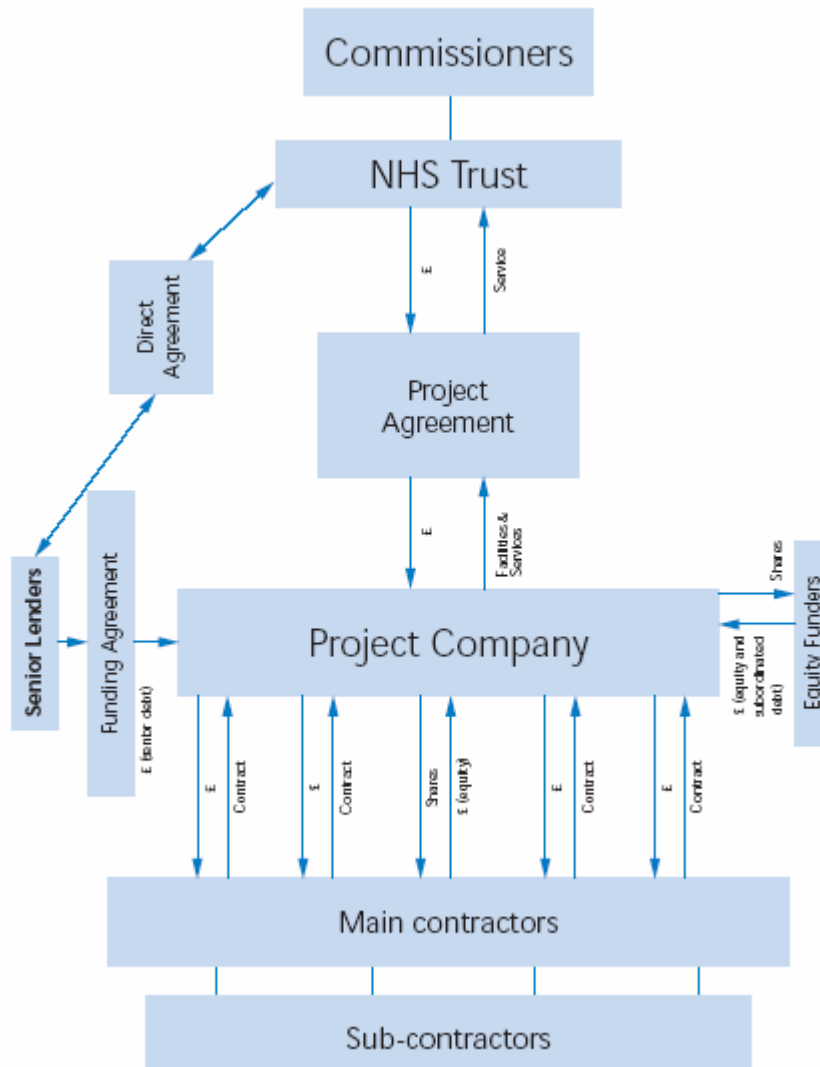
Figure 3.6: **Contractual relationships between the NHS Trust and the PFI contractor (source: NHS Executive, 1999)**

3.7.6.4   Clinical input of the *PFI case*

As discussed in section 3.7.5.4, and from the perspective of this study, the clinical teams mainly include the ICT and ward nurses. The ICT, in the *PFI case*, represents the whole NHS Trust and comprises two Infection Control Nurses and an Infection Control Doctor. It was revealed during the interviews that the input from the clinical teams is minimal in the *PFI case*. An in-depth discussion of the level of involvement and integration of the aforementioned teams in the *In-house case,* as opposed to the *PFI case,* is elaborated in detail in Chapter 6.

3.7.7 Data collection in the case studies

Semi-structured interviews were employed to collect data from the two cases described in the previous sections.

Patton (1990) asserts that semi-structured interviews enable the researcher to seek specific information from informants, while maintaining flexibility to explore important issues or themes that arise during the interview. Conducting semi-structured interviews was also useful, since there were different levels and professional categories of participants. Each group may have a legitimate, but different, interpretation of the area under study. Capturing these different views, as Keen and Packwood (1995) suggest, is often best achieved by using semi-structured interviews.

Unstructured interviews could also have been used to obtain views from the participants, as they see it, and the related issues. However, unstructured interviews suffer from issues of serendipity (pursuing unexpected directions) and unreliability (danger of interviewer bias) (Dereshiwsky, 1999).

Structured interviews were not chosen as the method of data collection due to their rigidity, as they employ standardised, close-ended questions. As Dereshiwsky (1999) states, this type of interview does not allow for spontaneity, and hence will be more suitable for a confirmatory study than an exploratory study.

Considering the aforementioned pros and cons, it was decided to employ semi-structured interviews as the method of data collection. The collected data was recorded using a digital Dictaphone. The participants were asked about the areas related to the control of HAI practices in domestic services (refer to Appendix 2a for case study questions). The questions were mainly divided into four sections:

- **Section 1:** general information (job role, type of domestic service provision)
- **Section 2:** issues related to domestic services (strategies adopted, involvement and integration of parties, etc)
- **Section 3:** knowledge management
- **Section 4:** performance management

The latter three sections (2, 3 and 4) were drawn from the conceptual framework developed. The interview questions (15 questions in total) and the order, in which they were organised, therefore, were designed to provide a common agenda for discussions between interviewees and the researcher. Domestic managers were asked to respond to all four sections, since they have the overall knowledge in the control of HAI in domestic services. The rest were asked questions from a few sections, based on the relevance of questions, according to their job role (refer to Appendix 2b).

3.7.8   Data analysis – case study approach

Jorgenson (1989) defined analysis of research data as a breaking up, separating, or disassembling of research materials into pieces, parts, elements, or units. With facts broken into pieces, the researcher sorts and sifts them, searching for types, classes, sequences, processes, patterns, or whole sequences. The aim of this process is to reconstruct the data in a meaningful or comprehensible fashion. Analysing case study data, however, is one of the least developed and most difficult aspects of doing case studies (Yin, 1994). Given the type of data obtained from the case studies, content analysis was used during this stage of the research.

Content analysis can be defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Krippendorff, 1980). Holsti (1969) offers a broad definition of content analysis, as 'any technique for making inferences by objectively and systematically identifying specified characteristics of messages'. It is a set of procedures for collecting and organising non-structured information into a standardised format that allows inferences to be made about the characteristics and meaning of written and otherwise recorded material (Bureau of Justice Assistance, 2005). Wikipedia (2005) simply identifies content analysis as a standard methodology in the social sciences on the subject of communication content.

Content analysis is also known as textual analysis, however, the two are significantly different. The content analysis method offers a more rigorous

approach based on the clarification and formalisation of how the text is read and codified, according to preconceived or built in categories (Belerson, 1954). The purpose of textual data analysis is to analyse the text as a set of words, to make a statistic of their (i.e. the set of words) utterance and of their relationship within the text (Moscarola, 2002).

In the present study, the content analysis method was used, to analyse the data collected from the case study approach, mainly for the following reasons:

1. It enables the organisation of large amounts of data into codes and categories (Junginger, 1996).
2. It, systematically, identifies the properties of categories (Zhang and Kuo, 2001).
3. It enables the identification of the relationships between categories (Wikipedia, 2005).

What makes content analysis particularly rich and meaningful is its reliance on coding and categorising of data. The basics of categorising can be summed up:

> 'A category is a group of words with similar meaning or connotations'
> 'Categories must be mutually exclusive and exhaustive' (Stemler, 2001):

Several writers have identified and classified types of content analysis in different ways. Janis (1965, as cited in Krippendorff, 1980) offers the following classification:

1. Pragmatic content analysis – procedures which classify signs according to their probable causes or effects
2. Semantic content analysis – procedures which classify signs according to their meanings:
   - Designations analysis – provides the frequency with which certain objects are referred to
   - Attribution analysis – provides the frequency with which certain characterisations are referred to

- Assertions analysis – provides the frequency with which certain objects are characterised in a particular way, that is, roughly speaking, thematic analysis.

3. Sign-vehicle analysis – procedures which classify content according to the psychophysical properties of the signs.

Palmquist et al (2003), however, give a different classification for types of content analysis:

1. Conceptual analysis - in conceptual analysis, a concept is chosen for examination, and the analysis involves quantifying and tallying its presence. Conceptual analysis is also known as thematic analysis.

2. Relational analysis - Relational analysis, like conceptual analysis, begins with the act of identifying concepts present in a given text or set of texts. However, relational analysis seeks to go beyond presence, by exploring the relationships between the concepts identified. Relational analysis has also been termed semantic analysis.

Considering the type of data to be analysed, conceptual analysis was adopted for this particular study. It focuses on the occurrence of selected terms within a text or texts. Conceptual analysis begins with identifying research questions and choosing sample/s. Once chosen, the text was coded into manageable content categories. The process of coding is called a selective reduction. By reducing the text to categories, consisting of a word, set of words or phrases, the researcher can focus on, and code for, specific words or patterns that are indicative of the research question (Colorado State University, 2003).

Case studies in the two hospitals inevitably yielded a large amount of data, which was arranged into segments of material, based on an organising system derived from the issues raised in the interviews (refer to Appendix 3 – categories and codes used for the study).

The analysis of data was deferred until the end of data collection and this meant that the interviews were transcribed and placed into transcript files. As described in section 3.7.7, the interview data was recorded using a digital Dictaphone. The data recorded was then transferred and stored as computer files, using Power

Voice III. Power Voice III is software which allowed the storage of possibility of storing digital files as wave (*.wav) or MP3 (*.MP3) files. The software also allowed the researcher to store transcribed data of the interviews as TTS (Text-to-Speech) pad files. The TTS pad file is very similar to text files, apart from the fact that they have the option of converting the stored data to voice, if required. Storing transcribed interviews as TTS pad files was convenient, because the interviews were also saved in digital files, using the same software. The TTS pad files also had the option of being converted to word documents.

Careful reading of the transcribed data revealed that it was relatively easy to code the data, according to the sections of the questions and according to the issues raised by the participants. It was clear that the sections of the questions (refer to Appendix 2a) could be separated into key themes for analysis. It was also clear that the coded data under each and every section could be categorised as sub-themes/sections of the analysis. Coding of data was, therefore, fairly straightforward and easy, even though the number of codes used was comparatively large.

Manual coding was used in this research study instead of computerised coding. Manual coding entails reading text and extracting user-specified information deemed relevant to its content and/or context (Carley, 1990). However, as Morris (1994) claims, manual coding in content analysis is more reliable, but time consuming. The following are the main reasons for coding data manually, in this research study:

- Number of interviews conducted was fairly low (26)
- There were different groups of participants involved
- The interviewees were asked a different number of questions (refer to Appendix 2b)
- The different groups of participants used different words on the same subject (e.g. ICT members and ward nurses use more clinical words such as 'C-diff' for 'a type of infection', 'excretions' for 'body waste', 'immuno-suppressed' for 'low immune system', etc.).

The findings from the review of literature were also taken into account when analysing the content of the transcribed interview data. This allowed synthesising the literature to identify any divergence of theory vs. practices, if any.

3.7.9   Derivation of results of the case study findings – cross-case synthesis

During the semi-structured interviews, apart from the case study questions (refer to Appendix 2a), a matrix was also used (see Table 3.9). Developing this matrix at the initial stages of the semi-structured interviews allowed further elaboration of the questions to be asked from the case study participants. According to Community Forestry Field Manuals (1990), developing a matrix provides a framework for the semi-structured interviews. This process, of developing a matrix, made it possible to triangulate the data and add internal consistency to the interviews (Miles & Huberman, 1994). The main idea of this matrix system was to depict the main issues/areas to be considered, under each question raised. The main issues/areas were identified or derived using the discussions with the participants of the case studies.

Table 3.9:   An example of a matrix used for case study questions

Question …: Can you briefly enlighten me as to the policies in place in your hospital/Trust for the control of HAI in domestic services			
FM policy – According to your view, what are the main areas to be considered in a policy?	**Considering the current situation, in your hospital, how do you rate the adherence to policies?**		
	Yes* **(Y)**	**To Some Extent*** **(S)**	**No*** **(N)**
Clear mission*	✓		
Remit*		✓	
Objectives of FM*	✓		
Roles and responsibilities*		✓	
Reporting structure*			✓
Communication procedures*		✓	
Control of HAI practices*	✓		
………………			

* provided by the interviewee

Categories and codes were then developed, using the questions and the matrix used for the semi-structured interviews. Developing categories and codes provided the following advantages:

- Condenses the content into analysable units (Junginger, 1996)
- Generates concepts from/with data (Wikipedia, 2005)

The categories and codes developed were modified progressively, using the data gathered from the semi-structured interviews. Modifying the list of categories and codes step-by-step throughout the interview stage allowed the researcher to have the flexibility to investigate new issues/matters raised by the interviewees. The comprehensive list of categories and codes, developed for the data analysis, is given in Appendix 3. Most of the findings are presented according to the type of professional/staff categories and according to the type of case. Table 3.10 elaborates the codes used for the professional/staff, according to the type of case. The contents of the interview transcriptions were then categorised and coded according to the codes developed initially.

Table 3.10:   Codes used for professional/staff categories

	Code	Professional/ staff category
In-house case	FMGR (CS1)	Domestic Managers
	FMGR-SUP (CS1)	Domestic supervisors
	ICT (CS1)	Infecton Control Teams
	STAF (CS1)	Domestic staff
	NURS (CS1)	Nursing staff
PFI case	FMGR (CS2)	Domestic Managers on behalf of the trust
	FMGR-OUT (CS2)	Domestic Managers - external FM provider
	FMGR-SUP, OUT (CS2)	Domestic supervisors - external FM provider
	ICT (CS2)	Infecton Control Teams
	STAF (CS2)	Domestic staff
	NURS (CS2)	Nursing staff

As aforementioned, the main issues/areas to be considered under a particular question, with regard to the control of HAI in domestic services, were tabulated in a matrix form during the interview process. These issues were identified from the discussions with the interviewees. During the data analysis stage, these issues were tabulated, highlighting the number of interviewees that mentioned any particular issue. An example of this is given in Table 3.11. Results gleaned from this analysis were used to spot whether the main issues/significant areas to be considered were different from the issues/significant areas identified during the review of literature and informal interviews.

Table 3.11: Identifying the main issues – an example

Strategies adopted for the control of HAI in domestic services					
Description	**In-house case**		**PFI case**		**Total (16)**
	FMGR (CS1)	FMGR, SUP (CS1)	FMGR (CS2)	…..	
	Total 3		**Total 2**		
Set up standards	2	…..	1	2	**14**
………………..	….	…..	…..	…..	**12**
………………..	3	…..	…..	…..	**…**
Set up guidelines	1	…..	…..		**…**
……………….		…..	…..		**…**

Callout labels around the table:
- 'Question'
- Total number of interviewees in the particular staff/professional
- Staff/Professional category code
- Case study code
- Total number of interviewees asked about the particular 'question'
- Number of interviewees that mentioned the particular issue/area under the 'question'
- Total number of interviewees that mentioned the particular issue/area under the 'question'

As shown in Table 3.9, if the areas highlighted by the interviewees are considered to be in their domestic service, this is then ticked in the matrix. Finally, these results were also tabulated during the data analysis stage. An example of the derivation of these results from the matrix is elaborated in Table 3.12.

The results gleaned from Table 3.12 were then substantiated with interviewees' comments/arguments to strengthen the overall findings of the analysis. The overall findings of the case studies are elaborated in Chapters 5, 6, 7 and 8.

Table 3.12: **Example of the derivation of results**

Staff/Professional category code	Case study code	Number of interviewees presented ideas under the particular 'question'

Description — Case study		In-house case			PFI case		
		FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
		2	1	3	2	2	2
Impact of domestic services on HAI rates		Y (1)	Y (1)	-	Y (2)	N (2)	-
Priority given for control of HAI in domestic services		-	Y (1)	Y (1)	-	-	N (2)
Awareness of domestic teams in the control of HAI	Dometic managers	-	-	Y (3)	-	Y (1)	-
	Domestic staff	-	-	Y (1), S (2)	-	Y (1)	-
Change of work practices in domestic services due to the high priority given for control of HAI in recent years		Y (2)	-	-	N (1)	-	N (1)

Sub-issues as identified by the interviewees under a particular 'question'	The level of agreement on the particular sub-issue regarding its existence in the particular domestic service (i.e. yes – Y, to some extent – S, no – N)	Total number of interviewees that agreed on the particular sub-issue

3.7.10 Reliability and validity of the findings of the case studies

The content analysis method adopted for this study allowed a comprehensive cross-case analysis to be done and robust results relating to the control of HAI in domestic services to be derived. However, as in most of the data analysis method/s, content analysis also has problems of reliability and validity. As Weber (1990) notes, reliability problems usually grow out of the ambiguity of word meanings, category definitions, or other coding rules. Yet, it is important to recognise that the people who have developed the coding scheme have often been working so closely on the project that they have established shared and hidden meanings of the coding (Stemler, 2001). The obvious result is that the reliability coefficient they report is artificially inflated (Krippendorff, 1980). Gottschalk (1995; as cited in Colorado State University, 2003) points out that the issue of reliability may be further complicated by the inescapably human nature

of researchers. For this reason, he suggests that coding errors can only be minimised, and not eliminated (he sees 80% as an acceptable margin for reliability).

Validity of a content analysis study refers to the correspondence of the categories to the conclusions, and the generalisability of results to a theory (Colorado State University, 2003). Shapiro & Markoff (1997) assert that content analysis itself is only valid and meaningful to the extent that the results are related to other measures. According to the Colorado State University (2003), the overarching problem of content analysis is the nature of the conclusions reached by its inferential procedures.

Content analysis also suffers from several disadvantages, both theoretical and procedural. In particular, content analysis (Colorado State University, 2003):

▪ Can be extremely time consuming

▪ Is subject to increased error, particularly when relational analysis is used to attain a higher level of interpretation

▪ Is often devoid of a theoretical base, or attempts to draw meaningful inferences too liberally, about the relationships and impacts implied in a study

▪ Is inherently reductive, particularly when dealing with complex texts

▪ Tends too often to simply consist of word counts

▪ Often disregards the context that produced the text, as well as the state of things after the text is produced

▪ Can be difficult to automate or computerise

However, considering the context of this research and considering the advantages of content analysis method given in the previous sections, it can be concluded that the advantages overshadow the disadvantages.

3.7.11 Limitations of the study

One major limitation of the study was identified as being that the sample chosen from the domestic supervisors, domestics and ward nurses. Due to issues such as staff absenteeism, high turnover of staff, and high workload, it was difficult to

choose a large sample. It was also difficult to have individual discussions with the selected staff. The list of staff who participated in semi-structured interviews was provided by the domestic supervisor and the assistant domestic managers of the two hospitals. Therefore, the sample was not a random one and was one that could be viewed as open to bias. This was evident from the type of domestics interviewed. Most of them were middle-aged and well-experienced staff who had been working in the same hospital for a long time. This limitation, however, did not materially impact upon the outcome of this stage of the study. The necessary research objective was achieved.

3.8   STAGE 3 - THE QUESTIONNAIRE SURVEY

The research process of this stage is shown in Figure 3.7. Discussions on this stage are given in subsequent sections.

Purpose of this stage of the research study	Corroborating the findings of the case study approach & identifying the performance management approaches in-use in the control of HAI in domestic services
Research questions	1. Identify the level of involvement and integration of key players in the control of HAI in domestic services 2. Investigate the key factors that promote/inhibit effective knowledge management 3. Review of current performance management approaches in-use 4. Identify critical issues relating to performance management
Research strategy	Quantitative Method
Sample	Domestic managers and ICT members from the NHS (England and Scotland)
Data collection	Postal Questionnaire Survey
Data Analysis	Inferential and Descriptive statistics (using SPSS 12.0.1)
Derivation of results	Main findings of the research

Figure 3.7:   The research process – third stage of the research study

3.8.1   Purpose of the third stage of the study

The main purpose of this stage of the study was to identify the performance management approaches in use for the control of HAI in domestic services and its associated issues (objective 6 of the study – see Table 1.2). In addition, this stage of the study was carried out to corroborate some significant findings of the case study approach. This is discussed in detail in the following section.

3.8.2   Research questions and hypotheses

The case study findings highlighted the need to investigate issues relating to; the level of involvement and integration of the key players in the control of HAI (refer to sections 6.4.2 and 6.5.2); and key factors that promote/inhibit effective knowledge management (refer to sections 7.4.1 and 7.5.1). Stage 3 was, therefore, undertaken to examine research questions IV to VIII of the study (see Table 1.2). These are:

- What is the level of involvement and integration of the key parties in the control of HAI, if any, in the successful implementation of strategies adopted for the control of HAI in domestic services?
- What are the key factors that promote/inhibit effective knowledge management in the control of HAI in domestic services?
- What are the common performance management approaches in-use in the control of HAI in domestic services?
- What are the critical issues that affect the level of performance in the control of HAI in domestic services?

The following hypotheses were used to examine the abovementioned research questions (see Table 1.2):

A. The level of involvement of key players varies according to their job role in the control of HAI

B. The level of involvement of key players varies according to the type of domestic service provision

C. The level of integration between the domestic managers and ICT members in the control of HAI in domestic services is low when the level of 'outside control' of the domestic service is high

D. The key factors that promote effective knowledge management differ according to the type of domestic service provision

E. The key factors that inhibit effective knowledge management differ according to the type of domestic service provision

F. The types of performance management approaches used differ according to the type of domestic service provision

G. There is a positive correlation between the effectiveness and frequency of use of performance management approaches

3.8.3 Research strategy for the third stage of the study

As shown in the research framework (see Figure 3.1), the third stage of the study adopted a quantitative approach. A survey approach was used to fulfil this.

Survey is a very popular quantitative method in social science (Creswell, 2003). Surveys are well suited to descriptive studies where the interest is, say, in how many people in a given population possess a particular attribute or opinion (Denzin, 1978). However, survey data can also be used to explore aspects of a situation, or to seek explanation and provide data for testing hypotheses (Oppenheim, 1966). Webster defines a survey as

> "the action of ascertaining facts regarding conditions or the condition of something to provide exact information, especially to persons responsible or interested" and as "a systematic collection and analysis of data on some aspect of an area or group" (Department of Defence – United States, 1996).

A survey, therefore, is much more than the mere compilation of data. The data must be analysed, interpreted, and evaluated. Successful completion of this entire process of data analysis, interpretation and data evaluation, hence, depend on the surveyor's (the person involve in the process of survey) skills and the methods adopted.

There are several methods to carry out a survey. According to Creswell (2003), a survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population, by studying a sample of that population. Here, Creswell's view was only on sample survey, which is one of the two main methods of surveys. The other method of survey is 'census' (Department of Defence – United States, 1996). This involves looking at the entire population (entire group) coming under the area of the research study. It is, however, obvious that census is not a realistic method for researchers if the population is large and the time allocated for the research study is limited. It can be costly and time consuming, albeit the accuracy is high if the entire population is selected.

A sample survey was selected for this research study, as the research study is bound by time and cost constraints. A sample survey involves examining a portion of the population of the area of research, and inferring information about the population as a whole.

The common types of surveys are postal, telephone and interview surveys. Out of these, a postal questionnaire survey was chosen as the mode for the data collection process. According to Oppenheim (1996), postal questionnaire surveys tend to have a lower response rate, which will distort and hence flaw a sample. Although telephone surveys may be relatively efficient and inexpensive, the more time consuming and correspondingly expensive personal interview allows more details and complex data to be collected (Frankfort-Nachmias and Nachmias, 1996). One of the main reasons for choosing postal questionnaire survey was to ensure anonymity of the respondents.

3.8.4 Sample chosen for the third stage of the study

The target sample of the survey was chosen from NHS (England and Scotland) Acute hospitals. Determining the size of the sample was important to ensure the representativeness of the sample to the population concerned. Without a representative sample, the survey could, most likely, produce results that are false or misleading, which can eventually make a negative impact on the main aim and objectives of the research study stated in section 1.2.2 (see Table 1.2).

A method fairly similar to stratified sampling was adopted, although, snowball sampling was also used at the beginning, to choose a sufficient sample. In the snowball sampling method, as explained by Robson (1993), the researcher identifies one or more individuals from the population of interest. After they have been interviewed (during the informal interviews and case studies), they are used as informants to identify other members of the population, who are themselves used as informants and so on. However, since there were different levels (strata) involved in the population of this particular research study (see Figure 3.8), stratified random sampling was considered as the most suitable method to select a representative sample.
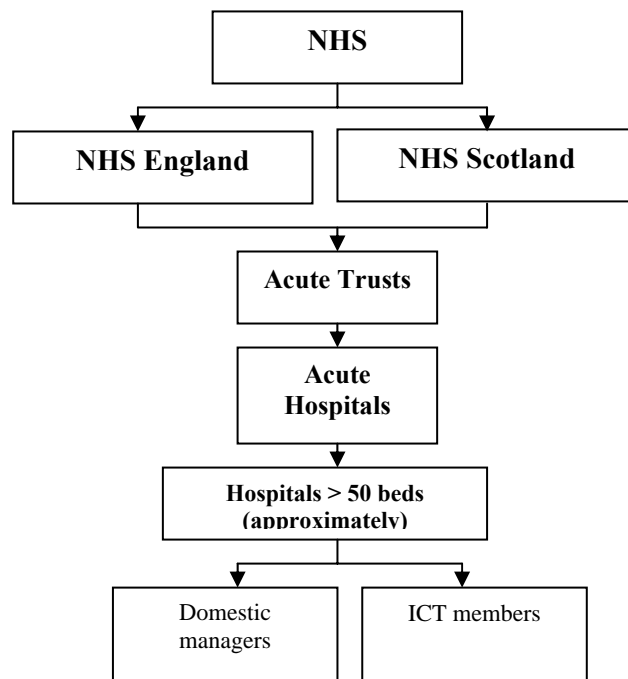
Figure 3.8:   Different strata of the targeted population

According to Robson (1993), stratified random sampling involves dividing the population into a number of groups of strata, where members of a group share a particular characteristic or characteristics. Stratified random sampling ensures that different groups of a population are adequately represented in the sample, so as to increase the level of accuracy when estimating parameters (Frankfort-Nachmias and Nachmias, 1996). It was attempted to ensure that the numbers of groups selected for the sample reflect the relative numbers in the population as a whole. This is an important strategy in order to have a proportionate sample (Creswell, 2003).

The sample was chosen mostly using the latest databases of Binley's NHS Facilities Management directory (2004 – 2005 edition) and the Infection Control Nurse's Association (ICNA) handbook (2004/2005). Directories were regarded as the most suitable method of choosing the sample for the survey, due to following reasons:

- Up-to-date nature of the directories
- Information available in the directories was clear and easy to use, in order to choose respondents from both NHS England and Scotland
- Time savings as the respondents' full contact details were available in the directories

In addition to these directories, the researcher was also able to expand the sample through personal contacts (snowball sampling). The level of support given by the Association of Domestic Managers (ADM - UK) and the Property and Environment Forum Executive - Scotland (now known as Health Facilities Scotland) was immense in this process.

A total of 1304 professionals, from NHS Scotland and NHS England, were chosen for the survey sample. The sample included domestic managers at different levels, ranging from the strategic to operational level. It also included ICT members. The following criteria were adopted when choosing the sample from the directories and through personal contacts:

1. Sample under the category of domestic managers – they should be directly involved in domestic services. Therefore, the job role of the participants should be one of the following:
    - Domestic manager
    - Assistant domestic manager
    - Head of facilities
    - Hotel services manager
    - Assistant hotel services manager

   The chosen sample should be domestic managers who are based in an acute hospital. However, some of the participants were based in acute Boards/Trusts (e.g. head of facilities). They were included in the sample only after verifying (through telephone conversations) that they were directly

involved in managing domestic services in the acute hospitals within the particular Trust.

2. Sample under the category of ICT members – the job role of the participants should be one of the following:

   - Infection control nurse

   - Senior infection control nurse

   - Infection control specialist

   The chosen sample of ICT members should be based in an acute hospital as well.

3. As mentioned above, the chosen sample of domestic managers and ICT members should be based in acute hospitals. These acute hospitals should have, approximately, more than 50 beds. This criterion was chosen because most of the acute hospitals with less than 50 beds only have a domestic supervisor based in the hospital to run the domestic services in the hospital. The domestic service of these hospitals was overall managed by the head of facilities, based either in the acute Trust or in the main acute hospital (most of them were already included in the sample). However, it should be noted that, regardless of the size of the acute Trust, at least one acute hospital (i.e. at least the main acute hospital) was chosen from all the acute Boards/Trusts in NHS Scotland and England, in order to amplify the external validity of the sample chosen.

The sample chosen was coded (see Table 3.13) according to the type of professional category (i.e. domestic services teams or ICT members) and the region (i.e. NHS England/NHS Scotland). This code was followed by a number during the data recording process (e.g. FM-SCOT 1, FM-SCOT 2, FM-ENG 1, FM-ENG 2, etc.). The percentages of the chosen sample, according to the region and according to the professional category, can be drawn in a pie chart as shown in Figure 3.9. From the pie chart, it can be seen that the majority of the sample were domestic managers from England (a percentage of nearly 40%). Overall, nearly 69% of the entire sample was from England. According to professional categorisation, about 63% were domestic managers.

Table 3.13:   Codes given for the respondents

Code	Description
FM-SCOT	Domestic managers from Scotland
FM-ENG	Domestic managers from England
ICT-SCOT	ICT members from Scotland
ICT-ENG	ICT members from England
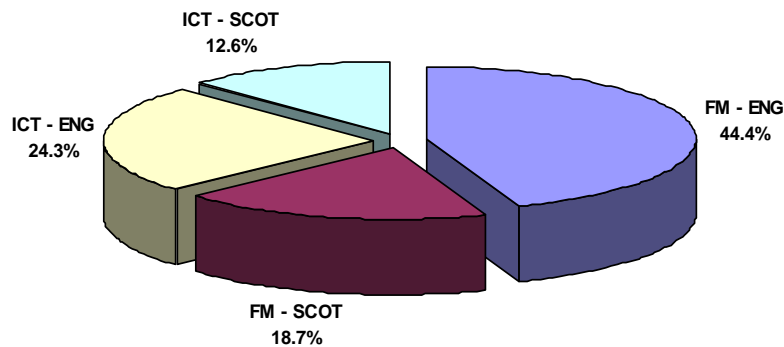
Figure 3.9:   Percentage distribution of the sample - according to different stratum

3.8.5   Data collection - postal questionnaire survey

A questionnaire was developed to reflect the research questions and key issues identified in section 3.8.2. The questionnaire (refer to Appendix 4a) consisted of three main sections as follows:

1. Involvement and integration of key players in the control of HAI
2. Knowledge management
3. Performance management

Close-ended questions, which were multiple-choice in nature, were used for the questionnaire, so as to avoid any complications during the data reduction stage. A Likert scale was used for all the questions. A Likert scale is a special form of multiple-choice scale and is a commonly used method for intensity questions. It allows the respondent to choose one of several degrees of agreement or disagreement about a statement. Respondents have a greater opportunity to express a variety of views if several alternative answers are available (Batchelor et al, 1994). According to Batchelor et al, attitudinal measures, in the form of Likert scales, can generate more valid data than single measures. In this research,

a Likert scale of 5 was seen as the most suitable method to choose phrases that are far enough apart from one another to be easily discriminated, while at the same time, keeping them close enough to ensure that the researcher does not lose potential information. A Likert scale of 4 is also acceptable in that way, however, since it was necessary to include a statement of 'not applicable', a Likert scale of 5 was appropriate. For example, if the question was about the extent of agreement of a statement, the Likert scale was:

1 Strongly Agree   2 Agree   3 Disagree   4 Strongly Disagree   5 Not Applicable

The researcher should gauge whether the phrases are commonly understood, so that different respondents will interpret the meaning of the phrases in the same way (Department of Defence – United States, 1996) in order to ensure the reliability of the information gathered. The use of a Likert scale of 6 or more was rejected, as it is perceived that this would cause confusion among the respondents.

To ensure adequate coverage of the issues, the questionnaire was evaluated by the research supervisor. The initial questionnaire developed was further scrutinised by three academicians, three domestic managers and two ICT members. This was to ensure understandability, applicability, clarity and unambiguity of the questions. The professionals contacted during this piloting of the questionnaire were all known to the researcher. The questions were slightly modified, based on their comments. The modifications were mostly in terms of the wordings of the questions. The modified set of questions was used in the final questionnaire. The pilot also revealed that the completion of the questionnaire would take approximately 20 minutes. The final version of the self-administered, structured questionnaire was mailed to the chosen sample (refer to section 3.8.4). It was assumed that the contacts abstracted from the databases (Binley's directory and Infection Control Nurses handbook – refer to section 3.8.4) were accurate. However, the contact details of the sample were checked and verified by making telephone calls to a selected random sample of 200 out of the 1304 sample chosen. Since there were many layers/stratifications of the sample, the respondents were asked to indicate whether they were from the NHS England or

NHS Scotland, their job role and their level of experience (total years of experience and years of experience in their current hospital).

A reasonable period of 4 weeks was given for the completion of the questionnaire. Responses received throughout the weeks are portrayed in Table 3.14. Altogether, a period of 7 weeks was taken to receive the responses.

Table 3.14:   Questionnaire responses – weekly categorisation

Week No.	Professional Category and Country	Questionnaires Received	Completed questionnaires received	Returned questionnaires*
1	FM - ENG	21	19	2
	FM - SCOT	15	14	1
	ICT - ENG	22	22	-
	ICT - SCOT	21	21	-
	Total in WEEK 1	**79**	**76**	**3**
2	FM - ENG	78	78	-
	FM - SCOT	48	48	-
	ICT - ENG	52	52	-
	ICT - SCOT	38	38	-
	Total in WEEK 2	**216**	**216**	**0**
3	FM - ENG	18	18	-
	FM - SCOT	11	11	-
	ICT - ENG	6	6	-
	ICT - SCOT	25	25	-
	Total in WEEK 3	**60**	**60**	**0**
4	FM - ENG	7	7	-
	FM - SCOT	4	4	-
	ICT - ENG	8	8	-
	ICT - SCOT	4	4	-
	Total in WEEK 4	**23**	**23**	**0**
5, 6 & 7	FM - ENG	15	15	-
	FM - SCOT	7	7	-
	ICT - ENG	9	9	-
	ICT - SCOT	6	6	-
	Total in WEEKS 5, 6 & 7	**37**	**37**	**0**
Quesitonnaires received	FM - ENG	139	137	2
	FM - SCOT	85	84	1
	ICT - ENG	97	97	-
	ICT - SCOT	94	94	-
	Total	**415**	**412**	**3**
Total Questionnaires Sent			**1304**	
Response Rate		**31.83%**	**31.60%**	**0.23%**

* recipients were not at the address sent

A total of 412 completed and usable questionnaires were received out of the 1304, giving an overall response rate of 31.60% (see Table 3.15). The response

rate is the percentage of respondents in the sample who returned the completed questionnaire.

Table 3.15: Response rate

Professional Category and Country	Questionnaires Sent	Questionnaires Received	
	No.	No.	%
FM - ENG	579	137	10.5
FM - SCOT	244	84	6.4
ICT - ENG	317	97	7.4
ICT - SCOT	164	94	7.2
Total	**1304**	**412**	**31.6**
Total Response Rate		**31.60%**	

Frankfort-Nachmias and Nachmias (1996) state that a low response rate is one of the serious disadvantages of the postal questionnaire survey. As they observed, the typical response rate for a personal interview is about 95%, whereas the response rate for a mail survey is between 20 and 40%. Therefore, the response rate of this survey, i.e. 31.60%, can be judged as a fairly satisfactory response rate. The reasons for attaining such an adequate response rate could be:

1. Personal contacts of the researcher
2. Layout of the questionnaire: straightforward and easy to understand
3. The area under study (HAI and cleanliness in hospitals) has received ample attention lately, especially in the UK, due to its severity and impact on the NHS and on the community as a whole.
4. Targeting ICT members, as part of the sample chosen, added more credibility to this research, and a means of obtaining different perspectives on the subject of control of HAI in domestic services. The case study participants from the ICT members perceived this study as a highly pertinent research, which could highlight the significance of their involvement in the control of HAI. This is evident from the questionnaire survey response as well. One hundred and ninety one (191) responses were received from the 481 questionnaires sent to ICT members (see Figure 3.10).
5. The questionnaire incorporated a cover letter, which highlighted the importance of taking part in the questionnaire survey. It was also mentioned that a copy of the results would be sent to the respondents if they so wished. Further, the questionnaire highlighted the benefits of this research study, e.g.

the development of a performance management framework for the control of HAI in domestic services.

All the above reasons might have made a positive impact on the fairly good response rate. The percentage of responses, according to the type of professional category and NHS type, is presented in a pie chart in Figure 3.10. According to the percentage of responses, 33% of the responses are from domestic managers in England. Percentage wise, there is an increased rate of response from the ICT members in Scotland, i.e. 22.8%, compared to the percentage distribution of the sample (see Figure 3.9 and Figure 3.10). This is may be due to the reason 4 explained above. Overall, nearly 57% of the responses were from NHS England.
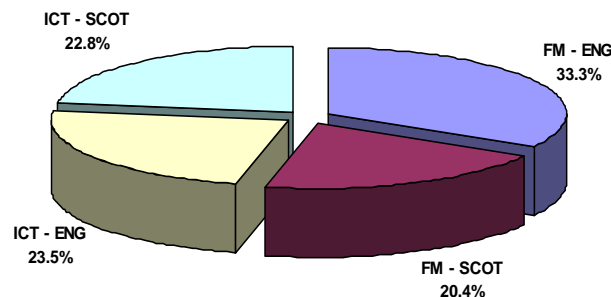
Figure 3.10: Percentage distribution of response rate

3.8.5.1 Respondent experience

Table 3.16 presents information on respondents' work experience, tabulated according to their job role and region (i.e. England or Scotland). It is given in two categories: years of experience in the present hospital in the control of HAI and total years of experience in the control of HAI. Herein, the first category is important, since most of the answers to be provided in the questionnaire are based on the experience in the current hospital where the respondents work, whilst the second is important, overall, to identify their total level of experience in the area of control of HAI.

Table 3.16:   Respondent experience according to the job role and region

Job title and country		Experience (in the current hospital)	Total years of Experience
FM-ENG	Mean	3.15	3.82
	N	137	137
	Std. Dev	1.380	1.236
ICT-ENG	Mean	2.88	3.56
	N	97	97
	Std. Dev	1.111	1.181
FM-SCOT	Mean	3.27	4.05
	N	84	84
	Std. Dev	1.245	1.129
ICT-SCOT	Mean	2.77	3.46
	N	94	94
	Std. Dev	1.102	1.094
Total	Mean	3.02	3.72
	N	412	412
	Std. Dev	1.243	1.186

Meaning of Scale (for mean values): **1** - Less than 1 year   **2** - 2 to 5 years   **3** - 6 to 10 years

4 - 11 to 15 years   **5** - More than 15 years

The mean value for years of experience (in their current hospital) is 3.02 ($\cong$ 3). Thus, according to the meaning of scale, the average years of experience (in the current hospital) of both FM and ICT respondents from England and Scotland is between 6 and 10 years. The mean value, for total years of experience of FM and ICT respondents from both England and Scotland, is 3.72 ($\cong$ 4). Therefore, their average years of experience (in total) is between 11 and 15 years. This provides a good base of personal experience in the sample. Thus, based on the respondents' designation (job role) and work experience, it is reasonable to infer that they have a reasonable knowledge of the control of HAI in domestic services.

3.8.5.2   Type of domestic service provision

Table 3.17 presents information on the type of domestic service provision of the respondent's organisation. It is tabulated according to their job role and region.

Table 3.17:   Type of domestic service provision of the respondents' organisations

		FM-ENG		ICT-ENG		FM-SCOT		ICT-SCOT	
		Count	Table %	Count	Table %	Count	Table %	Count	Table %
Type of FM service	Totally in-house	75	18.2%	49	11.9%	61	14.8%	62	15.0%
	Balanced approach	28	6.8%	8	1.9%	7	1.7%	11	2.7%
	Totally out-sourced	22	5.3%	26	6.3%	10	2.4%	17	4.1%
	PFI	12	2.9%	14	3.4%	6	1.5%	4	1.0%

From Table 3.17, it can be seen that, overall, both domestic managers and ICT members across England and Scotland have the highest representation, with totally in-house domestic services (a total of 247 respondents, giving an overall percentage of approximately 59.9%). Representation from the PFI type of domestic service provision is fairly low, giving an overall percentage of approximately 8.5% (a total of 36 respondents). The reason for the low representation from the PFI domestic services may be due to the fact that, comparatively, there are only few PFI hospitals in both England and Scotland anyway. Although the information on the number of contracted-out domestic services (including PFI services) is not held centrally (Hansard, 2000), Unison estimates it to be 30% of the domestic services across the NHS in the whole UK (Unison, 2005).

3.8.6   Data analysis – postal questionnaire survey

The data from the questionnaire survey responses was first entered on to a spreadsheet (Microsoft Excel software) and was then transferred to the Statistical Package for Social Science (SPSS version 12.0.1) software. This provided ease of handling for the large set of data, in the following ways:

- To speed up the manual data entering process
- To allow the organisation of data efficiently
- To allow dealing with data with ease

Each column of the spreadsheet represented a variable in the dataset, while each row of the spreadsheet represented a record. Since the amount of data was

comparatively large, each column was coloured differently to avoid any confusions/faults.

The most difficult part of completing the entry of data was proofreading the data for errors. At the end of completing the data entry, checking the data randomly with chosen questions was carried out to proofread the data sets. This was time-consuming, although worthwhile to ensure accuracy of the data entry process. Having different coloured columns for different questions/sub-sections, made the proofreading relatively easy.

At the end of the data entry process, dealing with missing data was also given due consideration. According to Robson (1979), 'the most acceptable solution to the problem of missing information is not to have any'. However, receiving questionnaires with missing data is often inevitable. Since there were two main stratifications of the dataset, according to the professional category, i.e. domestic managers and ICT members, the amount of missing data from the ICT members was comparatively large, compared to the responses from domestic managers. Generally, this could be because the level of involvement ICT members in the control of HAI in domestic services was fairly low - thus, they must have been unaware of some questions raised in the questionnaire. Coding such missing data was needed to make a distinction between the missing data and the 'do not know' or 'not applicable' responses.

Missing data can be coded in many ways. Most commonly, it can be coded as 'zero (0)' (Robson, 1993), 'hyphen (-)' or by using a 'full stop (.)' (Bryman and Cramer, 2005). Using a hyphen in spreadsheets is considered unsuitable, as it causes confusion, being similar to the minus sign. Most of the data was entered using an ordinal scale of 1 to 5: 1 being the highest rate and 5 being the lowest. Therefore, zero as the code for missing data could potentially be used. However, owing to the fact that the mean factor distribution was used as one of the statistical analysis methods, the use of zero for missing data could also have caused confusion. Therefore, the use of 'full stop' was considered the most suitable method. It avoided any confusion in terms of data analysis, handling or dealing with data.

Missing Value Analysis (MVA) was used to ensure the proper handling of missing data. Through MVA, it was identified that data was missing completely at random (MCAR). MCAR exists when missing values are randomly distributed across all observations (Allison, 2001; Little and Rubin, 1987). The MVA technique, within the SPSS software, supported *Little's MCAR test*, which is a chi-square test for missing values which are completely at random. If the 'p' value for Little's MCAR test is not significant, then data is assumed to be MCAR. If data are MCAR, then the researcher may choose list-wise or pair-wise deletion of cases. If data are not MCAR, missing values should be imputed (Little and Rubin, 1987). In the present study, the data were MCAR.

The entered data was then analysed, using the SPSS software. Identifying the type of data was crucial at this stage, in order to devise the correct method/s to be used for the analysis. According to the American Psychological Association (1994), the type of data can be identified in four main ways, according to the scales of measurement. The scales of measurement are commonly broken down into four types, i.e. nominal, ordinal, interval and ratio. The four types identified above can be categorised into two groups: categorical and continuous scale data. Nominal and ordinal scales are categorical data; interval and ratio scales are continuous data (Cho, 1997). Categorical data, having unordered scales, are called nominal scales. A person's name is a good example of the nominal scale. Categorical data, having ordered scales, are called ordinal scale. The 'ranking of degree of satisfaction' is an example of an ordinal scale. Continuous data, having interval scales, are called interval scales. Continuous data, having both equal intervals and an absolute zero point, are called ratio scales (Lee, 1999). As Cho (1997) describes, the reason for the type of data in the dataset is that the data analysis method differs according to the scale of measurement. According to the American Psychological Association (1994), categorical scale data use nonparametric measures, such as logistic regression models and log linear models. Continuous scale data use parametric measures such as t-test, ANOVA, regression, etc.

In this study, the data gathered from the questionnaire survey were categorical data. They were mainly ordinal and nominal data. Given the research questions

to be answered, and the nature of variables (i.e. independent or dependent), both descriptive statistics (mainly mean value comparison and cross tabulation) and inferential statistics (e.g. spearman's correlation, Kruskal-Wallis, etc) were used for the data analysis. Herein, descriptive statistics generally characterise or describe a set of data elements, by displaying the information graphically or describing its central tendencies and how it is distributed. On the other hand, inferential statistics try to infer information about a population by using information gathered by sampling (Calkins, 2005). The level of significance levels used throughout the analysis were 5% (0.05) and 1% (0.01). Using the aforementioned two classifications (i.e. descriptive and inferential statistics), the tests/methods adopted for the study are given below.

i. Cronbach's alpha: Santos (1999) notes that Cronbach's alpha is not a statistical test but a coefficient of reliability (or consistency). Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability or internal consistency of factors extracted from dichotomous (questions with two possible answers) and/or multi-point formatted questionnaires or scales (Santos, 1999). The higher the score, the more reliable the generated scale is.

ii. Mean value comparison: Mean is the average value in a data set. The comparison of mean values of two or more independent samples was done during the quantitative data analysis as it allows the identification of some differences between those samples.

iii. Null hypothesis testing: The purpose of null hypothesis is to test the viability of the null hypothesis in the light of experimental data (Lane, 1993). Thus, null hypothesis testing was used during the data analysis. The null hypotheses used were often the reverse of what was actually believed: they were put forward to allow the data to contradict them.

iv. Kruskal-Wallis test: The Kruskal-Wallis test is a one-way analysis of variance by ranks. It tests the null hypothesis that multiple independent samples come from the same population. Unlike standard Analysis of Variance (ANOVA), it does not assume normality, and it can be used to test ordinal variables. The Kruskal-Wallis One-Way ANOVA test for a k-independent sample was used to test the hypothesis that the responses of four

types of respondents (FM – England, FM – Scotland, ICT – England and ICT -Scotland) do not vary by comparing the mean ranking scores of the four groups of individual factors. The test statistic used is Chi-square value.

v. Mann-Whitney test: Mann-Whitney statistics was used for the study to test the null hypothesis in order check whether two independent samples come from the same population. The Mann-Whitney U test is equivalent to the Wilcoxon rank sum test and the Kruskal-Wallis test for two groups (Lane, 1993).

Apart from the aforementioned tests, some other methods were also used for measuring relationships between variables. The variables used for this study are nominal and ordinal. Hence, as Bryman and Cramer (2005) have suggested, the following rules of thumb were used for this study, to examine the relationship between the variables.

▪ Nominal-Nominal: Cross tabulation was used in conjunction with chi-square, as a test of statistical significance. Cramer's *V* or Phi is used to test for strength of association of the variables. The former is used for larger tables in which the number of both rows and columns is greater than 2.
▪ Ordinal-Ordinal: Spearman's *rho* and its associated significance tests
▪ Nominal-Ordinal: Same as 1.

The following paragraphs explain the aforementioned methods in detail.

i. Cross tabulation: Cross tabulation is a type of contingency table. The cross tabulation table is the basic technique for examining the relationship between two categorical variables, possibly controlling additional layering of variables (Department of Deference, 1996). In this study, the cross tabulation procedure was used to obtain tests of independence and measures of association and agreement for nominal and ordinal data.

ii. Chi-square: The Chi-Square test procedure tabulates a variable into categories and computes a chi-square statistic. This goodness-of-fit test compares the observed and expected frequencies in each category, to test either that all categories contain the same proportion of values, or that each category contains a user-specified proportion of values (Robson, 1992). In

this study, the Chi-Square test procedure was utilised to tabulate the variables into categories and test the hypothesis that the observed frequencies do not differ from their expected values.

iii. Phi: According to Lane (1993), 'phi' is a chi-square-based measure of association that involves dividing the chi-square statistic by the sample size and taking the square root of the result. Phi test was used for this study when the pairs of variables were dichotomous. Phi statistic's interpretation is the same as Pearson's *r*, in that it varies between 0 and plus or minus 1 to provide an indication of the strength of a relationship. A relationship of -1 or +1 would indicate a perfect relationship, negative or positive respectively, between the variables. The complete absence of relationship would engender a computer *r* of zero. The nearer *r* is to zero, the weaker the relationship. Cohen and Holliday (1982) suggest the following for a large correlation: 0.19 and below is very low; 0.20 to 0.39 is low; 0.40 to 0.69 is modest; 0.70 to 0.89 is high; and 0.90 to 1 is very high. However, as Bryman and Cramer (2005) inform us, these are rules of thumb and should not be regarded as definitive indications, since there are hardly any guidelines for interpretation over which there is substantial consensus.

iv. Cramer's *V*: Cramer's *V* is a measure of association, based on chi-square. This test, whose calculation in large part derives from chi-square, provides results that vary between 0 and +1. As Bryman and Cramer (2005) observed, in a 2 x 2 table, phi and Cramer's *V* will yield the same result.

v. Spearman's *rho*: The bivariate correlations procedure computes the pair-wise associations for a set of variables and displays the results in a matrix. Spearman's *rho* statistics measure the rank-order association between two scale or ordinal variables. They work regardless of the distributions of the variables (Lane, 1993). Spearman's *rho* was used in this study as it determines the strength and direction of the association between ordinal variables.

3.8.7   Derivation of results – postal questionnaire survey

The final stage of the questionnaire survey was to derive results/conclusions using the aforementioned data analysis process. Conclusions were drawn using

the main findings of the data analysis. Overall, this stage of the study assisted in deriving results, mainly on the performance management approaches in use in the control of HAI in domestic services (refer to Chapter 8). The findings of this stage also acted as the basis for developing the performance management framework as the final output of the research study.

3.8.8   Reliability analysis of the data

Reliability analysis allows for the study of the properties of measurement scales and the items that make them up. The reliability analysis procedure calculates a number of commonly-used measures of scale reliability and also provides information about the relationships between individual items in the scale. In this study, Cronbach's alpha was used for reliability analysis of the data (refer to section 3.8.6).

Table 3.18 gives the Cronbach's alpha values of this particular survey. As Bryman and Cramer (2005) suggest, the nearer the result of alpha value to 1 - preferably 0.8 or above - the more internally reliable the scale is. However, as Nunnaly (1978) suggests, 0.7 to be an acceptable reliability coefficient. As he further noted, lower thresholds are sometimes used in the literature. As shown in Table 3.18, the alpha coefficient of the data ranges from 0.681 ($\cong$0.7) to 0.851. This indicates that the measures of scale used are reliable and the data collected are interrelated, considering 0.7 as the cut-off value for being acceptable. Cronbach (1951) suggests that, if the scale shows poor reliability, then individual items within the scale must be re-examined and modified or completely changed as needed. It emphasises that a reliability test is especially important when derivative variables are intended to be used for subsequent predictive analyses.

Table 3.18:   Cronbach's alpha of the survey data

Question no.*	Item/variable	Cronbach's Alpha
6	Level of involvement	0.851
9	Level of integration	0.760
11	Factors that promote/inhibit effective knowledge management	0.681
12a	Frequency of use of Performance Management approaches used for the control of HAI in domestic services	0.729
12b	Level of effectiveness of the Performance Management approaches used	0.768
13	Key issues related to managing performance in domestic services	0.827
14	Areas of improvement needed in the Performance Management approaches used	0.839

* refer to Appendix 4a for the questions

3.9   STAGE 4 – PERFORMANCE MANAGEMENT FRAMEWORK (PMF)

The research process of this stage is shown in Figure 3.11. This stage consisted of two sub-stages:

- The development of the Performance Management Framework (PMF)
- The refinement and validation of the PMF

Discussions on the aforementioned two stages are given in the following sections.
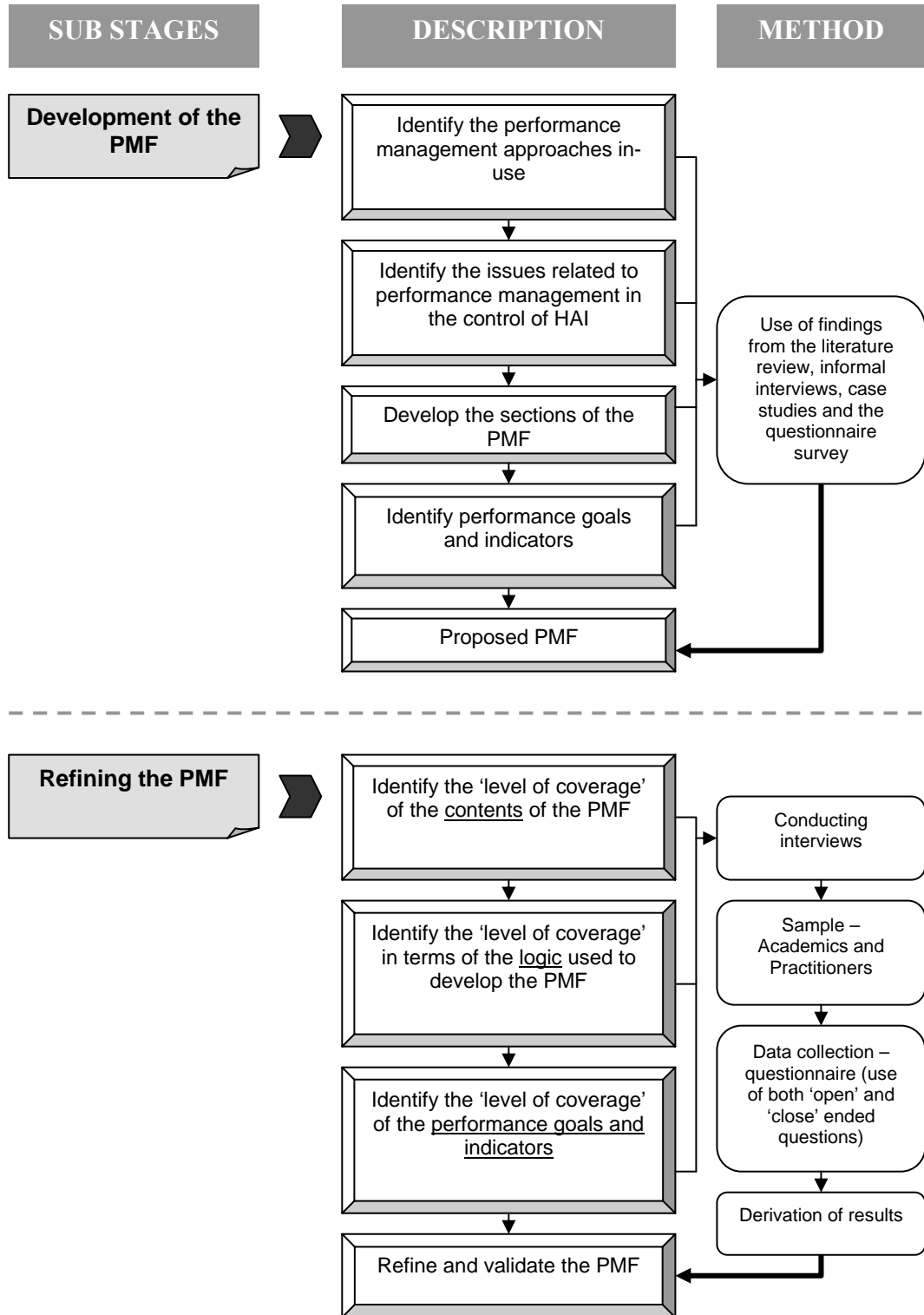
Figure 3.11: The research process – fourth stage of the research study

3.9.1 The development of the Performance Management Framework

Findings of stage 1 (review of literature and informal interviews), stage 2 (case study approach) and stage 3 (questionnaire survey) of the study highlighted the need for a PMF. These findings also assisted in identifying the contents of the PMF. This is discussed in detail in Chapter 9.

3.9.2 The refinement and validation of the Performance Management Framework

The developed PMF was refined and validated. This was achieved using the views of experts in the areas of performance management, control of HAI and facilities management (domestic services in particular). The experts chosen consisted of both academics and practitioners. The academics were mainly university lecturers/professors. The number of academics chosen for the study was ten (10). The practitioners were chosen from domestic managers and ICT members, since they have the hands-on experience in the area of control of HAI in domestic services. Altogether twenty practitioners were chosen, taking ten from each professional category (i.e. domestic managers and ICT members).

All thirty experts (academics and practitioners) were selected, based on the following criteria:

1. The academics should have an understanding of the theory of performance management - this assisted in the refinement of the performance management framework using a theoretical perspective.
2. The practitioners should be directly involved in one or more of the previous approaches of the research study (informal interviews/case studies/questionnaire survey) - this was to ensure that they already had an understanding of the research study. This was also to achieve continuity and validity of information in relation to performance management in the control of HAI in domestic services

The framework was first sent out to all thirty experts (by e-mail and post). The experts selected were then required to provide comments on the PMF. They provided their comments using a questionnaire format (refer to Appendix 5). The

questionnaire included both 'open' and 'closed' ended questions. For the 'closed' ended questions, participants were required to provide their views, using a Likert scale of five. A Likert scale of five was considered to be the most appropriate option in order to avoid any confusion among the participants (refer to section 3.8.5). The results were finally analysed using SPSS version 12.0.1. The participants were asked to provide their views on the following:

1. Background information: this was to gauge their level of expertise in the areas of performance management and/or control of HAI in domestic services

2. Respondents were required to provide their views on the level of coverage, in terms of the contents of the PMF. Herein, contents signify the different components/activities used of the PMF, e.g. performance monitoring, performance measurement. This was to identify whether the PMF covers the main aspects of performance management.

3. Respondents were required to provide their views, in terms of the logic used in the PMF. Herein, logic signifies the sequence of components/activities and how it mirrors what should be done. This was important to identify whether the PMF follows the basic principles of a performance management approach.

4. Respondents were required to provide their views on the level of coverage, in terms of performance goals and indicators developed for the PMF. This was needed to identify whether the performance goals and indicators fulfil the requirements of the control of HAI in domestic services.

5. Comments on areas the participants think are to be included/deleted /improved in the PMF. The findings of this indicate further improvements/refinements are required in the PMF.

Apart from the areas mentioned above, the practitioners were asked questions on further issues relating to the control of HAI in domestic services, in order to validate some of the critical findings from both the case studies and the questionnaire survey.

3.10 SUMMARY

The overall research process adopted for the study can be presented concisely, as shown in Figure 3.12. Although quantitative and qualitative methodologies are different, one approach is not superior to the other. A qualitative approach appears to be invaluable for the exploration of subjective experiences of the sample of participants of the research, while a quantitative approach facilitates the discovery of quantifiable information. Both have recognised strengths and weaknesses and are used ideally in combination. Through a review of literature, using qualitative approaches seemed to be invaluable for the in-depth exploration of this research study, while quantitative methods appeared to be valuable in the development of quantifiable information. Therefore, combining the strengths of the two approaches is considered significant in the creation of richer and deeper research findings. This was also strengthened by the context of the research, research questions, issues of sampling, relationship between the researcher and subject, and validity and reliability. The different data analyses techniques employed in the study were also documented, together with detailed justification of their employment in the study (see figure 3.12).

Figure 3.12: A summary of the research process adopted for the study

CHAPTER 4 : CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS IN FACILITIES MANAGEMENT SERVICES – A CONCEPTUAL FRAMEWORK

4.1 INTRODUCTION

The idea of this chapter is to present a conceptual framework for the control of HAI in FM services. The main purpose of developing the framework was to highlight the issues to be investigated during the next stages of the research study. The conceptual framework was developed using four steps. The chapter describes these four steps in detail. As a whole, Chapter 4 addresses objective 3 and its related research question I (see Table 1.2). At the end, the chapter also presents a 'rationale' for choosing domestic service as the focus area of the subsequent stages of the research study.

4.2 WHAT IS A CONCEPTUAL FRAMEWORK?

All research needs an adequate conceptual framework (York University Research Partnership, 2000). A framework is defined (Miriam-Webster dictionary, 1994) as a 'basic conceptual structure', which would normally contain two or more domains (groups) as well as one or more dimensions (sub-groups). According to the Miriam-Webster dictionary (1994), a framework is a valuable tool for conceptualising the ideas/issues to be considered under a particular area. According to Hoelzer (2001; as cited in Adair et al, 2003), a conceptual framework is a systematic model which helps to generate questions, but does not provide a single answer. However, a model is different from a framework. A model is 'an example, pattern or prototype' (Miriam-Webster dictionary, 1994). Models tend to be initiatives that go beyond frameworks, and include rich descriptions of particular approaches and unique solutions (Adair et al, 2003).

According to the Millennium Ecosystem Assessment (2003), a conceptual framework is designed to address a set of core questions developed through an extensive literature search and/or through extensive interaction with users (i.e. users of the particular area concerned). As they further explain, a conceptual framework lists the issues to be addressed and illustrates their interrelationships.

In the context of this study, the development of the conceptual framework involved four main steps (see Figure 4.1). The following sub-sections discuss these steps in detail.

STEP 1:
Identifying the central focus of the Framework

STEP 2:
Identifying the key issues relating to the subject concerned

STEP 3:
Devising the main areas of the framework

STEP 4:
Development of the conceptual framework
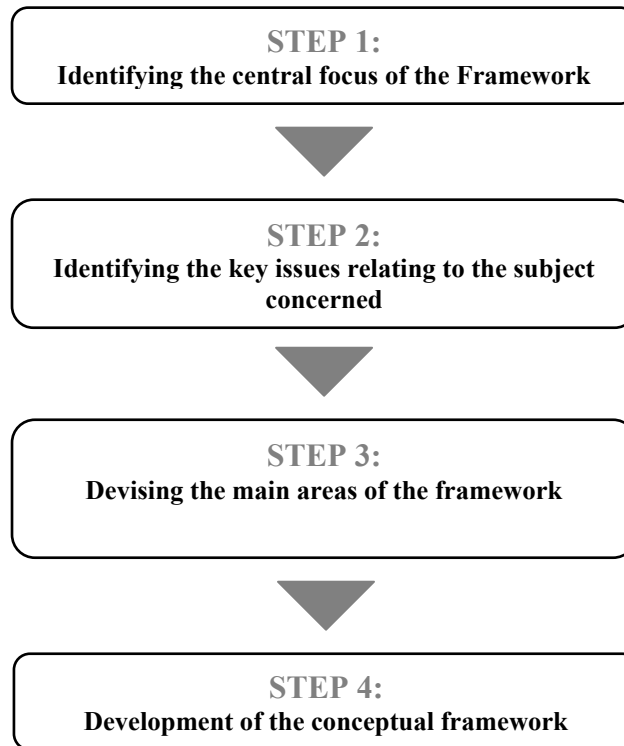
Figure 4.1:   Steps adopted to develop the conceptual framework

4.3   STEP 1: THE CENTRAL FOCUS OF THE FRAMEWORK

It is evident from Chapter 2 that FM services play an important role in the control of HAI. Therefore, the conceptual framework developed for the control of HAI take an FM view.

4.4   STEP 2: IDENTIFYING THE KEY ISSUES

Step 2 aimed at identifying the key issues to be considered under the control of HAI in FM services. These mainly derived from the findings of the thorough review of literature and the informal interviews carried out as part of the study. The key issues relating to the control of HAI in FM services are:

- Lack of clear roles and responsibilities of FM
- Involvement of ICT members

- Integration among the parties involved

- Lack of knowledge in the control of HAI

- Lack of training and education

- Issues relating to guidance documents

- Lack of performance measures

- Resource limitations during FM operations

4.4.1 Lack of clear roles and responsibilities of FM

A series of government reports have acknowledged and emphasised the importance of control of HAI as a key indicator of high quality clinical care (Masterton et al, 2003). As discussed in Chapter 2, thus far, HAI is mainly considered as a clinical issue. Therefore, many government reports published by the NHS (UK) have not yet given any adequate responsibilities to facilities managers in the control of HAI. For examples, the organisational structure specifically developed for the control of HAI by the Comptroller and Auditor General (2000), the model developed for the control of HAI by the Scottish Centre for Infection and Environmental Health (SCIEH, 2002a and 2002b) have not considered FM as part of the control of HAI programmes in the NHS.

According to one of the facilities managers who participated in the informal interviews, although many government documents have averred the significance of FM services in the control of HAI, it would seem that they have not accorded a prominent role to FM services in doing so. As he claims, to tackle HAI, FM has to be given due priority. Thus, improvements in the process of control of HAI demand an understanding of the relative importance of FM in the said process. Furthermore, steps should be taken to define the roles and responsibilities of FM in the control of HAI.

4.4.2 Involvement of ICT members in the control of HAI

Chefurka et al (2005) state that the design of healthcare facilities has undergone substantial changes in large part because patients with impaired host defences now represent an increasing proportion of hospitalisations. As a result, both design and construction (new build and renovation projects) of healthcare facilities present unique changes and opportunities for design and construction

professionals in terms of control of HAI. Therefore, Noskin and Peterson (2001) assert that ICT members should play a major role during the design and construction stage because the microbial flora of a healthcare facility can be influenced by its design and construction. Early involvement of ICT members in the design and construction process can protect patient safety in order to improve the quality of patient care. As Queensland Health (2001a) affirms, the involvement of ICT members in building and refurbishment projects ensures that relevant epidemiological issues in the design and layout of healthcare facilities have been considered, and incorporated into building plans.

In one of the Department of Health reports (2002) it was suggested that the NHS Trusts have to fully involve ICT members not only throughout the design process of a hospital but also during FM operations. As the National Audit Office recommended, the FM services should ensure that they comply with the newly published control of HAI standards by consulting ICT members when purchasing equipment, planning, etc (Comptroller and Auditor General, 2004).

The present chairperson of Infection Control Nurses Association (ICNA) (Harrison, 2005) claims that 'infection control professionals working in the NHS are often ignored or their advice is given lip service by facilities managers'. This was also affirmed by a few of the ICT members who participated in the informal interviews. As one of the infection control nurses claimed;

'It is very frustrating when our advice is ignored or overridden'

Therefore, there is a need to develop guidelines that highlight the involvement of the ICT members in FM services. Early involvement of ICT members in FM services helps to ascertain the risks for susceptible patients and disruption of essential patient services.

4.4.3 Integration among the parties involved in the control of HAI

The ICT members and other medical team representatives must be allowed to routinely address issues associated with the control of HAI throughout a hospital construction project (Bartley and Bjerke, 2001). Not only during the design and construction stage, but as identified by the Auditor General for Wales (2003), it

is vital to closely liaise with the ICT members during FM operations in hospitals. Close liaison with the ICT members ensures that the infection control standards are maintained throughout the hospital in clinical services as well as in FM services. As the Scottish Executive Health Department (2005) explains, clear mechanisms should be established in the NHS Boards/Trusts for the ICT members to coordinate and communicate with the clinical and non-clinical (FM) services in all prevention and the control of HAI programmes. It is a critical success factor in achieving the goals of infection control and prevention.

As an Expert working group of the Australian Infection Control Association (2001) says, the integration of FM teams should not be confined to the ICT members but work with other clinical teams as well. According to the Scottish Executive Health Department (2002a), links between clinical staff and facilities staff are essential to influence many of the factors underlying HAI such as the spacing and configuration of beds, control of bed occupancy, patient movement and delayed discharges. The impact of a poor clinical environment on the incidence of HAI can be compounded by many patient management factors such as bed occupancy and throughput. Delayed discharges can increase the likelihood of patients acquiring an HAI and can, in turn, lead to further delayed discharge.

As the Auditor General for Wales (2003) asserts, in terms of cleaning of wards the facilities staff (domestics) and nurses have to carry out different tasks, thus their integration is essential to avoid gaps in coverage. The informal interviews, however, revealed that clinical staff and support staff consider themselves as two separate entities. Hence, co-ordination between the two is relatively weak. Staff's perception of the cleaning of ward beds is evidence of this; they regard cleaning of the upper part of the bed (pillows, bed linen, etc.) as a duty of clinical staff and underside cleaning (cleaning of equipment underneath the bed, floor, bed frame, etc) as the duty of the domestics.

As one of the facilities managers noted, one of the main reasons for a relatively low level of integration between them and the clinical staff is the attitude of the latter (especially nurses):

'Most of the time, clinical staff tend to consider themselves as superior and this often creates cultural barriers…………there is always an us and them situation.'

Thus, integration between the clinical teams (especially ICT members and ward nurses) and FM teams has evolved as a significant issue to be addressed in the control of HAI in domestic services.

4.4.4 Lack of knowledge in the control of HAI

A Canadian Communicable Disease report (1998) highlights that: "although FM services are considered to be important in the control of HAI, studies have repeatedly shown poor compliance with control of HAI protocols by FM personnel". The report further claims that failure to comply is a complex problem that includes an element of lack of knowledge about the importance of control of HAI.

Designers, construction professionals and facilities managers often lack knowledge in the control of HAI and lack awareness of the severity of HAI. This can increase the chances of avoiding their adherence to the control of HAI standards during design and construction of hospitals and during FM operations. Many of the ICT members also lack knowledge in many aspects of FM (design and construction, cleaning, catering, etc.). With this, managers and staff tend to be, or often become, pigeonholed within their own specialities and only when necessary are they backed up by ad-hoc teamwork (Horton and Parker, 2002). Newton (2003) avers that adopting Knowledge Management (KM) practices is definitely advantageous in such types of situations. For instance, sharing of knowledge - having representatives from the teams involved is certainly beneficial to assisting each other in their particular areas of expertise.

4.4.5 Lack of training and education in the control of HAI

Many construction and facilities staff have limited up-to-date training and background knowledge in the principles of control of HAI. Conducting formal training and education programmes for the facilities staff is vital. Most of the infection control nurses who participated in the informal interviews revealed that,

in the NHS, there is a severe shortage of formal training and education programmes in the control of HAI.

The Royal College of Nursing (2005) believes that all facilities staff should receive mandatory infection control training as part of their induction and on an on-going annual basis. As they state;

'it is particularly important that knowledge and skills are continually updated'

All the architects who participated in the informal interviews acknowledged that currently there is little or no formal training and education programmes on the control of HAI geared towards the construction staff. According to the facilities managers, however, there are mandatory induction training programmes for facilities staff on the control of HAI. However conducting on-going training and education programmes for facilities staff is difficult due to staff absenteeism and the high turnover rate of staff.

4.4.6   Issues relating to guidance documents in the control of HAI

The NHS has published some guidance documents (i.e. policies, guidelines, specifications and standards) on appropriate healthcare facility design to ensure effective control of HAI. For examples, 'infection control in the built environment – Health Building Note 30' (NHS Estates, 2001c) and 'infection control in the built environment – Scottish Health Facilities Note 30' (Property and Environment Forum Executive, 2002). However, as one of the infection control nurses who participated in the informal interviews highlighted, such documents only contain general guidelines and standards. She believes that what is needed, is far more comprehensive documents on healthcare facility design and construction, particularly with respect to the type of healthcare facility, e.g. operation theatres, emergency departments, wards, etc.

It was also found during the informal interviews that, at times, there are ambiguities in reports, which have stipulated the standards of control of HAI during hospital construction. The best example can be drawn from the 'bed space' (space between the beds in wards) recommendations. Some reports recommend 2.1m as the appropriate bed space while others recommend 2.4m,

2.7m and even 3.6m. One of the architects said that such ambiguities have led them to take different approaches and standards when designing hospitals.

There is also an issue in terms of availability of guidance documents in the control of HAI in FM services during the building occupancy stage. As one of the facilities managers highlighted, the guidance documents on the control of HAI is limited and only available for some areas of FM such as cleaning, catering and water supply systems. He claimed that the NHS appears not to be in a hurry to develop comprehensive guidelines on a particular issue/area unless it emerges as a critical issue/severe problem. Some of the facilities managers further pointed out that there is still a lack of evidence-based guidelines in the NHS for FM services. They claim that substantive evidence-based proof of the relationship between rates of HAI versus improper management of facilities is yet to be produced by the NHS. Such evidence would increase the awareness among the facilities managers and facilities staff in terms of the importance of control of HAI.

4.4.7 Lack of performance measures in the control of HAI

The Healthcare Infection Control Practices Advisory Committee (HICPAC, 2001) has recommended performance measurement as a significant part of control of HAI in FM services (performance measurement is considered as one of the areas of performance management – refer to Chapter 8). Their recommendation includes a list of steps to carry out performance measurement. For example:

- To document whether infection control personnel are actively involved in all phases of FM operations
- To monitor and document daily practices
- To evaluate possible environmental sources of specimen contamination, etc.

Bartley (2000), on the other hand, has recommended 'performance management' to assess the level of adoption of control of HAI standards in FM services. However, the informal interviews with the experts revealed that performance measurement and management in terms of control of HAI are less developed areas in FM services. As one of the healthcare managers claims, hitherto, there

are no performance measures in place to ensure that the control of HAI standards are adequately met during FM operations.

4.4.8   Resource limitations during FM operations

The NHS is a non-profit-based organisation. It has to cater for high public demand. Thus, clinical services are always given high priority in order to reduce waiting lists and to provide better standards of medical care. However, FM seems to bear the brunt when it comes to budget limitations, as it is still regarded as a mere support service. Often, facilities managers face difficulties when allocating resources and during FM operations.

High levels of staff absenteeism due to sickness, high turnover rate of staff, and high job vacancy levels that need to be filled with competent staff, are major issues in the control of HAI in FM services. As noted by one of the facilities managers, the relatively low level of salaries/wages is one of the major reasons for the high turnover rate of staff.

4.5   STEP 3: DEVISING THE MAIN AREAS OF THE FRAMEWORK

In considering the issues of control of HAI in FM services identified during step two, significant areas of control of HAI in FM services were developed during the 3rd step of the development of the conceptual framework. Recommendations offered by some of the key documents relating to successful control of HAI were taken into consideration during this step. The paucity of literature on 'the control of HAI in FM services' (especially journal papers and books) was one of the main limitations of this study. Therefore, the key documents considered for the development of the conceptual framework were mostly reports published by healthcare organisations/related organisations in the UK and worldwide. These documents should conform to three criteria, which are associated with the title, the author (i.e. organisation) and year of publication:

1. Relevance of the title: the documents chosen are specifically relating to the control of HAI (in general and FM services in particular).

2. Prominence of the organisation: the author of the document should be a leading healthcare organisation. This is to ensure reliability of the information gleaned from the publication.

3. Up-to-date nature of documents: the conceptual framework for this study was developed in mid 2004. Therefore, the date of publication of most of the key documents ranges from 2000 to 2004.

The list of key documents referred to are given in Appendix 6a. Given all the recommendations in the key documents (refer to Appendix 6b), and the key issues (refer to section 4.4), the significant areas associated with the successful control of HAI in FM services are encapsulated and presented in Table 4.1. Information given in Table 4.1 reveals that, at present, strategies adopted in the control of HAI in FM services, involvement integration of different parties involved in the control of HAI in FM services, performance management and knowledge management stand as significant areas in the control of HAI in FM services. Detailed discussions on these areas are given in subsequent chapters (Chapters 5, 6, 7 and 8).

Table 4.1:   Significant areas associated with the successful control of HAI in FM services

KEY ISSUES	KEY RECOMMENDATIONS	SIGNIFICANT AREAS
▪ Issues related to roles and responsibilities ▪ Issues related to guidance documents (policies, guidelines and standards) ▪ Issues related to priority given to FM in the control of HAI ▪ Lack of resources (availability of staff, cost implications)	▪ Define accountability ▪ Define roles and responsibilities ▪ Develop and review control of HAI policies, guidelines and standards ▪ Ensure compliance with policies and guidelines ▪ Develop and review service specifications ▪ Ensure FM is stressed as a vitally important part of control of HAI ▪ Giving infection control the right priority ▪ Identify resource deployment	**Strategies**
▪ Lack of involvement of ICT members ▪ Lack of integration among the parties involved	▪ Involve ICT members ▪ Work with the ICT members, matrons and nurses ▪ Improve communication and coordination	**Involvement and integration of different parties**
▪ Lack of training and education ▪ Lack of knowledge in the control of HAI	▪ Set up training and education programmes ▪ Review training and education programmes ▪ Develop knowledge and skills appropriate to the control of HAI in FM services ▪ Apply knowledge and skills appropriate to the control of HAI in FM services ▪ Knowledge dissemination	**Knowledge Management**
▪ Lack of performance management	▪ Develop key performance indicators/measures ▪ Identify performance requirements ▪ Develop monitoring and supervision arrangements ▪ Measure performance ▪ Audit and feedback to staff	**Performance Management**

4.6   STEP 4: DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

From the discussions documented in section 4.3, 4.4 and 4.5, a conceptual framework was developed in order to address objective 3 of the study (refer to Table 1.2). The conceptual framework is presented in Figure 4.2. The significant areas, i.e. strategies, involvement and integration of parties, PM and KM, are highlighted in the conceptual framework. These areas are not stand-alone areas. Thus, they are linked with each other to show their interrelationships. The recommendations highlighted in Table 4.1 are also given in the conceptual framework to further elaborate the significant areas. The framework was developed for use in the next stages of the study. Therefore, the research questions relating to the next stages (see Table 1.2) are also depicted in the conceptual framework.
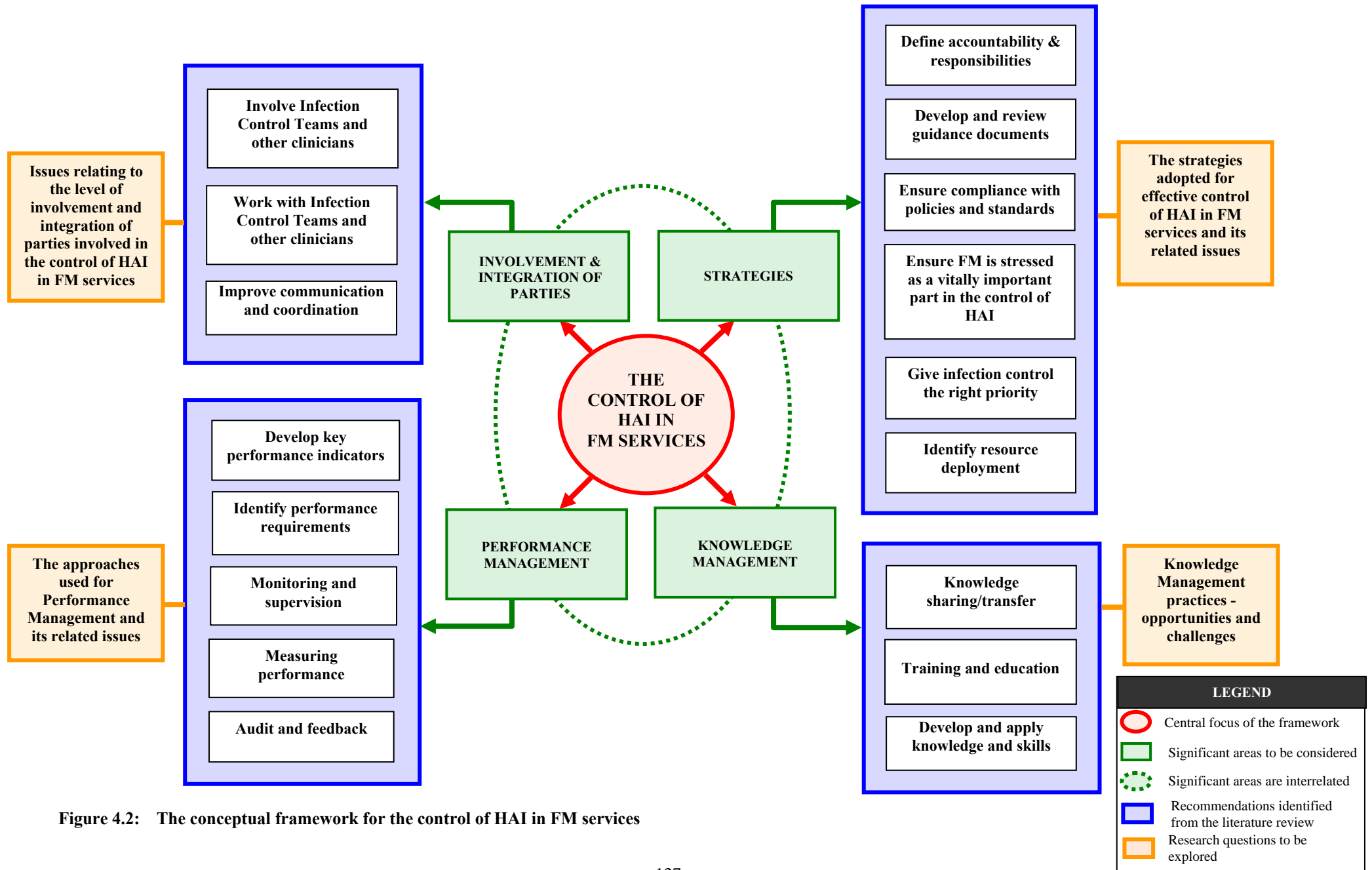
Figure 4.2:   The conceptual framework for the control of HAI in FM services

It was evident from Chapter 2 that even though FM is a support service, its integration with core services (i.e. clinical care), as a whole, can enhance the overall healthcare experience of patients. As the Health Facilities Notes 17 (NHS Estates, 1998) states, patient's perception of quality is based not only on clinical treatments but also on a range of other factors relating to the overall healthcare experience. Support functions, such as catering, cleaning, administration and reception services, can create first and lasting impressions – good and bad. Hence, there is a need to consider the support services as an integral part of healthcare services (NHS Estates, 1998).

FM can be made integral to the healthcare services when there is improved co-ordination and communication among the clinical and FM services staff. In addition, the involvement of all the relevant parties in the relevant processes (e.g. involving both ICT members, nurses and FM teams in the control of HAI in FM services) allows key functions to be performed, as and when, required. Nevertheless, this has to be achieved through the development of appropriate strategies.

Knowledge Management (KM) is also vital in the process of improving the level of involvement and integration parties in the control of HAI in FM services. Involvement and integration of key players require an open culture where FM and clinical staff can blend with one another without any barriers. KM can be used to create this through encouraging employees to share their knowledge (Liyanage and Egbu, 2005).

Section 4.4.7 highlighted the importance of Performance Management (PM) in the control of HAI in FM services. PM is mainly about assessing the achievement of planned targets. In doing so, the selection of suitable performance measures is significant in reflecting the actual levels of performance of FM services. However, this is always challenging because of the difficulty in choosing what is appropriate and what is to be measured, rather than picking what is easy to measure. Most importantly, PM can also assist in developing and/or reviewing strategies adopted in FM services. It can provide the opportunity to assess/evaluate the degree of application of KM in FM services.

Finally, it can be used to evaluate the extent of involvement and integration of different parties in the control of HAI.

4.7   LIMITING THE SCOPE OF THE STUDY

Within the context of FM services, there is a growing recognition that domestic services have a dominant role to play in the control of HAI (refer to section 2.10.1). Therefore, emphasis has been placed on the control of HAI in domestic services in order to limit the scope of this study (see Figure 4.3).
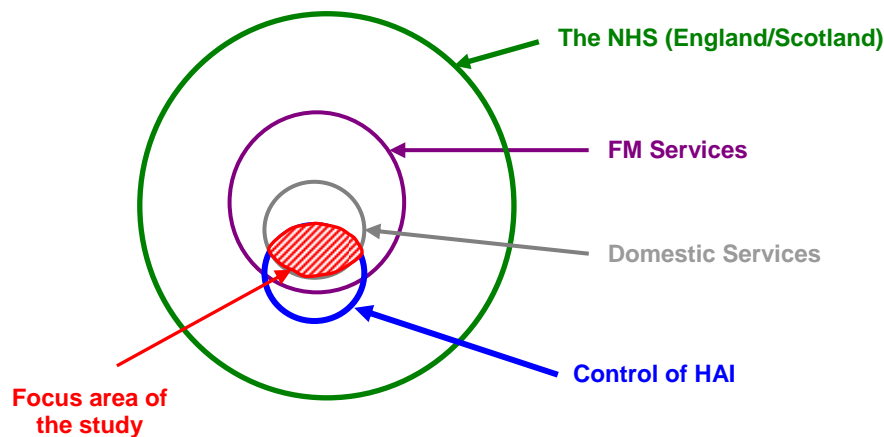
Figure 4.3:   Focus area of the study
(N.B. The scale of the circles is not relevant)

Leading writers and researchers in the field of HAI such as Prof. G A J Ayliffe, and Prof. Emmerson, as well as reports published by health service organisations and related organisations worldwide have affirmed the important role of domestic service in the control of HAI (Emmerson and Ayliffe, 1996; Ayliffe et al, 1988; Ayliffe et al, 1999; Meers et al , 1981; NHS Estates, 2004a and 2004b; NHS, 2004; Clinical Standards Board for Scotland, 2002; Department of Health, 2004a, 2004b, 2004c and 2004d; WHO, 2002; Communicable Disease Network of Australia, 2002; Centres for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee, 2001). Nevertheless, up until now, there has been a paucity of evidence-based literature, which suggests the association/relationship between domestic services and the control of HAI.

A systematic literature review carried out by Dettenkofer et al (2004) revealed that about 236 articles have highlighted the importance of environmental

disinfection or association of cleaning with HAI. According to Dettenkofer et al's classification of the strength of evidence available (refer Table 4.2), none of the articles described published meta-analysis, systematic review, or randomised controlled trial (level 1 and level 2 articles). The majority of these articles only had expert judgments or consensus statements about the association of cleaning with HAI, which Dettenkofer et al have categorised as the lowest level of evidence. Of the 236 articles, only 4 have described completed cohort studies with concurrent or historical controls meeting the criteria for final inclusion. The paucity of evidence-based literature available on the importance of cleaning in the control of HAI, therefore, was a challenge in this study.

Table 4.2: **Criteria used for assessing strength of evidence (Source Dettenkofer et al, 2004)**

Level	Criteria
I	Meta-analysis based on randomised controlled trials
II	Randomised controlled trials
IIIa	Nonrandomised concurrent cohort comparison between contemporaneous patients who did and did not receive an intervention
IIIb	Nonrandomised historical cohort comparison between current patients who did receive an intervention and former patients who did not
IIIc	Case-control study
IV	Case series without control
V	Expert judgement, consensus statements, reports

As indicated by Ayliffe et al (1999), regular and efficient cleaning is necessary to maintain the appearance, structure and function of healthcare buildings and their contents. According to them, cleaning is a process intended to remove contamination and this includes any harmful or undesirable substances. Taguchi et al (1992) conducted a survey which revealed that sanitation and cleanliness are necessary to prevent the dissemination of MRSA in hospitals. Similarly, Dancer (1999), through one of his successful surveys on the control of HAI, concluded that 'there was a sustained decrease in HAI, when cleaning was included as major part of an aggressive infection control programme'.

In accordance with the US Federal Centres for Disease Control and Prevention report, deaths linked to hospital germs represent the fourth leading cause of mortality among Americans (Berens, 2002). Murphy (2002) ascertains that despite aggressively applied infection control measures, a 21-month outbreak of

infection/colonisation with MRSA on a male surgical ward in Dorchester could not be controlled. Increasing the cleaning hours to almost double the usual level, and allocating responsibility for the cleaning of ward medical equipment finally terminated the outbreak.

Lately, the NHS has made efforts to produce key policy documents/reports that set out a strategy to improve hospital cleanliness in order to tackle HAI. Some of these reports are; 'the Matron's Charter – an action plan for cleaner hospitals' by the NHS Estates and Department of Health (2004), 'healthcare facilities cleaning manual' by the NHS Estates (2004b), 'towards cleaner hospitals and lower rates of infection' by the Department of Health, UK (2004c), 'code of practice' by the NHS in Scotland Task Force groups for infection control (2003), and 'Healthcare Associated Infections (HAI) - Cleaning Services Standards' by the Clinical Standards Board for Scotland (CSBS - now known as Quality Improvement Scotland – QIS, 2002).

Despite the fact these reports have highlighted the significance of domestic services in the control of HAI, as Dancer (1999) notes, hospital cleaning is still a neglected component in the control of HAI. Cost cutting in the UK National Health Service (NHS) has targeted domestic services because a reduction in the domestic budget does not directly affect the patient waiting lists. Domestic service, by its very nature, is labour-intensive and staffing costs are the greatest single cost to the NHS. Therefore, Dancer hypothesises that in the UK, financial constraints have forced managers to re-evaluate domestic services and general cleaning has been reduced to the bare minimum.

Murphy (2002) has also asserted that domestic services are continuing to provide falling standards in the control of HAI. He claims that the contracting-out domestic of services has resulted in falling standards (refer to section 3.7.4). According to Pollock et al (2002), PFI schemes have two main effects on the NHS. First, they have displaced the burden of debt from central government to NHS Trust and with it the responsibility for managing spending controls and planning services, thereby hindering a coherent national strategy. Second, the PFI schemes have presented an issue in terms of the quality of service provided by them. Froud and Shaoul (2001) declare that 'there is no evidence that PFI has

increased overall levels of service. Largely as a result of this, the case for PFI now rests on the *value for money* argument'. UNISON (2005), in their report on 'hospital contract cleaning and infection control', provides a range of drawbacks of contracting-out services (especially in PFI schemes) as follows:

- Difficulties in drawing up contractual arrangements
- Lack of flexibility
- Monitoring and lack of trust
- Difficulties in imposing sanctions
- Separation of the cleaning service from the rest of the healthcare services and other healthcare teams
- Lack of health and safety training

Therefore, as UNISON observed, domestic services, which are operated through outside contractors (especially PFI schemes), have the worst standards of cleanliness in the NHS.

Overall, the following key points can be drawn from these discussions:

1. Domestic services are an important service in the area of control of HAI, even though, there is very little evidence-base to prove the actual relationship between the two.
2. Several government reports have drawn attention to the issue of raising the standards of domestic services in the control of HAI,
3. There is concern in some quarters that the domestic service is not given the appropriate attention to improve its level of standards.
4. The view by some is that the contracting-out of the domestic services (refer to section 3.7.4 for discussions related to types of domestic service provisions) has resulted in poor quality of service.

Given the above, several inferences can be made as follows;

1. There is a dilemma of theory vs. practice
2. There is a need to promote the profile of domestic service in the control of HAI to increase the level of awareness among FM professionals and staff on the importance of the control of HAI.

3. There is a need to change the type of strategies currently adopted by the domestic services, to raise the standards of the control of HAI in domestic service

4. There is a need to measure and manage the performance of control of HAI in domestic services in order to improve the service levels

5. There is a need to carry out investigations on assessing the standards of contracted-out domestic services in order to actually understand whether they have an impact on the quality of domestic service.

4.8   SUMMARY

A thorough review of literature and informal interviews suggest that strategies, involvement and integration of parties, performance management and knowledge management are significant in the control of HAI in FM services. It was perceived that there should be a greater level of involvement and integration of relevant parties in the control of HAI in FM services. This is to eliminate discrepancies of work practices in terms of the control of HAI. Performance Management (PM) is essential to assess whether staff have successfully achieved set targets in connection with the control of HAI. Since Performance Management is mostly about assessment and management of the achievement of planned targets, it could enable the facilities managers to identify where and how they can do better in terms of control of HAI. Knowledge Management is also vital in the control of HAI, and helping to deliver and improve the knowledge and skills of facilities staff who are unaware of the issues relating to the control of HAI. Some can misinterpret KM as an approach which has a high association with information technology (IT). However, if studied carefully, KM is not all about technology; it is also about identifying and linking groups and individuals. Overall, it can be concluded that the review of literature and the informal interviews highlighted four themes in the control of HAI in FM services, which point to the need for further investigation. They are:

- The strategies adopted in the control of HAI
- The level of involvement and integration of key players in the control of HAI
- Knowledge Management
- Performance Management

Due to time constraints, there was a need to limit the scope of the study in terms of investigating these areas. Further review of literature and feed back from informal interviews indicated the need to focus on domestic services in terms of control of HAI. As many researchers have noted, the standards of the domestic service are falling due to a host of reasons, including outsourcing the service and budget limitations. Thus, domestic service was taken as the area of focus in the subsequent stages of the research study.

CHAPTER 5 : STRATEGIES ADOPTED FOR THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

5.1   INTRODUCTION

The main idea of this chapter is to report some of the findings of the case study approach carried out as part of the research. The findings are related to the type of strategies adopted in two case studies, namely an in-house domestic service and a PFI domestic service. Altogether twenty-six (26) interviews were conducted across the two cases. The results are presented in the form of a cross-case synthesis in order to ascertain the similarities and differences between the two cases. The discussions laid out in the chapter are also substantiated with findings from the thorough review of literature. Overall, Chapter 5 aims to fulfil part of the 4th objective and research questions II and III of the study (see Table 1.2).

5.2   STRATEGY – AN INTRODUCTION

A 'strategy' in simple terms signifies 'an elaborate and a systematic plan of action' (Oxford dictionary, 1994). The concept of strategy has been borrowed from the military and adapted for use in business. Professor George Steiner, a key figure in the origins and development of strategic planning, points out that there is very little agreement on the meaning of strategy in organisations. Some of the definitions in use which Steiner noted include the following (Nickols, 2000):

- Strategy refers to basic directional decisions, that is, of purposes and missions
- Strategy consists of the important actions necessary to realise these directions
- Strategy answers the question: what should the organisation be doing?
- Strategy answers the question: what are the ends we seek and how should we achieve them?

Mintzberg (1994) also points out that people use 'strategy' in several different ways., the most common being the following four:

- Strategy is a plan, a "how", a means of getting from here to there
- Strategy is a pattern in actions over time
- Strategy is position, that is, it reflects decisions to offer particular products or services in particular markets
- Strategy is perspective, that is, vision and direction

Tregoe and Zimmerman (1980) define strategy as the framework which guides those choices that determine the nature and direction of an organisation. Nickols (2000) also perceives strategy as a general framework that provides guidance for actions to be taken and, at the same time, is shaped by the actions taken. The necessary precondition for formulating a strategy is a clear and widespread understanding of the ends to be obtained.

All in all, most of the above definitions identify strategy as a 'framework within which to plan/work so as to achieve the goals of an organisation'. According to the NHS Estates (2003a), for an FM service to be effective, formulating a 'strategy' is an essential criterion in order to address key issues in FM services.

5.3   TYPES OF STRATEGIES

As Table 4.1 and Figure 4.2 revealed, an understanding the type of strategies adopted is vital in order to understand whether or not the domestic services have a consistent approach in the control of HAI. Table 5.1 below depicts the types of strategies adopted in the two chosen case studies. <u>Because it falls under a managerial issue, the case study questions related to strategies, were directed to only sixteen (16) interviewees out of the twenty-six interviewed (refer to Appendix 2b).</u> These are the domestic managers, domestic supervisors and ICT members. The ICT members are responsible for formulating strategies on the overall control of HAI agenda in a hospital whilst the domestic managers and domestic supervisors are responsible for formulating strategies in a domestic service.

Table 5.1:   Strategies to be adopted in the control of HAI in domestic services

Description	In-house case*				PFI case*					Total (16)**
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	Total for In-house case	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)	Total for PFI case	
	Total 3	Total 2	Total 3		Total 2	Total 2	Total 2	Total 2		
Set up standards	3	2	3	**8**	2	2	2	2	**8**	**16**
Set up specifications of services	3	2	3	**8**	2	2	2	2	**8**	**16**
Set up policies and guidelines	3	2	3	**8**	2	2	2	2	**8**	**16**
Set up education and training requirements	3	2	3	**8**	2	2	2	2	**8**	**16**
Identify staff deployment	3	2	2	**7**	2	2	2	2	**8**	**15**
Identify the level of Importance given to the control of HAI	2	1	3	**6**	2	-	2	2	**6**	**12**
Identify resource deployment	2	2	1	**5**	1	2	2	1	**6**	**11**
Defining of accountability	2	-	3	**5**	2	1	-	2	**5**	**10**
Set up an appropriate organisational structure	2	-	2	**4**	1	2	1	1	**5**	**9**

* See Table 3.10 for codes given for the interviewees. Also, see Table 3.11 to identify the way results are derived in this table.
** Refer to Appendix 2b to identify the number of interviewees

Discussions related to the above areas (see Table 5.1) are given in subsequent sections. However, education and training are discussed under the area of KM (refer to section 7.3.1) whilst staff deployment is discussed under resource deployment (refer to section 5.3.5).

5.3.1   Setting up standards for control of HAI

All the sixteen interviewees, who were asked the particular question (refer to Appendix 2b), unanimously, identified setting up clear standards as one of the most important strategies in the control of HAI in domestic services (see Table 5.1). As defined by the Ulster community and hospitals Trust (1990), a standard is a level of performance against which something or someone is judged. It is the measurement or benchmark to which staff should conform. The standards are designed to focus users' attention on the outcome or output sought, rather than the method by which it is achieved (NHS Estates, 2003b). Therefore, the standards should be designed to be concise, flexible and easy to use.

The findings of the case studies unveiled some of the main characteristics of developing standards specifically for the control of HAI (refer to Table I in Appendix 7a). These are:

- Easy to understand
- Involvement of domestic teams/ICT members in developing the standards
- Consistency with national/local infection control requirements
- Option of reviewing the standards if changes are made to the infection control requirements at national level/local level
- Flexibility of the standards to adapt to any changes made at the national level/local level

The sixteen interviewees from the two cases discussed the current situation with regard to standards available for the control of HAI in their domestic service. The results are tabulated as shown in Table 5.2.

Table 5.2: **Current situation with regard to standards used in the control of HAI in domestic services**

Description	In-house case*			PFI case*			
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
Types of standards	1. National standards - CSBS standards			1. Local standards			
	2. Local standards						
Main reason/s for using the standards	1. As the framework for performance audits			1. To develop the service specifications			
				2. As the framework for performance audits			
Characteristics of the standards:							
Easy to understand	Y (3)	Y (1), S (1)	Y (1), S (2)	Y (2)	Y (1)	Y (2)	N (2)
Involvement of parties in developing the standards	Y (2), S (1)	-	Y (1), S (1), N (1)	Y (1)	Y (1)	-	N (2)
Consistency with national and hospital standards	Y (2)	Y (2)	Y (2), S (1)	Y (1)	-	-	N (2)
Option of reviewing the standards	Y (2)	Y (1)	Y (2)	Y (1)	-	Y (1)	N (2)
Flexibility of the standards	-	-	-	-	Y (2)	-	-
Overall, happy with the standards available for control of HAI in domestic services	Y (3)	Y (2)	Y (1), S (2)	Y (2)	Y (2)	Y (2)	N (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

In domestic services, 'standards' aim to improve the quality of the overall service by ensuring that all cleaning related tasks are identified and managed. Both case studies use their standards mainly as a framework for performance audits (refer to Chapter 8). The *PFI case* has also used its 'standards' as a basis for developing their service specifications for service level agreements, at the inception of the PFI contract in 2001 (refer to section 5.3.2). However, as the NHS Estates (2003b) states, 'standards' can be used for many other purposes such as:

▪ As a standard against which services can be benchmarked

▪ An aid to develop a departmental service structure, which ensures consistent high standards

▪ As part of an ongoing performance management process

An audit carried out by the Auditor General for Wales (2003) disclosed that the standards used by the domestic services vary greatly between the Trusts and often, within Trusts themselves. This was also evident from the case study findings (see Table 5.2). The *In-house case* adheres to both national and local standards whilst the *PFI case* only adheres to local standards (see Table 5.2). As one of the domestic managers from the *PFI case* explained, in the *PFI case*, their local standards form part of the PFI contract, thus, it is essential for them to adhere to these. In the *In-house case*, the national standards used are based on the Clinical Standards Board for Scotland standards (CSBS, 1999; CSBS is now known as the NHS Quality Improvement Scotland – NHS QIS). These standards are specifically developed for the control of HAI, thus, it supports the implementation of control of HAI programmes in domestic services and monitors its progress.

As the Auditor General for Wales (2003) asserts that, unless all hospital domestic services follow the same standards, there is clearly a risk of differing qualities in the domestic services;

"The domestic services should only adhere to <u>national set of minimum standards,</u> as it would give healthcare managers more control over the levels of cleanliness in their hospitals and would ensure consistency across their Trust/s"

One of the significant findings of the case studies, as per Table 5.2, is the contradiction of views between the domestic managers and the ICT members of the *PFI case*. The latter strongly claimed that the *PFI case*, at present, does not fulfil any of the characteristics of standards available for the control of HAI.

Many interviewees averred that 'ease of understanding' should be one of the main characteristics of standards. As one of the assistant domestic managers from the *In-house case* noted:

> "We have a considerable amount of <u>non-British citizens</u>, mostly Asians…so, we have to make sure that the standards and other relevant documents are clear and easy to understand"

Some of the interviewees noted that their, or their peers' involvement is important, when developing standards. According to Table 5.2, in the *In-house case*, two top-level domestic managers and a senior ICT member are fully involved in the process. In the *PFI case*, a domestic manager from the Trust side and a domestic manager from the PFI consortium are fully involved in developing the control of HAI standards (see Table 5.2). However, it was obvious that there was no ICT input.

Of the case study findings, the review of standards according to the national/local control of HAI requirements was also seem to be a significant characteristic of standards. Ten out of the sixteen interviewees mentioned this (refer to Table I in Appendix 7a). However in-depth investigations of the two cases suggested that most of the standards used by the two cases are poorly defined and are not-up-to date. For example, at the time of the case study interviews (April – July 2004), the *In-house case* was using the CSBS standards (1999 version), even though it had been superseded by the national standards of control of HAI in 2003 (Quality Improvement Scotland standards, 2003).

Only two out of the sixteen interviewees (13%) recognised 'maintaining flexibility of the standards' as an important characteristic. Two domestic managers from the *PFI case* stated that the standards used by the *PFI case* are flexible enough to adapt to any changes in the national requirements of control of HAI:

"There are thousands of rules and regulations stipulated in the PFI contract …………if
we change something, then it has to be informed and approved by an array of bodies
such as the PFI consortium, the Trust representatives from the property and support
services and the Trust chief executive. This is a tedious and a complex process; hence, it
is very important for us to keep our standards flexible. In that case, even if there are
some changes to the national requirements, we are still able to include it in our standards
in such a way that will make a minimum impact on the performance audits as well as on
the PFI contract as a whole."

Overall, most of the interviewees across the two cases, except the ICT members
from the *PFI case*, were happy with the available standards for the control of
HAI in their domestic service (see Table 5.2).

5.3.2 Setting up service specifications

All the interviewees across the two cases identified setting up service
specifications as a key strategy in the control of HAI in domestic services (see
Table 5.1). As UNISON (2005) suggests, a well-constructed cleaning
specification assists in ensuring that the cleaning contractors plays their part in
minimising the risk of HAI. The specification of a service is different from
standards (see Figure 5.1).

There is a need to have a common understanding of the service outcomes and
quality required to discharge the responsibilities of the parties involved in a
domestic service; a service specification fulfils this (Acute Health Division of the
Victorian Government, 2000) and is a critical element, especially when the
services are provided by an external party (e.g. outsourced or PFI).
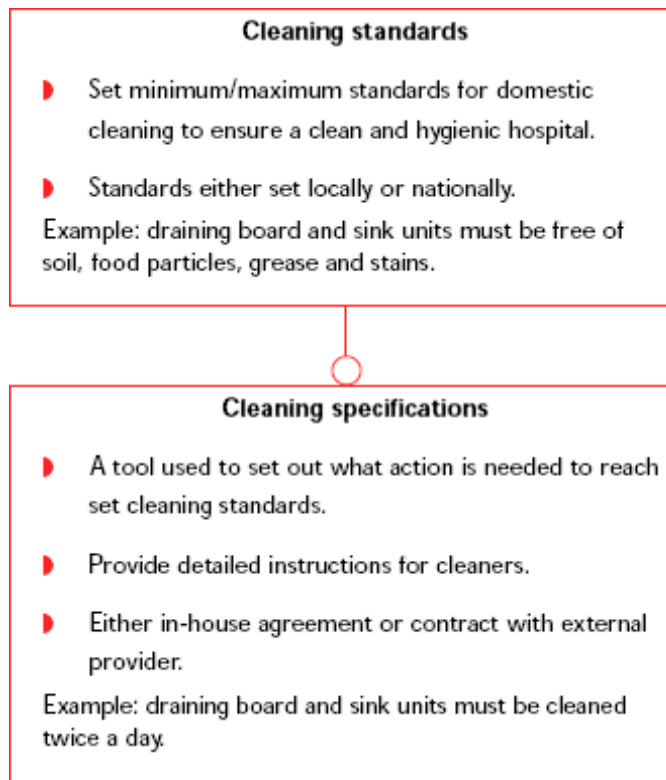
Figure 5.1: Standards vs. specifications (Source: Auditor General for Wales, 2003)

The NHS Estates (2003b and 2004b) revealed some of the important characteristics of specifications. Namely,

- Be patient/customer focused: the cleaning specifications have to focus clearly on patients' expectations.

- Provide clarity for staff responsible for healthcare cleanliness: all staff with cleaning responsibilities need to have the same understanding of the specifications to ensure that they are working towards cleanliness issues in the same way.

- Enhance quality assurance systems: all domestic services should ensure that consistency, effectiveness and best value are being derived from the resources available.

- Be consistent with infection control requirements

- Set clear outcome statements, which can be used as benchmarks and output indicators

- Have clear objectives that provide a foundation for service improvements: specifications should set out a range of issues that need to be addressed to ensure that services are planned and controlled effectively.

142

These findings are somewhat similar to the characteristics of specifications identified from the case study findings (see Table II given in Appendix 7a). The sixteen interviewees provided their views on the current situation with regard to specifications of their domestic service. The results are presented in Table 5.3.

Table 5.3: **Current situation with regard to service specifications in the domestic services for the control of HAI**

Description	In-house case*			PFI case*			
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
Type of service specification	Input & Process specification			Output specification			
Clear objectives	Y (2), S (1)	Y (2)	Y (2), S (1)	Y (2)	Y (2)	S (2)	N (2)
Clear outcome statements	Y (2)	Y (1)	S (2)	Y (2)	Y (2)	Y (2)	N (2)
Clear for domestic staff	Y (2)	S (2)	Y (1), S (1)	Y (2)	Y (2)	Y (2)	N (1)
Involvement in developing the specifications	Y (3)	N (1)	Y (1), S (1)	Y (2)	Y (1)	-	N (2)
Consistency with hospital/ national control of HAI requirements	Y (2)	-	Y (2)	Y (2)	Y (1)	-	N (2)
Provide specific information rather than being too general	-	Y (1), S (1)	S (1)	-	-	S (2)	-
Regular review of specifications	Y (1)	-	Y (2)	-	Y (1), S (1)	N (1)	N (2)
Overall, satisfied with the service specification available for control of HAI in domestic services	Y (3)	Y (1), S (1)	Y (2), S (1)	Y (2)	Y (2)	Y (1), S (1)	N (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

The Auditor General for Wales (2003) has identified three main types of service specifications, i.e. input, process and output specifications. As the names imply the difference between the specifications is their point of consideration. Input specification specifies the service requirement such as structure, infrastructure, people and resource requirements. Process specification specifies the process requirements such as what is to be done and how it should be done. Finally, the output specification specifies the work that is to be accomplished, i.e. what is expected from the domestic service.

According to the case study findings, the *In-house case* uses a combination of input and process specifications (Table 5.3). The *PFI case*, on the other hand,

uses an output specification, which was developed by the client (the NHS Trust) and partly by the SPV (i.e. PFI consortium).

Once again, the findings presented in Table 5.3 show a clear rift between the views of the domestic managers and the ICT members of the *PFI case*. The latter believed that the service specifications of the *PFI case* do not meet any control of HAI requirements.

Most of the interviewees highlighted the significance of setting up clear outcome statements in a service specification. As one of the domestic managers from the *PFI case* described, an outcome statement is part of their output specifications and it simply gives some instructions of the results to be achieved. Herein, an 'outcome' is different from an 'output'. The output is the final product whereas the outcome is the result of the final product.

Nearly 69% of the interviewees believed that the involvement of domestic managers and ICT members is important for developing effective service specifications (see Table II in Appendix 7a). However, it was obvious that the two ICT members of the *PFI case* are not at all involved in the said process.

A poorly specified service can lead to greater costs as it may result in some areas being uncleaned, cleaned too often or in the wrong way (Ayrshire and Arran Acute Hospitals NHS Trust – NHS in Scotland, 2004). Thus, it is necessary to have, 'specific' details in specifications. The specifications used in the *PFI case*, however, appeared to be fairly nebulous and wide (see Table 5.3). This was mainly due to the rules and regulations attached to the PFI contract. As one of the domestic managers revealed, having 'broad' statements in the specifications allow them to make changes to it with ease, by making minimal impact on their performance audit requirements.

Regular review of the specifications was also considered as one of the important characteristics of service specifications (see Table II in Appendix 7a). However, both case studies, at the time of the interviews, did not have any up-to-date specifications. For example, the specifications used in the *In-house case* are based on SCOTMEG frequencies, which were first published in 1987 and has have only been revised once in 2001. The output specifications used by the *PFI*

case have not being reviewed since the inception of the PFI contract in 2001 as well. As one of the domestic supervisors in the *PFI case* claimed, the client does not make an attempt to effect any changes to the specifications, as it involves a tedious process:

"According to the PFI contract requirements, the PFI contractor has to work according to a framework. If something new comes along or if there are any changes to be made in the requirements stipulated in the original PFI contract, the client has to add it up in the framework and also has to bring new policies and procedures to allow it to happen."

A hospital cleaning review undertaken by the Auditor General for Scotland (2003) has earlier revealed that most of the hospitals have variations in the levels of cleanliness in wards. This is mostly due to their non-compliance with the latest national specifications (e.g. NHS QIS frequencies, 2003). This study therefore supports the view of the Auditor General for Scotland (2003).

5.3.3   Setting up policies and guidelines

All the interviewees in the two cases believed that setting up policies and guidelines is vital for the control of HAI in domestic services (see Table 5.1).

Policies and guidelines differ from the aforementioned standards and specifications; however, they are also important. The differences between these are given below (Writing guide, 2004; Oxford Dictionary, 1994):

- A specification *'specifies'* the work to be completed
- A standard states the *level of quality required*; it is the measurement or benchmark to which staff should conform
- A policy states the rules to be *adhered to*
- A guideline provides staff with *guiding principles*

As the Ulster Community and Hospital Trust (1990) explicates, a policy explains how goals will be achieved, and defining the general course and scope of activities for the accomplishment of goals. A policy is also different from guidelines. According to the Auditor General for Scotland (2000), a clear policy sets out the mission, remit and objectives of a service. Policies lay down performance indicators, roles and responsibilities of staff, decision-making and

reporting structure and communication procedures as well. On the other hand, guidelines provide staff with information on the advised course of action to be taken (Ulster Community and Hospital Trust, 1990). However, policies and guidelines have often been discussed in combination.

The way the policies and guidelines are developed and presented (i.e. characteristics), decide the operationability of such documents (NHS Estates, 2004a). For instance, specificity and clarity should be important characteristics of policies and guidelines (Auditor General for Scotland, 2000). The case study findings revealed a group of characteristics of polices and guidelines (refer to Table III in Appendix 7a). The current situation with regard to the policies and guidelines in the two cases is presented in Table 5.4.

Table 5.4:   Current situation with regard to policies and guidelines for the control of HAI in domestic services

Description Case study	In-house case*			PFI case*			
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
Types of policies and guidelines	Both local and national policies and guidelines			Mainly local policies and guidelines to meet the Trust's requirements			
Availability of policies and guidelines	Y (3)	Y (2)	Y (3)	Y (2)	Y (2)	Y (2)	N (2)
Clarity in terms of the attainment levels to be achieved	Y (3)	Y (1)	Y (1), S (2)	Y (1)	Y (1)	-	N (1)
Up-to-dateness of policies and guidelines	Y (3)	Y (2)	Y (1), S (1), N (1)	Y (2)	Y (2)	Y (2)	N (2)
Clarity in terms of training needs	Y (3)	Y (1)	S (2)	Y (2)	Y (1)	-	N (2)
Clarity in terms of working methods	Y (1)	Y (1)	S (2)	Y (2)	Y (2)	S (2)	N (1)
Clarity in terms of responsibilities	Y (1)	Y (1)	S (1)	Y (2)	Y (1)	Y (2)	N (2)
Clarity in terms of lines of communication	Y (1)	-	N (1)	Y (1)	Y (1)	-	N (2)
Involvment of the key parties in the control of HAI in developing policies	Y (2), S (1)	-	Y (1), S (1), N (1)	Y (1)	Y (1)	-	N (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

Once again, there was a conflict of views between the domestic managers and ICT members in the *PFI case*.

As the Quality Improvement Scotland (2003) report suggests, written policies and guidelines are important to reflect relevant legislation and published

professional guidance, for the prevention and control of infection. According to the case study findings, it could be suggested that, at present, both the *In-house case* and the *PFI case* have sufficient policies and guidelines for the control of HAI.

The *In-house case* adheres to both local and national policies and guidelines in order to meet the necessary requirements for the control of HAI, both at local and national level (see Table 5.4). The types of polices and guidelines available in the *In-house case* are:

1. Infection control in domestic services: a guide to domestic staff (local guidelines)
2. Infection control manual (local policy)
3. Scottish executive health department (1998) – national policy
4. Healthcare associated infections (HAI) cleaning services (2002) – national guidance document
5. Risk management policies and guidance on control of hazardous substances (COSHH) – national documents

On the other hand, the *PFI case* only has its own policies and guidelines developed by the PFI consortium in collaboration with the FM provider. The FM representatives from the Trust also availed their assistance in developing this comprehensive set of documents.

In order to ensure timely and effective practices, the policies and guidelines in the two cases have clearly set out the range and scope of work to be undertaken. They include:

- Attainment levels to be achieved
- Clear and measurable outcomes to be sought
- Systems to be used to measure outcomes
- Reports required and the managers who should receive them
- Working methods (including equipment, materials and frequencies)
- Operational/training policies and procedures
- Risk assessment protocols
- Service level agreements for each functional area

- How cleaning services operations and controls dovetail with infection control policies and procedures

In addition to the above, because the *PFI case* is penalised for non-performance or low performance levels, their policies contains details such as how often audits take place, who is involved, the standards to be audited against and how results should be reported and acted upon. However, it was revealed that the actual roles and responsibilities of staff (both nursing and domestic staff) are not stipulated in the policies and guidelines in both cases. This not only causes confusion but also creates cultural barriers between the staff. As a result there seemed to be a rift between some of the nurses and the domestic staff in the *In-house case* as well as in the *PFI case* (this is discussed in detail in Chapter 6). As one of the domestic staff from the *In-house case* noted:

'there is always a them and us situation'

As the NHS Quality Improvement Scotland (2003) suggests, up-to-date policies and guidelines are essential for staff and managers to carry out their duties safely and consistently to the required standard. According to the interviewees from the *In-house case*, the policies and guidelines available in the *In-house case* are up-to-date and clear. However, the situation was different in the *PFI case*. The *PFI case* has developed their policies and guidelines in 2001, at the inception of the PFI contract. However, since there have been no changes to the PFI contract and its output specifications, the domestic managers asserted that there was no need for any review of documentation after 2001. As repeatedly discussed in section 5.3.1 and 5.3.2, there have been significant changes in the control of HAI agenda during recent years (Scottish Executive Health Department, 2002a and 2002b; Department of Health, 2003). Thus, it is vital to have up-to-date documentation.

Overall, most of the interviewees across the two cases, except for the ICT members from the *PFI case*, were happy with the current policies and guidelines on the control of HAI in their respective domestic services.

5.3.4   The level of importance given to the control of HAI

About 75% of the interviewees across the two cases recognised the importance given to the control of HAI practices in formulating strategies (see Table 5.1). The twelve interviewees presented different interpretations to this. According to them, the importance given to the control of HAI in domestic services is determined using one or more of the following (see Table IV in Appendix 7a):

- Impact of domestic services on HAI rates
- Priority given to the control of HAI in domestic services
- Domestic team's awareness of the issues associated with the control of HAI
- Change of work practices in domestic services due to the high priority given to the control of HAI in recent years

The interviewees discussed the current situation with regard to the importance given to the control of HAI in their domestic service. The results are shown in Table 5.5.

Table 5.5:   The current situation with regard to the importance given to the control of HAI in domestic services

Description		In-house case*			PFI case*		
		FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
Impact of domestic services on HAI rates		Y (1)	Y (1)	-	Y (2)	Y (2)	-
Priority given to the control of HAI in domestic services		-	Y (1)	Y (1)	-	-	N (2)
Awareness of domestic teams in the control of HAI	Dometic managers	-	-	Y (3)	-	Y (1)	-
	Domestic staff	-	-	Y (1), S (2)	-	Y (1)	-
Change of work practices in domestic services due to the high priority given to the control of HAI in recent years		Y (2)	-	-	N (1)	-	N (1)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

According to some of the interviewees, the impact of domestic services on the rates of HAI plays a significant role in the level of importance given to the control of HAI in domestic services (see Table IV in Appendix 7a). A domestic

manager from the PFI contractor in the *PFI case*, however, had a slight disagreement:

> "I am finding it difficult to accept that uncleaned hospitals result in increased rates of HAI. There is a growing opinion supporting the argument, but where is the research evidence? … I have been working in this hospital for years and I have no complaint whatsoever that we have caused an enormous amount of infections. We have a role to play (in the control of HAI), but it is not as much as some assume…"

However, even though there is very low level of empirical evidence, it is fair to say that, the domestic services have a major impact on HAI rates (refer to section 4.7).

According to the case study findings, priority given to the control of HAI in domestic services is another indicator of the importance of control of HAI in domestic services. The Oxford Dictionary (1998) defines 'priority' as a '*thing that is regarded as more important than others'*. As one of the domestic managers in the *In-house case* assured:

> "… the priority given to infection control is enormous here. We are now in a stage where we can't do anything without giving a single consideration for infection control…I must say that it couldn't be better"

In contrast, the ICT members from the *PFI case* claimed that, the *PFI case* is yet to give real to the control of HAI practices in their domestic service. Given this, the *PFI case* should make every attempt to resolve the issue relating to 'priority'.

The increased awareness on possible causes and the control of HAI could result in a safer system of work. According to the case study findings, awareness among the domestic team members determines the importance given to the control of HAI. The entire domestic team of the *In-house case* seemed to be fully aware of the issues associated with the control of HAI. This may be a result of an array of training and education programmes conducted by the *In-house case* (refer to section 7.3.1).

Identifying any changes made to the domestic services in recent years, is also appear to be useful in determining the importance given to the control of HAI. As the Scottish Executive Health Department (2002a) recommends:

"to help ensure that the NHS learns the lessons from HAI incidences, it is vital to make changes to practices to minimise the chances of a similar episode occurring in the future."

The *In-house case* has made some significant changes to its practices during the past years according to the national control of HAI agenda (by the Quality Improvement Scotland, 2003). The findings of the *PFI case*, however, were quite the opposite. According to the ICT members, the *PFI case* has made no attempt to change its practices. As one of the domestic managers from the PFI consortium in the *PFI case* noted:

"I don't think that we had to change the output specifications because of infection control requirements. The specifications are moreover wide and generalised so they cover all the aspects of domestic services, even infection control."

As the domestic managers from the *PFI case* further claimed, the reason for not following the national requirements of control of HAI is:

"there are not sufficient guidelines in the NHS marketplace…"

However, it was noted in section 4.4.6 and section 4.7 that the NHS has produced a number of publications on the control of HAI in recent years. Thus, their (domestic managers in the *PFI case*) ignorance on these publications could be the main reason for not making any changes to the domestic service. This clearly portrays the disadvantage the *PFI case* has, by not having any links with the ICT (refer to Chapter 6).

5.3.5   Resource deployment

As Malone (2001) explains, 'how resources are deployed helps an organisation achieve its goals.' Nearly 70% of the interviewees (eleven out of the sixteen interviewees), identified resource deployment as vital in the control of HAI strategy (see Table 5.1). Resources, as the interviewees implied, mainly include budget and equipment & materials. According to all the sixteen interviewees,

staff deployment is also vital in the process (see Table 5.1). Even though they identified staff and resources as two separate issues, staff are also a resource (Department of Health, 1999a and 1999b; Waring, 2000). For instance, as the Auditor General for Wales (2003) explains, resources should include staffing, suitable and effective equipment and cleaning materials and facilities such as staff rooms, changing rooms and laundry facilities for uniforms; underlying all of these is a budget geared to cleaning needs.

The level, application and quality of resources are clear influences on performance of any organisation. Three major categories of resources were considered for the purpose of this study are; staff, budget, and equipment and materials (including facilities such as domestic services rooms). Staff are a vital resource, as it is the staff who deliver the appropriate services in a hospital. Equipment and materials are also necessary for effective functioning of an organisation. Financial resources, on the other hand, facilitate the acquisition of staff , equipment and materials.

According to the case study findings, the following factors should be considered during resource deployment (see Table V in Appendix 7a).

- Resource availability (staff, budget and equipment and materials)
- Type of equipment and materials
- Staff salaries/wages
- Staff skills and expertise

The case study findings revealed the current situation in the two cases in terms of resource deployment (see Table 5.6). In-depth discussions on this are presented in Chapter 8.

Table 5.6:   Resource deployment – current situation

Description Case study	In-house case*			PFI case*			
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	ICT (CS2)
<u>Resource availability</u>							
Staff availability	S (3)	N (2)	S (2)	Y (2)	Y (2)	Y (1), N (1)	N (2)
Budget availability	N (3)	Y (1)	S (1)	Y (1)	Y (2)	-	-
Availability of equipment and materials	Y (1)	S (2)	Y (1)	-	Y (1)	Y (1), N (1)	-
Staff salaries/ wages	-	N (2)	-	Y (1)	Y (1)	N (2)	-
Types of equipment and materials	-	-	S (2), N (1)	-	-	-	N (2)
Staff skills and expertise	-	Y (1)	S (1)	-	-	-	N (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

In terms of the case study findings, it was found that the *In-house case* has 'planned frequencies' that are in line with national guidance. However, there were shortfalls in the staff hours spent on cleaning, supervising and monitoring. The level of availability of resources was comparatively high in the *PFI case* (see Table 5.6). This must be because the *PFI case*, *per se*, is financed by an external party. According to many domestic managers and domestic staff, the shortage of staff and budget limitations appear to be the biggest challenges in the *In-house case*. This high level of resource constraints is obviously a concern in the *In-house case*. Planning the resource requirement (i.e. staff input hours, budgetary requirement and equipment and materials requirement) and frequencies of work (e.g. cleaning frequencies) are vital during resource deployment. The lack of efficiency of resources occurs when planned resource levels do not match the required frequencies of work; while resource constraints occur when availability of resources do not match the planned resource levels. Therefore, effective resource deployment means making an attempt to adequately address these three parameters, i.e. frequencies of work, planned resource levels, and availability of resources.

5.3.6   Defining accountability

Accountability can be defined as an obligation for an organisation or person who manages resources to answer or report to others (e.g. high-level managers or authorities), about the intended and effective use of the resources and on the achievement of the results (Ministry of Foreign Affairs – Denmark, 1999). The American Heritage Dictionary (2000) defines accountability as "being obliged to answer for one's actions, to an authority that may impose a penalty for failure". As Christensen (2004) states, accountability indicates who is responsible for completing a particular activity. Accountability and responsibility, hence, marginally differ from one another. For example, accountability is "accepting the consequences for the outcome of a situation for which, one is responsible" while responsibility is "being answerable for the outcome or results of a situation" (Unit Leadership Program, 1998).

As shown in Table 5.1, ten out of sixteen interviewees (63%) identified defining accountability as one of the key strategies in the control of HAI in domestic services. All the ten interviewees from both cases remarked that they have a clear definition of accountability in their service (refer to Table 5.7).

Table 5.7:   Accountability of the domestic service

Description	In-house case	PFI Case	
	As perceived by the domestic team and infection control team	As perceived by the domestic team	As perceived by the infection control team
Accountability is clearly defined in the service?	Y (5)	Y (3)	Y (2)
Accountability of the services lies with …..	Accountability for all aspects of cleaning including control of HAI and cleaning staff clearly lies with the management or board of the hospital	Accountability relating to the service, as a whole, remains with the PFI consortium whilst the board of the health facility (the NHS Trust and the related hospital) is responsible for monitoring the service provided by the PFI consortium and the PFI contractor	Accountability for control of HAI always remains with the hospital

Y – Yes, **S** – To some extent, **N** – No

According to the latest national infection control standards (NHS Quality Improvement Scotland, 2003), there should be clear accountability for infection control and prevention. It is also noted in the national infection control standards that, "while infection control and prevention is everyone's responsibility, there

are designated staff in every Trust with specific roles, particularly the ICT members and the senior management". According to the interviewees in the *In-house case*, the accountability for all aspects of domestic services, including control of HAI, clearly lies with the management or board of the hospital. The head of all FM services (i.e. the general manager, facilities) is also a member of the board of the hospital. In the *PFI case*, the contractor is responsible for the FM service provision including domestic services. According to a top-level domestic manager from the PFI consortium, the accountability relating to the service, as a whole, remains with the PFI consortium whilst the NHS Trust is responsible for monitoring the service provided by the PFI consortium and the PFI contractor. However, as the ICT members of the *PFI case* noted, the accountability for the control of HAI always remains with the hospital. Therefore, as they further stated, the PFI contractor must comply with national and the hospital's infection control policies.

As stipulated in one of the fourteen standards (i.e. STANDARD 3 – Accountability of ICT) provided by the Clinical Standards Board for Scotland (2001), the ICT is responsible for the day-to-day implementation of the control of HAI programmes in clinical as well as in FM services. The *PFI case* findings suggest that, at present, its area and level of accountability have a major deviation from the national requirements. This may be because the *PFI case* is operated by an external service provider. In one of the studies undertaken by the Department of Public Health and Policy (2001) it was identified that, in many cases, infection control was not taken into account when contracts were drawn up:

"It became apparent very quickly that the people with the most knowledge of infectious diseases were not involved in contracting at all. So the finance officers and other people in the Trusts were signing contracts, but were unaware of the implications of these agreements for infection control."

This study has identified innumerable problems resulting from the minimal attention paid to the control of HAI when contracts were drawn up. For example, domestic staff have brought their own cleaning materials in, because

these were in short supply. In some instances, there was no budget for the extra cleaning that would need to be done following an outbreak of HAI.

5.3.7   Setting up the organisational structure

As identified by Mintzberg (1989), the structure of an organisation is the sum total of the ways in which it divides labour into distinct tasks and then achieves coordination among them. The Human Resource and Organisational Development Consultancy (2003) defines organisational structure as "a system of roles, relationships, responsibilities, authority, accountability and communication channels".

Nine out of the sixteen interviewees (56%) identified setting up an effective organisational structure as one of the key strategies in the control of HAI in domestic services (see Table 5.1). A summary of the findings of the organisational structures of the two cases is given in Table 5.8.

Table 5.8:   Organisational structure of the domestic service

Description	In-house case			PFI Case			
	FMGR (CS1)	FMGR - SUP (CS1)	ICT (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP, OUT (CS2)	ICT (CS2)
The type of organisational structure that exist in the domestic service	Hierarchical			Complex organisation structure to define the lines of coordination and communication between the Trust, PFI consortium and the PFI contactor.			
Are you happy with the current organisational structure?	Y (1)	N (1)	N (2)	Y (1)	Y (2)	Y (1)	N (1)

Y – Yes, **S** – To some extent, **N** – No

As mentioned in section 3.7.5.3 and as shown in Table 5.8, the organisational structure of the *In-house case* is hierarchical (see Figure 3.5) whilst the organisational structure of the *PFI case* is complex (refer to section 3.7.6.3 and Table 5.8). As a whole, both organisational structures have outlined the lines of accountability from the domestic staff to the Trust management team. However, both structures do not specify links with any clinical functions such as infection control or nursing. As inferred by the Comptroller and Auditor General (2000), this is a major drawback in effective management and the control of HAI. It is worthwhile noting that, at the time of the case study interviews, the Trust

management team of both cases were under the old NHS structure where each and every unit of the structure was idled. Nevertheless, the case study participants supposed that their management teams are in the process of making structural changes to their respective Trusts by introducing the new and integrated NHS Board system (refer to section 3.7.4). This could introduce clear links and lines of accountability between different units within the Boards/Trusts and hospitals.

5.4 ENSURING SUCCESSFUL STRATEGY IMPLEMENTATION

Once the strategies of control of HAI have been formulated, it is important that it be formally implemented and operationalised within the domestic service. King (2000), in his report on 'New Zealand health strategy', highlights that the process of ensuring successful strategy implementation must engage tools such as 'communication incentives' and 'organisational structure'. On the contrary, Glennan and Melmed (1996) introduce communication, organisational structure, motivation, training and education, not as approaches of ensuring successful strategy implementations but as key enablers for successful strategy implementation. As Camillus (1999) suggests, to ensure success in strategy implementation the process must engage performance management. He sees this as the process of 'linking strategy to performance'. This relates to various approaches that leading organisations use to bring about consistency between organisational strategy and organisational practices throughout the organisation. It also includes the strategic control processes that check the continued relevance and validity of current plans. According to Fortier (2005), performance management approaches such as the balanced scored card approach (refer to Chapter 8), help organisations to embark on refining strategies to fit changing market and customer needs.

According to one of the top-level domestic managers from the *In-house case*, 'good communication and training' are vital in ensuring successful implementation of strategies. However, the findings from the two cases suggest that the management approaches in use are primarily related to performance audits (refer to Chapter 8).

5.5   STRATEGIES FOR THE CONTROL OF HAI – DATA SYNTHESIS

The previous sections of this chapter, overall, attempted to fulfil part of the fourth objective and research questions II and III of the research study (refer to Table 1.2). This section of the chapter presents some overall discussions relating to the findings presented above.

During the case study interviews, both the *In-house case* and the *PFI case* were able to demonstrate that they have a senior management team designated with overall accountability for the control of HAI in domestic services. The Department of Health has introduced an audit and accountability system within the NHS, namely, Clinical Governance. Under this system, Chief Executives of NHS Trusts are not merely financially accountable but are now also accountable for the control of HAI procedures within their NHS Trusts. Thus, they have made formal arrangements to incorporate the ICT component in their hospital services (Plowman et al, 1999). However, it seems that the ICT component is neglected in domestic services, especially when the domestic service provision is contracted-out. The level of involvement of domestic managers and ICT members in the control of HAI is significant in developing effective guidance documents (for ease of reference standards, specifications and policies and guidelines are identified as guidance documents). There can be innumerable problems if minimal attention is paid to the control of HAI when contracts are drawn up. The domestic staff might not be aware of appropriate practices of control of HAI, which will result in the occurrence of HAI. For example, ineffective handwashing procedures could increase the risks of HAI through direct or indirect contacts (refer to section 2.4).

In the *PFI case*, the roles, responsibilities and relationship between the PFI consortium, PFI contractor and the NHS Trust is transparent. This can be regarded as good practice for any contracted-out domestic service. Well-defined links, roles and responsibilities between the client and the contractor, are essential components of any constructive working relationship. Therein, defining the parameters at the start of the contract is essential to lessen the risk of future problems of communication and coordination between parties.

Even though there have been some significant changes to the national agenda of control of HAI, it is apparent from the findings that both the *In-house case* and the *PFI case* do not have any up-to-date guidance documents on the subject. For example, the *PFI case* has not updated its policies and guidelines since the inception of the PFI contract in 2001. This may be due to their (both the *In-house case* and the *PFI case*'s) low level of adaptability to the changes made at the national level. As repeatedly discussed in Chapter 2, the requirements for the control of HAI are ever changing in the NHS due to factors such as technological advances, susceptibility of hosts, medical interventions, to mention but a few. The key risk of using out-of-date guidance documents is that they may not match current requirements and, consequently, hospitals may be inappropriately or inadequately cleaned, thereby putting patients at risk of HAI.

A high level of resource constraints is obviously a concern in the *In-house case*. Domestic service providers must have systems in place to ensure that resources are properly deployed in the right places at the right time in order to meet required standards. Such systems must also ensure that the resource deployment can quickly respond when abnormal circumstances are encountered; e.g., change of cleaning frequencies during an occurrence of HAI. Murphy (2002) also asserts this. As he explains, when deploying resources, the domestic services should ensure that they have appropriate resource contingency plans to deal with significant changes in the system. For instance, resource deployment programmes must ensure that they can cover for periods where higher than normal absence of staff might be anticipated.

From the case study findings, it is apparent that the control of HAI has become an integral part of the cleanliness agenda in the *In-house case*. For example, the *In-house case* employs the national level standards and National Cleanliness Standards framework (NHS Estates, 2001a) in their day-to-day operations. In the *PFI case*, however, the focus on the control of HAI is comparatively very low. An obvious reason is their detachment to the ICT function of the hospital. Even though some of the domestic managers have identified the significance of the control of HAI, they are a bit hesitant to make changes to the PFI contract accordingly. This is mainly due to the rules and regulations attached to the PFI

contract. For example, even a minor change in a contract document should be approved by an array of parties ranging from the FM provider, the PFI consortium to the client. Making changes to the performance audit requirements could be another reason for their hesitation to make any modifications to the PFI contract.

As the Scottish Executive Health Department (2002a) explain, giving HAI low priority, relative to other issues, may exacerbate the problem. Therefore, it is high time that all domestic services prioritised the control of HAI. The situation could easily be improved if the domestic team has direct links with the ICT. As the NHS Estates (2001a) explains:

> "We continue to believe that high quality infection control standards in cleaning services can only be achieved and thereby effectively contribute to enhancing the overall patient experience through Modern Matrons taking the lead; and direct links with infection control teams and committees"

5.6   SUMMARY

According to the case study findings, the main strategies adopted in domestic services for the control of HAI are as follows:

- Development of standards
- Development of service specifications
- Development of policies and guidelines
- Resource deployment (resources herein include staff, budget and equipment and materials)
- Consideration of importance given to the control of HAI
- Managers
- Development of an organisational structure

In conclusion, it appears that the *In-house case* has more established practices than the *PFI case* in terms of strategies adopted. However, it can also be said that the *PFI case* is well resourced compared to the *In-house case*, especially in terms of staff and budget.

Overall, the following inferences and implications could be documented:

1. Irrespective of the type of service provision, every attempt should be made to introduce clear and direct links and accountability lines between the units within the hospitals (e.g. domestic services and the ICT).

2. Guidance documents (standards, specifications, policies and guidelines), which contain information on the control of HAI, should be in place in all domestic services. The senior management of the hospital/Trust should identify the importance of having up-to-date guidance documents. This is to ensure that the guidance documents are regularly being reviewed with the national best practice guidance and local needs, based on a risk assessment programme.

3. The hospitals/Boards/Trusts should ensure that all the guidance documents are easily accessible to staff and, ideally, that all relevant sections are included in form of a 'hand book'. The language used in the handbooks should be clear and easy to understand.

4. Any domestic service should ensure that operational policies specify roles and responsibilities of the staff (nursing and domestic staff) clearly. Attempts should also be made to ensure that all staff are made aware of their roles and responsibilities.

5. Domestic services should ensure that dedicated resources are available to cover essential practices in relation to domestic service (including the control of HAI). They should ensure that they have contingency plans in place to deal with resource constraints, e.g. staff shortages.

CHAPTER 6 : THE LEVEL OF INVOLVEMENT AND INTEGRATION OF KEY PLAYERS IN THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

6.1   INTRODUCTION

Chapter 6 presents some of the findings of the case study approach. The findings are related to the degree of involvement and integration of key players in the control of HAI in domestic services. The key players herein include domestic managers, domestic supervisors, domestics, ICT, ward nurses and matrons. The findings are further elaborated using some of the results gleaned from the questionnaire survey. The idea of this is to investigate whether the type of domestic service provision has an impact on the extent of involvement and integration of the key players in the control of HAI in domestic services. The findings are also substantiated with some of the findings of a thorough review of literature. Overall, Chapter 6 addresses part of the fourth objective and research question IV of the study (refer to Table 1.2).

6.2   INVOLVEMENT AND INTEGRATION – AN INTRODUCTION

How best to integrate is simple, yet difficult; innovative, yet traditional (Patterson, 2001). To integrate means to make whole by bringing all parts together, to unify (Tydell, 2005). Even though the words 'involvement' and 'integration' go hand-in-hand, for the purpose of this study; the two are discussed as two separate issues. Involvement is considered as 'engaging as a participant' while integration is considered as 'their communication and coordination'. Thus, the words 'communication and coordination' or 'close liaison' are used interchangeably to discuss the issue of 'integration' throughout the thesis.

The following sections of this chapter present some of the findings gleaned from the case studies and questionnaire survey approach. The findings are related to the integration and involvement of key players in the control of HAI in domestic services. It is worthwhile noting that, at the time of this research, there was only a limited literature on the aforementioned subject area. Besides, none of the literature discussed the issue of involvement and integration particularly with

regard to the control of HAI in domestic services. Thus, many of the case study participants and survey respondents commended the efforts made by the researcher to investigate the subject in-depth. As an ICT member (a questionnaire survey participant) commented:

"Lovely to see someone taking an in-depth interest in the services we manage everyday"

The implications, inferences and conclusions made in this chapter are mostly based on the research findings and the researcher's perception; although some were substantiated through some of the findings of the review of literature.

6.3 WHO ARE THE KEY PLAYERS?

The parties involved in the control of HAI in domestic services can be listed as shown in Figure 6.1 (refer to section 2.5). The parties shown in Figure 6.1 are either directly (e.g. facilities managers, domestics, ICT members, etc.) or indirectly involved (e.g. Association of domestic services, British Institute of Cleaning Services, Infection Control Nurses Association, etc.) in the process.
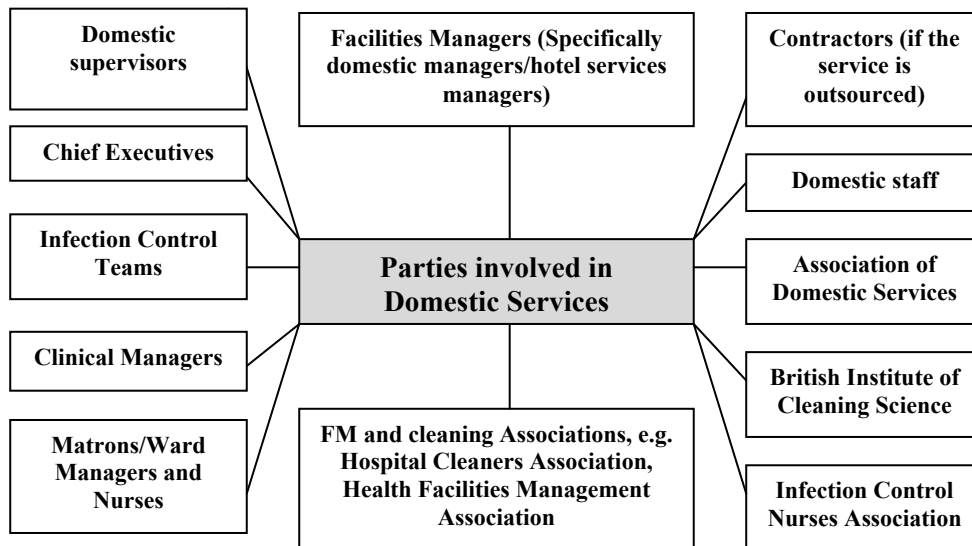
Figure 6.1:   Parties involved in the control of HAI in domestic services (adapted from NHS Estates, 2004b)

It was identified from a thorough review of literature that domestic managers, domestic supervisors, domestics, infection control team (ICT) members and ward nurses/matrons play significant roles in the control of HAI in domestic services (Auditor General for Wales, 2003; ; Clinical Standards Board for Scotland, 2002;

Auditor General for Scotland, 2000; Acute Health Division Victorian Government, 2000). Thus, they have been identified as the key players involved in the process. For the purpose of this study, domestic managers, domestic supervisors and domestics are considered as the 'domestic team' and the ICT members and ward nurse/matrons are considered as the 'clinical team'. The Auditor General for Wales (2003) provides a list of responsibilities of these key players as given in Table 6.1 (also refer to Appendix 8).

Table 6.1: **Parties involved in the control of HAI in domestic services (Source: Auditor General for Wales, 2003)**

Role	Cleaning responsibilities
Domestic managers	Management of staff and resources
Domestic Supervisor	Monitoring of cleanliness, supervision of staff, training, personnel
Domestics	Cleaning and house keeping duties (e.g. bed making, catering, messenger service, etc)
ICT members	Carry out infection control audits, training
Ward nurses/matrons	Cleaning clinical and treatment equipment

6.4 THE LEVEL OF INVOLVEMENT OF KEY PLAYERS IN THE CONTROL OF HAI

6.4.1 Current situation with regard to the level of involvement - case study findings

All the twenty-six (26) interviewees who participated in the case studies were asked questions on the level of involvement of the key players (refer to Appendix 2b). The interviewees presented their views on the degree of involvement under different stages as follows (see Table VI in Appendix 7a):

- In planning
- In monitoring and supervision
- In taking corrective actions
- In changing domestic practices relating to the control of HAI
- In carrying out domestic practices relating to the control of HAI

The twenty-six interviewees provided their views on these stages of involvement in terms of the current situation in their respective domestic services. The results are laid out in Table 6.2.

Table 6.2: **Current situation in terms of involvement of the key players in the control of HAI**

Description	In-house case[*]					PFI case[*]					
	FMGR (CS1)	FMGR - SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)
Involvement											
In planning	Y (3)	-	-	Y (1), S (2)	-	Y (2)	Y (2)	-	-	N (2)	-
In monitoring and supervision	Y (1)	Y (2)	-	Y (2)	Y (1), S (1)	Y (2)	Y (1)	Y (2)	-	N (2)	S (2)
In taking corrective actions	Y (2)	-	-	Y (1), S (1), N (1)	-	Y (1)	Y (2)	-	-	-	-
In changing practices	Y (1)	-	-	Y (1), S (2)	-	Y (2)	N (1)	-	-	N (2)	-
In carrying out domestic practices relating to control of HAI	-	S (2)	Y (3)	-	Y (1)	-	-	S (2)	Y (3)	-	Y (2)
Satisfaction in terms of involvement	Y (3)	Y (2)	Y (3)	Y (2), S (1)	Y (1), S (1)	Y (2)	Y (2)	Y (2)	Y (3)	N (2)	S (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

The domestic managers from both cases and ICT members from the *In-house case* are very much involved in the planning stage of the control of HAI in their respective domestic service (see Table 6.2). This is, mainly, to set out the appropriate strategies in the said process. They are also involved in taking corrective actions and in changing practices in the control of HAI. Herein, 'taking corrective actions' mainly occur in case of a poor performance. On the other hand, 'changing practices', as highlighted by one of the ICT members from the *PFI case*, means:

"Every aspect of clinical or non-clinical practices has an association with infection control… Also infection control is an area where its practices and requirements change rapidly. So, in case of any modifications, alterations or shifts to either national or local infection control requirements, the clinical and non-clinical practices should also be changed accordingly."

Nearly 61% of the interviewees stated that their involvement in monitoring and supervision stage is also vital in the control of HAI (see Table VI in Appendix

7a). Most of the domestic supervisors and nurses from both cases, at present, are very much involved in the said process (refer to Table 6.2).

The results of the current situation of the *PFI case* revealed a clear rift between the domestic teams and ICT members (see Table 6.2). The two ICT members from the *PFI case* noted that, thus far, they have not been involved in any of the stages identified above, (particularly in planning, monitoring and supervision stages).

All the aforementioned stages of involvement, i.e. planning, monitoring and supervision, taking corrective actions, changing practices, are moreover related managerial responsibilities. At the operational level, 'involvement' mostly associates with carrying out practices, i.e. cleaning and housekeeping duties. All the domestics and some domestic supervisors from both cases are fully involved in this process. According to the views of the nurses across the two cases, they too have some duties to fulfil in domestic services, such as cleaning the upper side of the beds in wards, cleaning medical equipment and cleaning patients' hoists.

Overall, most of the interviewees, except the ICT members from the *PFI case*, were satisfied with their level of involvement in the control of HAI in domestic services.

6.4.2 Factors that have an impact on the level of involvement - questionnaire survey findings

It was apparent from the case study findings that the ICT members from the *PFI case* had limited or literally no involvement in the control of HAI in domestic services (refer to section 6.4.1). The results distinctly showed a friction between the domestic team and ICT members in the *PFI case*. The main reason for this could be the fact that the *PFI case* is operated and managed by an external party. Therefore, as discussed in section 3.8.2, this prompted the need to investigate whether the situation is the same elsewhere across the NHS, especially when the domestic service is operated by an outside organisation. This was fulfilled through a questionnaire survey approach.

The above was examined using the following two hypotheses (see Table 1.2):

A. The level of involvement of key players varies according to their job role in the control of HAI

B. The level of involvement of key players varies according to the type of domestic service provision

The respondents were asked about their level of involvement in the control of HAI in domestic services in relation to the following four stages (refer to section 6.4.1):

- Planning
- Monitoring and supervision
- In taking corrective actions
- In changing practices

Apart from the above, the respondent's overall level of involvement in the control of HAI was also sought, in order to confirm the reliability of their responses. A summary of the overall responses is given in Table 6.3.

Table 6.3: **Level of involvement in the control of HAI in domestic services – descriptive statistics**

	N	Min	Max	Mean	Std. Dev
Involvement – planning [a]	411	1	5	2.18	1.079
Involvement - monitoring & supervision [b]	412	1	5	1.93	.917
Involvement - taking corrective actions [c]	412	1	5	1.89	.889
Involvement - changing practices [d]	412	1	5	2.04	.967
Overall level of involvement [e]	412	1	4	2.13	.966
Valid N (list wise)	411				

Note: $e \neq (a + b + c + d) / 4$

<u>Meaning of scale (Level of involvement):</u> **1** (Very High Level), **2** (High Level), **3** (Low level),
4 (Very Low Level), **5** (Not Applicable)

A close observation of the Table 6.3 reveals that there is one missing data, however it is assumed that due to the high volume of responses (412), the effect of one missing data is minimal.

The mean values given in Table 6.3 ranges from 1.89 (involvement in taking corrective actions) to 2.18 (involvement in planning). Overall, this suggests that the respondents have a high level of involvement in planning, monitoring and supervision, taking corrective actions and changing control of HAI practices in domestic services. Coincidently, the mean value for the overall level of involvement is approximately the same at 2.13. This not only signifies that the respondents are highly involved in the control of HAI in domestic services, but also hints that the responses are reliable.

An attempt is now made to identify whether the following factors have an impact on the level of involvement of the respondents:

a. Job role (i.e. domestic managers and ICT members)
b. Region (i.e. England and Scotland)
c. Type of domestic service provision (i.e. In-house, balance approach, outsourced, and PFI – refer to section 3.8.4)

The results are given in the following sections.

6.4.2.1   The level of involvement vs. job role

There is a need to identify whether the level of involvement of the respondents (in the control of HAI in domestic services) differs according to their job role, i.e. domestic managers and ICT members. This can be examined using the test of null hypothesis.

Null hypothesis H_0 – The level of involvement in the control of HAI does not differ according to the job role of the respondents

Table 6.4 illustrates the mean comparison of the level of involvement according to the job role of the respondents. The results have also been further categorised by the region (i.e. England or Scotland).

Table 6.4: **Level of involvement of different groups of respondents – mean value comparison**

Job role & region*	Involvement – planning (a)	Involvement - monitoring & supervision (b)	Involvement - taking corrective actions (c)	Involvement - changing practices (d)	Overall level of involvement (e)
FM-ENG	1.39	1.65	1.23	1.16	1.11
FM-SCOT	1.04	1.30	1.49	1.26	1.47
ICT-ENG	2.91	2.89	2.69	2.78	2.98
ICT-SCOT	3.12	2.51	2.93	3.10	3.03

Note: $e \neq (a + b + c + d) / 4$

Meaning of scale (level of involvement): **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

* see Table 3.15 for the codes given for the respondents

Mean values given in Table 6.4 present some distinctive results. Domestic managers from both England and Scotland carry low mean values ranging from 1.04 to 1.65. In contrast, the ICT members from both England and Scotland carry higher mean values ranging from 2.49 to 3.12. This clearly indicates that the domestic managers have a very high level of involvement in each and every stage of control of HAI in domestic services. The ICT members' level of involvement, on the other hand, is comparatively low in the said process.

The aforementioned results revealed that there is a difference in the level of involvement according to job role of the respondents. This was further corroborated using a Kruskal-Wallis test (see Table 6.5).

Table 6.5: **Kruskal-Wallis test statistics for the level of involvement by the job role and region**

	Involvement - planning	Involvement - monitoring & supervision	Involvement - taking corrective actions	Involvement - changing practices	Overall level of involvement
Chi-Square	75.441	78.314	77.965	71.113	63.080
df	3	3	3	3	3
Asymp. Sig.	.000*	.000*	.000*	.000*	.000*

* results are statistically significant at $p < 0.05$

According to the results given in Table 6.5, all p values in Table 6.5 are equal to zero, which is statistically significant. Therefore, at 5% level of significance, the null hypothesis is rejected, which means that 'the level of involvement of the

respondents differs according to their job role in the control of HAI in domestic services'.

The Kruskal-Wallis test results only explain that there are differences in the respondent groups in some way/s. However, the test does not show how they differ. Therefore, the Mann-Whitney U test was carried out for pair-wise comparisons (refer to section 3.8.6). It was performed between the four groups (i.e. FM-ENG, FM-SCOT, ICT-ENG and ICT-SCOT), for the purpose of determining the group/s that contributed to the difference in level of involvement at the 5% level of significance. The results are presented in Table 6.6.

Table 6.6: **Mann-Whitney U test comparing the level of involvement of domestic managers and ICT members from England and Scotland (p value)**

| Job role and region** | Level of involvement | | | | |
	Planning	Monitoring and supervision	Taking corrective actions	Changing practices	Overall
FM-ENG/ICT-ENG	.000*	.000*	.005*	.000*	.000*
FM-SCOT/ICT-SCOT	.001*	.000*	.001*	.000*	.012*
FM-ENG/ICT-SCOT	.003*	.000*	.002*	.000*	.000*
ICT-ENG/FM-SCOT	.000*	.001*	.004*	.000*	.000*
FM-ENG/FM-SCOT	.055	.328	.067	.582	.556
ICT-ENG/ICT-SCOT	.077	.012*	.058	.352	.355

* results are statistically significant at $p < 0.05$
** see Table 3.15 for the codes given for the respondents

As per Table 6.6, it is apparent that, at the 5% level of significance, the job roles of the respondents (i.e. domestic managers and ICT) have contributed to the difference in level of involvement between the groups. On the other hand, overall, the region where the respondents are from has not been a factor in the level of involvement of the respondents.

The aforementioned results reveal that the level of involvement of the domestic managers and ICT members differs in the control of HAI in domestic services. This confirms hypothesis 'A' of the research study (see Table 1.2). Therefore, as the mean value comparison suggests (refer to Table 6.4), the domestic managers have a higher level of involvement in the control of HAI in domestic services than the ICT members.

6.4.2.2   The level of involvement vs. region

As described in the previous section, the region of the respondents (England/Scotland) did not appear to be an issue in the level of involvement. This is further supported by using a chi-square test (see Table 6.7).

Table 6.7:   Chi-square test statistics for the level of involvement of the respondents in England and Scotland

Level of involvement	Pearson Chi-Square		
	Value	df	Asymp. Sig. (2-sided)
Planning	2.692	4	.611
Monitoring and supervision	8.115	4	.187
Taking corrective actions	10.311	4	.115
Changing practices	4.823	4	.430
Overall level of involvement	1.095	3	.778

According to Table 6.7, the two-sided asymptotic significance of the chi-square statistic is greater than 0.10 in the level of involvement of the respondents. This means that the region where the respondents are from, does not have an impact on their level of involvement in the control of HAI in domestic services. This may be due to the fact the respondents from the two regions, i.e. England and Scotland, have similar roles and responsibilities as they adhere to, moreover, similar guidance documents. During the review of literature, it was apparent that most of the Scottish publications (published by the NHS in Scotland and related organisations) have been extracted from the English publications (published by the NHS – England and related organisations). For example, 'Infection Control in the Built Environment' – SHFN 30 (Property and Environment Forum Executive, 2002) is primarily drawn from the 'Infection Control in the Built Environment' – HBN 30 (NHS Estates, 2001c).

6.4.2.3   The level of involvement vs. the type of domestic service provision

During the data analysis stage of the questionnaire survey, the test of null hypothesis was used to verify whether there are any differences in the level of involvement of the key players according to the type of domestic service provision.

Null hypothesis H_0 – there is no difference in the level of involvement of the respondents according to the type of domestic service provision

Table 6.8 illustrates the mean comparison of the level of involvement according to type of domestic service provision.

Table 6.8: **Level of involvement and types of domestic service provision – mean value comparison**

Type of domestic service provision	Involvement – planning (a)	Involvement - monitoring & supervision (b)	Involvement - taking corrective actions (c)	Involvement - changing practices (d)	Overall level of involvement (e)
Totally in-house	2.05	1.60	1.76	1.98	1.96
Balanced approach	2.07	1.87	1.83	2.04	2.13
Totally out-sourced	2.56	2.03	2.33	2.21	2.57
PFI	2.46	2.00	1.94	2.14	2.39

Note: $e \neq (a + b + c + d)/4$

Meaning of scale (level of involvement): **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

The results presented in Table 6.8 do not report any significant differences in the mean values according to the type of domestic service provision. However, a closer observation of Table 6.8 suggests that a totally in-house type of domestic service provision has, comparatively, lower mean values. This means that there is a relatively higher level of involvement of the respondents in the In-house type of domestic service provision, in the control of HAI. The totally out-sourced type of domestic service provision, on the other hand, has the highest mean values in terms of level of involvement. The overall level of involvement, shown in the last column of Table 6.8, presents similar results. This not only verifies the reliability of the data collected but also hints that the level of involvement between the teams could vary according to the type of domestic service provision. This was further examined using a Kruskal-Wallis test (see Table 6.9).

Table 6.9: **Kruskal-Wallis test statistics for level of involvement of the respondents and the type of domestic service provision**

	Level of involvement				
	Planning	Monitoring and supervision	Taking corrective actions	Changing practices	Overall level
Chi-square	16.983	25.598	11.825	24.975	16.093
df	3	3	3	3	3
Asymp. sig	.000*	.006*	.000*	.004*	.000*

* results are statistically significant at $p < 0.05$

As Table 6.9 shows, p values of the level of involvement are near or equal to zero (<0.05). Therefore, at 5% level of significance, the null hypothesis is rejected. This denotes that there is a difference in the level of involvement of the respondents, according to the type of domestic service provision.

The aforementioned results mean that the level of involvement of the respondents varies according to the type of domestic service provision. This confirms hypothesis 'B' of the research study (see Table 1.2).

6.4.3 The level of involvement of the key players in the control of HAI - data synthesis

A mean value comparison of the level of involvement of the respondents according to their job role and the type domestic service provision is shown in Table 6.10.

Table 6.10:   The level of involvement vs. job role and type of domestic service provision

Job role	Type of domestic service provision	Involvement – planning (a)	Involvement - monitoring & supervision (b)	Involvement - taking corrective actions (c)	Involvement - changing practices (d)	Overall level of involvement (e)
FM	Totally in-house	1.62*	1.65*	1.54*	1.71*	1.86*
	Balanced approach	1.77*	1.66*	1.63*	1.86*	1.83*
	Totally out-sourced	1.82*	1.44*	1.75*	1.69*	1.85*
	PFI	1.78*	1.50*	1.60*	1.78*	1.94*
ICT	Totally in-house	2.19**	2.08**	2.01**	2.03**	2.01**
	Balanced approach	2.53**	2.11**	2.15**	2.05**	2.15**
	Totally out-sourced	3.38***	2.57**	2.77**	2.63**	3.23***
	PFI	3.41***	2.48**	2.61**	2.50**	3.17***

* mean values < 2
** mean values > 2 but < 3
*** mean values > 3

Note: $e \neq (a + b + c + d) / 4$

Meaning of scale (level of involvement): **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

The results from Table 6.10 suggest the following:

1. In terms of the job role, the domestic managers have a higher level of involvement in the control of HAI than the ICT members.
2. The level of involvement of domestic managers in the control of HAI does not significantly differ across different types of domestic service provisions.

3. The ICT members from In-house domestic services have a higher level of involvement in the control of HAI than the ICT members from a totally outsourced service or from a PFI service. Overall, the latter two have the lowest level of involvement in the control of HAI in domestic services.

Taking the findings presented in Table 6.10, section 6.4.1 and section 6.4.2 into consideration, the following observations may be deduced.

The findings of the case studies suggest that there is a variation in monitoring and supervision arrangements in the domestic services. Therefore, there is a need to put in place formal monitoring and supervision procedures, including relevant documentation and reporting arrangements. A lack of formal monitoring system can, otherwise, lead to ad hoc arrangements, leading to risks such as incomplete coverage, variation in standards and results not being collated, reviewed and acted on. If domestic services do not monitor and supervise both inputs and outputs, they will not have the information to amend cleaning plans as required to deal with lower inputs (e.g. staff absence) or poor outcomes (e.g. HAI).

According to the results presented in section 6.4.2, respondents from both England and Scotland had similar levels of involvement in the control of HAI in domestic services. One of the reasons for this may be that they are following similar guidance documents in domestic services (refer to section 6.4.2). This is a positive sign in terms of control of HAI. As repeatedly discussed in Chapter 5, HAI issues are ever changing, thus, control of HAI practices should change accordingly. If domestic services are adhering to similar documents, it would ensure consistency across the regions (at national level). Also, it would avoid any risks of differing qualities in the domestic services (refer to section 5.5).

The domestic managers have the highest level of involvement in the control of HAI in domestic services. In addition, the results suggested that their level of involvement does not significantly differ across different types of domestic service provisions. This may be because, the domestic managers, irrespective of the type of domestic service provision, have the overall accountability for domestic services (refer to sections 5.3.6 and 5.5). The ICT members, on the other hand, have a comparatively low level of involvement in the control of HAI.

This is even very low or, at times, non-existent, when the domestic service is contracted-out (i.e. outsourced or PFI, refer to section 3.7.4). There is an array of reasons attached to this. The level of involvement of ICT members in the control of HAI in domestic services can be limited, as they are considered to have an advisory role in the said process, as opposed to the domestic managers. The lack of clarity of the links between the ICT and the domestic service in the organisational structure, and the lack of clarity of the roles and responsibilities of the key players, could also be inhibiting the level of involvement of the ICT members in the control of HAI in domestic services (refer to sections 5.3.7 and 5.5). Their lack of involvement in the said process could lead to innumerable problems in terms of the level of attention paid to the issues associated with the control of HAI (refer to section 5.5), training and education in the control of HAI (refer to section 7.3.1). Thus, the domestic managers should ensure that the ICT members become an integral part of their service (Department of Health, 2001c and 2003). According to the Matron's Charter, both the ICT members and the matrons should be part of the domestic services (NHS Estates and Department of Health, 2004). The Matron's Charter stresses that, whether domestic services are delivered by an in-house team, or by an external contractor, it is imperative to have clarity around the service that can be expected.

The case study findings revealed that there is a rift between the ICT members and domestic managers in the *PFI case*. As Barret (1995) claims this often happens when the direct control is given to outside organisations. During a workshop on HAI related standards, it was reported that one of the obstacles in implementing HAI standards in hospitals is contracting-out (Scottish Executive, 2002b). As the Scottish Executive Health Department (2002b) further stated, "contracting-out of domestic services can hinder infection control procedures and standards…. it diminishes the opportunities for teamwork, partnership approach…". Hence, there is a great need to avoid the 'division of teams' when contracting-out services. This is a major issue to be addressed by the contracted-out domestic services. They should identify the importance of ICT input in their services.

6.5 THE LEVEL OF INTEGRATION BETWEEN KEY PLAYERS IN THE CONTROL OF HAI

6.5.1 Current situation with regard to the level of integration - case study findings

The twenty-six (26) case study participants presented different interpretations as to the nature and level of integration between the key players involved in the control of HAI in domestic services, as follows (see Table VII in Appendix 7a):

- Working together as a team
- Taking clinical team's advice into consideration
- Meetings between the teams
- Clear lines of communication in the structure
- Support by the clinical teams
- Domestic managers are members of the Infection Control Committee (ICC)

The interviewees explained the current situation of their domestic service in terms of the above. The results are presented in Table 6.11.

Table 6.11: Current situation with regard to the integration between key players in the control of HAI in domestic services

Description	In-house case*					PFI case*					
	FMGR (CS1)	FMGR·SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	FMGR (CS2)	FMGR-OUT (CS2)	FMGR-SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)
Integration											
Working together as a team	-	Y (2)	S (2)	-	Y (2)	-	Y (1)	S (2)	N (2)	-	S (1), N (1)
Taking clinical team's advice into consideration	Y (2)	-	-	Y (1), S (1)	S (1)	-	-	-	-	N (2)	N (2)
Meetings between the teams	Y (2), S (1)	-	-	Y (1)	-	S (1)	N (1)	-	-	N (2)	-
Clear lines of communication in the structure	Y (1)	-	-	S (1)	-	Y (2)	Y (1)	-	-	N (2)	-
Support by the clinical teams	Y (1)	Y (1)	Y (1), S (1)	-	-	-	-	-	-	-	-
Domestic managers are members of infection control committees	-	-	-	-	-	-	N (1)	-	-	-	-
Satisfaction in terms of Integration	Y (3)	Y (2)	Y (1), S (2)	Y (2), S (1)	S (2)	Y (2)	Y (2)	Y (1), S (1)	S (1), N (2)	N (2)	S (2)

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

An important finding of the case studies was, once again, the clear rift between the domestic team and the ICT members in the *PFI case*. The latter claimed that there was no form of integration with the domestic team.

Half (50%) of those interviewed noted that working together as a team (or as one entity) is very important in order to have a good level of integration between the parties involved (refer to Table VII in Appendix 7a). The domestic supervisors and the nurses from the *In-house case* believed that they are working as one team. However, the domestics from the *In-house case* had a different view on this. Some of their comments prove this:

"I've been working in this hospital for nearly 10 years, so, I have a good rapport with the nurses in our wards. I and my old colleagues are almost part of the ward teams…But, I know that our new domestics, the 20 year olds, have difficulties with the nurses. Not with all but with some who try to boss them around. So, sometimes the domestics find it difficult to fit into the so called 'team' set up."

'the domestics are separated from the rest of the healthcare team.'

Almost all the ICT members across the two cases believed that taking clinical teams' advice into consideration is essential to maintaining good communication and coordination with each other. As an ICT member from the *In-house case* explained, converting their advice into action denotes that the service offered by them is valued by the domestic team. This, as he further explained, results in maintaining a good relationship with each other.

It was also revealed from the case study interviews that conducting regular meetings between the domestic team and clinical team is significant in terms of improving the level of integration between the parties involved. The main purpose of the aforementioned meetings should be to discuss issues relating to the control of HAI in domestic services. The interviewees from the *In-house case* reported that they have regular meetings with the clinical teams, especially with the ICT members.

According to the case study findings, having clear lines of communication in the organisational structure is also a significant aspect of integration between the parties involved. However, the organisational structures of both in-house and *PFI*

*case*s seem to have not depicted any relationship between the essential units within the service, e.g. relationship between the ICT members and domestic teams (refer to section 3.7.5.3, section 3.7.6.3 and section 5.3.7).

Some of the domestic team members of the *In-house case* (i.e. a domestic manager, a domestic supervisor and two domestics) believe that the support given by the clinical teams is vital to ensure integration between the teams. As they noted, both nursing and ICT members in their hospital are very supportive of each other and coordinate some of their joint efforts/activities.

One of the domestic managers from the *PFI case* believed that their involvement in the Trust infection control committee could help in better integration between the teams. According to the Quality Improvement Scotland (2003), the Infection Control Committee (ICC) endorses all infection control policies, procedures and guidelines and provides advice and support on their implementation (refer to section 3.7.5.4). As Quality Improvement Scotland further explains, the membership of the ICC normally should include a senior manager who represents the chief executive of the Trust, the infection control team, nurse executive director, microbiologist, representatives from all FM services (including domestic services) and the risk management coordinator. However, according to the domestic manager from the *PFI case*, at present, none of the domestic managers are members of the infection control committee. In contrast, in the *In-house case*, the general manager (facilities) and the hotel services manager are members of the Trust's infection control committee.

Overall, the findings suggest that the level of integration between the domestic team and the clinical team is comparatively higher in the *In-house case* than in the *PFI case*.

6.5.2 The level of integration vs. the type of domestic service provision - questionnaire survey findings

As the findings of the case studies revealed, in the *In-house case*, the level of integration between the two teams (i.e. domestic teams and clinical teams) was fairly high. In contrast, the results highlighted that there is a major rift between the domestic team and the ICT in the *PFI case*. For the *In-house case*, being an

internal service to the hospital, could be a reason for having a higher level of integration between the domestic and infection control teams. This prompted the need to identify whether the situation is similar elsewhere in the NHS.

The above was examined using the following hypothesis (see Table 1.2):

C. The level of integration between the domestic managers and ICT members in the control of HAI in domestic services is low when the level of 'outside control' of the domestic service is high

The respondents of the questionnaire survey were asked about their level of agreement on the following ways, in which, the case study participants interpreted integration:

- the organisational structure has clear lines of communication that facilitate communication and coordination between domestic and infection control teams
- domestic and infection control teams meet very often (at least once a month) to discuss issues related to the control of HAI in domestic services
- infection control teams are very supportive in enlightening or advising the domestics on issues to do with the control of HAI
- infection control team's advice is always taken into consideration by the domestic services team
- domestic managers are members of the infection control committee formed by the NHS Trust

Apart from seeking the respondent's view on their level of agreement on aforementioned statements, the respondents were also asked to volunteer their views on the overall level of integration between the domestic and infection control teams. This is also to further identify whether both parties 'work as a team'. This was also important to ensure reliability of the answers the respondents provided. A summary of the overall responses is given in Table 6.12.

Chapter 6: Involvement and integration

Table 6.12: **The level of integration between the key players in the control of HAI – descriptive statistics**

	N	Minimum	Maximum	Mean	Std. Dev
Overall level of integration [a]	412	1	4	2.13	.679
Lines of communication [b]	412	1	5	2.76	.726
Meetings between the teams [c]	412	1	5	2.39	1.032
Support from the ICT [d]	412	1	5	1.73	.769
ICT's advice is taken into consideration [e]	412	1	5	1.73	.788
Members of ICC [f]	412	1	5	2.64	1.284
Valid N (list wise)	412				

Note: $a \neq (b + c + d + e + f) / 4$

Meaning of scale (level of integration): **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

As per Table 6.12, the mean values of the different interpretations of integration (marked as b, c, d, e and f in the table) range from 1.73 to 2.76. Coincidently, the mean value of overall level of integration given in Table 6.12 is also closer to 2. This denotes that, not only is there a high level of integration between domestic managers and ICT members, but also, the responses are reliable.

During the data analysis stage of the questionnaire survey, the test of null hypothesis was used to verify whether there are any differences in the level of integration according to the type of domestic service provision.

Null hypothesis H_0 – there is no difference in the level of integration between the domestic managers and the ICT members in domestic services according to the type of domestic service provision

Table 6.13 illustrates the mean comparison of the level of integration between the domestic managers and the ICT members according to type of domestic service provision.

180

Table 6.13:   Mean value comparison - the level of integration between the key players according to the type of domestic service provision

Type of domestic service	Overall level of integration (a)	Lines of communication (b)	Meetings between the teams (c)	Support from the ICT (d)	ICT's advice is taken into consideration (e)	Members of ICC (f)
Totally in-house	1.28	2.71	1.38	1.20	1.24	2.36
Balanced approach	1.83	2.94	1.76	1.39	1.31	2.81
Totally out-sourced	2.69	2.77	2.95	2.11	2.26	3.07
PFI	2.75	2.83	3.25	2.18	2.32	3.36
Total	2.13	2.76	2.39	1.73	1.73	2.64

Note: $a \neq (b + c + d + e + f) / 4$

<u>Meaning of scale (level of involvement):</u> **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

The results presented in Table 6.13 report significant differences of mean values according to the type of domestic service provision. A closer observation of Table 6.13 suggests that a totally in-house type of domestic service provision has comparatively lower mean values. The PFI type of domestic service provision, on the other hand, has the highest mean values in terms of level of integration. This hints that the level of integration between the teams could vary according to the type of domestic service provision. This was further examined using a Kruskal-Wallis test (see Table 6.14).

Table 6.14:   Kruskal-Wallis test statistics – the level of integration between the key players according to the type of domestic service provision

	Overall level of integration	Lines of communication	Meetings between the teams	Support from the ICT	ICT's advice is taken into consideration	Members of ICC
Chi-Square	4.485	1.783	3.784	2.622	8.599	10.085
df	3	3	3	3	3	3
Asymp. Sig.	.000*	.188	.002*	.004*	.000*	.000*

* results are statistically significant at $p < 0.05$

According to the results presented in Table 6.14, the p value for 'clear lines of communication between the domestic team and the ICT in the organisational structure' is not significant (at 5% level of significance). This denotes that the results pertaining to that do not differ according to the type of domestic service provision. However, overall, p values of the level of integration are near or equal to zero (<0.05). Therefore, at 5% level of significance, the null hypothesis is

rejected. This denotes that there is a difference in the level of integration between the domestic teams and ICT according to the type of domestic service provision.

A cross tabulation test was carried out to verify the aforementioned results. Chi-square statistics of the cross tabulation test are given in Table 6.15.

Table 6.15: Chi-square test statistics - level of integration between the key players according to the type of domestic service provision

	Pearson Chi-Square		
	Value	df	Asymp. Sig. (2-sided)
Overall level of integration	64.634	9	.000*
Meetings between the teams	58.320	12	.002*
Support from the ICT	53.320	12	.001*
ICTs advice is taken into consideration	66.761	12	.000*
Members of the ICC	64.765	12	.000*

* results are statistically significant at $p < 0.05$

According to Table 6.15, the two-sided asymptotic significance of the chi-square statistics is less than 0.05 (< 0.05). This indicates that the results are statistically significant at 5% significance level, thus, affirms the results obtained from the previous Kruskal-Wallis test (see Table 6.14).

Overall, the aforementioned results mean that the level of integration in domestic services between domestic teams and ICT varies according to the type of domestic service provision. The next step, therefore, attempts to measure the strength of the association between these two variables, i.e. level of integration and type of domestic service provision. A Cramer's *V* test was used to fulfil this. The results derived from the Cramer's *V* test are presented in Table 6.16.

Table 6.16: Cramer's *V* test statistics - level of integration between domestic managers and ICT members according to the type of domestic service provision

	Cramer's *V*	
	Value	Approx. Sig
Overall level of integration	.708	.000*
Meetings between the teams	.751	.002*
Support from the ICT	.286	.001*
ICTs advice is taken into consideration	.299	.000*
Members of the ICC	.232	.000*

* results are statistically significant at $p < 0.05$

The results presented in Table 6.16 appear to be very significant (approximate significance of the Cramer's *V* value is zero). The Cramer's *V* values also suggest a positive relationship. As per Table 6.16, the Cramer's *V* value for overall level of integration is 0.708. As it lies between 0.70 and 0.89 it is apparent that there is a high positive relationship between the two variables (refer to section 3.8.6). Therefore, the level of integration between the domestic team and the ICT is high when the internal control of the domestic service is high. In other words, the level of integration between the parties is low when the domestic service is managed/operated by an external party, e.g. a PFI contractor. This confirms hypothesis 'C' of the research study (see Table 1.2).

6.5.3 The level of integration between the key players in the control of HAI - data synthesis

This section synthesises the data from the two research instruments discussed above (i.e. case study approach and the questionnaire survey).

Sections 6.5.1 and 6.5.2 revealed that, overall, the level of integration between the parties is high when the internal control of the domestic service is high. Contracted-out domestic service provisions, on the other hand, provided somewhat appalling results. The level of integration between the parties in totally outsourced services and PFI services appeared to be very low compared to the other two types of domestic service provisions (i.e. in-house and balanced approach). Many researchers have claimed that contracting-out services lead to falling standards of domestic services (refer to section 6.4.3). The policy of contracting-out cleaning services mean that ICT members no longer have any direct responsibility for keeping wards clean (BBC News, 2002). This could eventually result in low level of coordination and communication between both domestic teams and ICT. UNISON, the UK's largest union, is drawing on new research linking cost cutting and contracting-out of hospital cleaning with an increased risk of spreading infection, to further its call for more cleaning staff in hospitals. The report concludes that contracting-out has driven down cleaning standards, giving weight to UNISON's campaign to take cleaning staff back in-house and under the direct control of NHS staff (UNISON, 2005). A press release by UNISON in January 2006 also reinforces this. As it further states:

"Other elements of the contractual relationship work against high quality hospital cleaning. The contract culture atomises functions within a hospital and contributes to the breakdown of a team-based approach unifying clinical and non-clinical staff, damaging flexibility and overall effectiveness"

Old (2003) has a similar view on this:

"Contracting-out means breaking up the healthcare team and compromising our infection control efforts,"

None of the aforementioned literature is, however, supported by substantial research evidence. Nevertheless, it is a known fact that the contracted-out domestic services exist, and given the increasing number of PFI services it is fair to say that 'they are here to stay'. Thus, it is important to make appropriate mechanisms to improve the level of integration between the teams, irrespective of the type of domestic service provision, in order to improve practices of control of HAI. As Steve (2005) suggests, the solution (to the control of HAI) is not to rush and bring cleaning contracts back in-house. If a cleaning company (a cleaning contractor) is not doing its job properly, perhaps it is time to change the cleaning company (Steve, 2005).

6.6   SUMMARY

Chapter 6, overall, attempted to address part of the 4th objective and research question IV of the study (see Table 1.2).

Evidence from this research shows that, at present, there is a relatively low level of involvement of the ICT members in the control of HAI. Besides their, including other key players such as nurses, level of integration with the domestic team of domestic managers, domestic supervisors and domestics, appear to be very low as well. This is obvious especially when the domestic service is managed by an external party (e.g. outsourced or PFI). Therefore, the relatively low level of involvement of ICT and the level of integration between the key players that currently pertains has evolved as a significant issue to be addressed in the successful control of HAI in domestic services. This will not only hamper communication and coordination between the ICT and the domestic teams, but in

the long run, would increase the risk of HAI. ICT members are, per se, the specialists in infection control, thus, their involvement in domestic services and integration with the domestic teams will help improve the level of awareness among the domestic team members. More empirical research is, therefore, needed to identify effective approaches to resolve the issues of 'involvement' and 'integration', in order to create good working relationships in hospitals.

Considering what has been discussed above, the following inference can be made:

- Activities relating to the control of HAI cannot be isolated from one another. All domestic teams and clinical teams in hospitals should make a collective effort to achieve goals of control of HAI. In doing so, they should work as a team. They should maintain good relationships and communication with each other. The clinical team should appreciate and value the work performed by domestic teams. At the same time, the domestic teams should ensure that they get sufficient input/feedback from the clinical teams (e.g. ICT members) in the control of HAI.

CHAPTER 7 : KNOWLEDGE MANAGEMENT IN THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

7.1   INTRODUCTION

Chapter 7 reports some of the findings of the case study approach, relating to Knowledge Management (KM). The findings of the case studies first explain the KM practices in use in domestic services. These findings are further elaborated using some of the results gleaned from the questionnaire survey. The idea of this is to investigate the factors that promote/inhibit effective KM in domestic services. These are also substantiated with some of the findings of the thorough review of literature. Overall, Chapter 7 addresses part of the fourth objective and research questions V and VI of the study (see Table 1.2).

7.2   KNOWLEDGE MANAGEMENT – AN INTRODUCTION

Elaborating the meaning of Knowledge Management (KM) will help in recognising its importance in the control of HAI in FM, particularly in domestic services.

'Knowledge' could not easily be defined. Indeed, philosophers such as Socrates and Plato have considered the question in some detail. Knowledge can be considered as a continuum from data to information to knowledge that can be applied effectively. Essentially, it is all that is relevant to enable people to work effectively (Public Sector Benchmarking Service, 2003). However, while knowledge allows work to be carried out effectively (do the right things), people's expertise and skills can be used to do it efficiently (do things right).

Amidon (2002, as cited in Albers and Brewer, 2003) defines the fundamentals of knowledge as data, information, and then knowledge. She notes that 'data is a base representation of fact; information is data with context; and knowledge is information with meaning… fully actionable'. Davenport and Prusak's (1998) definition goes far beyond Amidon's definition of knowledge. They explain it as a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new

experiences and information. However, knowledge always originates from an individual's brain. It is information interpreted by the individual and applied to the purpose for which it is needed. Knowledge is different from expertise (refer Figure 7.1). Expertise is specialised, deep knowledge and understanding in a certain field, which is far above average. It is gained through experience, training and education and is built up from scratch over a long period of time by an individual and importantly remains with that person (Bender and Fish, 2000).
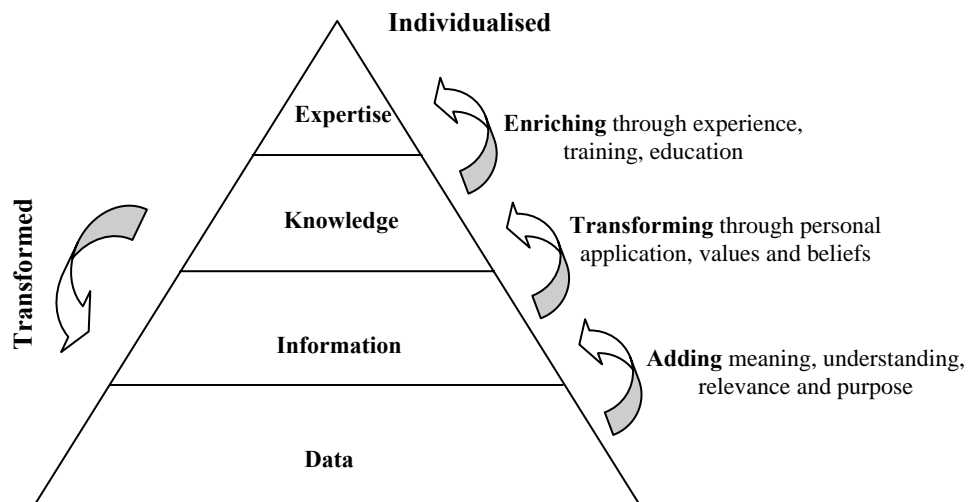
Figure 7.1: Knowledge hierarchy (Bender and Fish, 2000)

Knowledge can be seen mainly in two ways, i.e. tacit and explicit. This classification of knowledge is based on the level of its complexity of knowledge continuum (Koulopoulos and Frappaolo, 1999).

Tacit knowledge is 'non-verbalised, intuitive and unarticulated knowledge' (Polanyi, 1962 as cited in McAdam and McCreedy, 1999). It is the knowledge that resides in human brain and cannot be easily captured or codified (Wong and Radcliffe, 2000; Nonaka and Takeuchi, 1991). Simply, it is information that is not written down, but which people keep in their heads (Public Sector Benchmarking Service, 2003). Apart from individuals' brains, Maula (2000) has noted that, team skills and cultural aspects of an organisation are also as constituents of tacit knowledge. Hence, tacit knowledge resides not only within people but also may be embedded in organisational and social processes, building cumulatively within the organisation (Quintas et al, 1997). Tacit knowledge adds more value to the organisation. It is difficult and sometimes impossible to capture and diffuse (Koulopoulos and Frappaolo, 1999; Pederson,

2003). Individuals accumulate tacit knowledge through direct 'hands-on' experience (Nonaka, 1994). Sharing this knowledge allows others to avoid mistakes.

Explicit knowledge, on the other hand, is the knowledge that can be articulated in formal language and easily be transmitted amongst individuals Explicit (Koulopoulos and Frappolo, 1999),. Pederson (2003) explains this as the stuff of books. However, it is more than that. It is the information that is recorded in documents or on computer systems, for example (Public Sector Benchmarking Service, 2003), which means that explicit knowledge can be expressed and codified easily.

Since knowledge always originates from human knowledge, KM is also defined as the activity, which is concerned with strategy and tactics to manage human-centred assets (Brooking, 1997). Quintas et al (1997) define KM as a process. Clearly, it is the process of continually managing knowledge of all kinds to meet existing and emerging needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities. The American Productivity and Quality Centre (APQC) defines KM as 'the strategies and processes of identifying, capturing and leveraging knowledge' to enhance competitiveness (McCampbell et al, 1999).

All the above definitions define KM at an organisational level. According to the definitions, KM identifies, captures, stores and distributes knowledge to use in an organisation as and when required. However, KM can occur at individual or team levels as well. At times, it cannot not be stored in an explicit way. If KM occurs via an individual or at team level, the process of KM will be mainly identifying, sharing and using the knowledge (Allee, 2001). What is important in all these processes of KM is to acquire and create new knowledge. This is a continual process where people can acquire existing knowledge in order to create new knowledge (NHS National Electronic Library for Health, 2003). This recurring process encourages integration and empowers employees constantly to boost the way their work is performed. Therefore, KM is a driver for process improvement and an enabler for sharing of knowledge/information (Pellicciotto, 2003). It also

improves decision-making, encourages innovation, engenders learning, facilitates collaboration and promotes systems thinking (Bennet, 2000).

7.2.1 Knowledge management in healthcare

As will be discussed in Chapters 8 and 9, the input, process and outcome model of healthcare should be designed in such a way as to achieve quality delivery in terms of efficiency, effectiveness, safety and timeliness. Technology will be one of the key aspects in this context for hospitals to drive the delivery of care by minimising waste effectively. According to Handy (2002), technology can be used to reinforce the human relations values of confidence, proximity and responsiveness that are the very essence of business. However, as he states, businesses may be enhanced by the new technology but the involvement of people/experts is always essential to ensure the smooth running of functions and to identify errors. Especially in a service sector like healthcare, technology is only an enabler for efficient delivery. Healthcare workers or healthcare professionals' skills, experience, ideas and knowledge will be the core input for an effective delivery of healthcare. Ideas, skills and the knowledge of people are the intellectual property which drives an organisation and is now recognised as the key asset of most organisations (Handy, 2002). Presently, many sectors have turned to explicit and systematic knowledge management (KM) to develop the intellectual capital needed to succeed (Wiig, 1999) in order to retain, develop, organise, and utilise their employees' capabilities.

KM is about ensuring that people have the knowledge they need, where they need it, when they need it - the right knowledge, in the right place, at the right time (National Electronic Library for Health, 2003). It is known that, as the capabilities by which communities within an organisation capture the knowledge that is critical to them, they constantly improve it, and make it available in the most effective manner to those people who need it. They can then exploit it creatively to add value as a normal part of their work (Haines, 2002).

7.3   PRACTICES OF KNOWLEDGE MANAGEMENT – CASE STUDY FINDINGS

All the twenty-six interviewees who participated in the case studies were asked about the questions on KM (refer to Appendix 2b). At first, most of the interviewees were not familiar with the phrase 'knowledge management'. After explaining the meaning of 'knowledge management', the participants, overall, identified nine (09) practices of KM (see Table VIII in Appendix 7a) as follows (the practices are ranked in order of frequency of citation):

- training and education programmes
- learning from books/manuals
- sharing ideas and learning from each other
- mentoring
- meetings
- seminars/conferences
- information technology
- expert groups
- hiring external consultants

In terms of the current situation of their domestic services, the majority of them believed that they adopt at least few of these KM practices (see Table 7.1). Discussions related to the above are presented in the following sub-sections.

Table 7.1: **Current situation in terms of practices of KM in the control of HAI in domestic services**

Description	In-house case					PFI case					
	FMGR (CS1)	FMGR - SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)
Training and Education programmes	Y (3)	Y (2)	Y (3)	Y (3)	Y (2)	Y (2)	Y (2)	Y (2)	Y (3)	N (2)	Y (2)
Learning from books/ manuals	Y (3)	Y (2)	Y (3)	Y (3)	Y (2)	Y (2)	Y (2)	Y (2)	Y (3)	N (2)	Y (1), S (1)
Sharing ideas and learning from each other	Y (3)	Y (2)	Y (1), S (1)	Y (3)	Y (2)	Y (1)	S (1)	Y (2)	Y (1), N (2)	N (2)	Y (2)
Mentoring	Y (2)	Y (2)	Y (1)	Y (1)	Y (2)	Y (2)	Y (1)	Y (1)	Y (2)	-	Y (1)
Meetings	Y (3)	Y (1)	-	Y (3)	-	Y (2)	Y (2)	-	-	N (2)	-
Seminars and Conferences	Y (3)	S (1)	-	Y (2)	-	Y (1)	-	-	-	N (1)	-
Information Technology	S (2)	N (2)	-	S (1)	-	S (1)	Y (1), N (1)	-	-	-	-
Expert groups	Y (2)	-	-	Y (1)	-	-	-	-	-	-	-
Hiring External consultants	Y (2)	-	-	-	-	-	-	-	-	-	-

Y – Yes, **S** – To some extent, **N** – No
* See Table 3.10 for codes given for the interviewees. Also, see Table 3.12 to identify the way results are derived in this table.

7.3.1 Training and education programmes

Training and education is a learning process, which assists in obtaining or developing knowledge or skill (The American Heritage Dictionary of the English Language, 2004). Even though the words 'training' and 'education' can be used interchangeably, 'education' is broader than training and encompasses the need to maintain completeness and continuity of competences across generations. Simply, education refers to a 'basic or lifelong learning process', whereas 'training' refers to 'learning a particular skill required to deliver a particular outcome' (Goethem, 2005). Furthermore, the idea of training is 'to bring to a desired/pre-determined standard of performance or behaviour by instruction and practice'. This can include practical and on or off the job training. On the other hand, education is a 'systematic learning to acquire knowledge and skills' (Barley et al, 2003). In this context, it mainly means formal education (e.g. academic courses) or informal education (e.g. values, skills and knowledge from daily experience or through resources such as books) (Conner, 2005).

Training and education programmes appear to be the most common KM practice in occurrence in domestic services. The *In-house case* conducts an array of

training and education programmes ranging from management training to staff training. These are:

1. Induction training: The domestic managers are given two induction training programmes, i.e. corporation induction and departmental induction, in order to train them on their basic duties at Trust-level, hospital-level and at departmental-level. The corporate induction training is for any staff member, e.g. domestics and nursing staff. The domestics and the domestic supervisors also undergo a mandatory local induction-training programme, which includes introductory training on the control of HAI.

2. Control of HAI training: The domestics referred to this as the 'hygiene course'. This is mandatory for all the domestics. The course covers training on good hand hygiene, protective clothing, and colour-code systems (colour-codes differentiate the cleaning equipment according to the area where they are used). Control of HAI training is conducted for a period of six months by a consultant. Seminars are also conducted during this period by an infection control specialist.

3. Training and education programmes organised by the higher education institutions: All the domestic managers receive special education programmes on domestic duties and the control of HAI. Some of these education programmes include the Higher National Module for cleaning services (specifically for supervisors), NHS Education Scotland (NES) Training, ISO (International Organisation for Standardisation) audit training and an in-house training for Scottish Vocational Qualifications. These training and education programmes are only conducted on a need basis due to the limited funding available.

All the aforementioned training and education programmes are well planned and organised. Some of them are mandatory and some of them are geared toward improving awareness of good practice.

The *PFI case*, on the other hand, there were only two training programmes, i.e. on-the-job training and induction training. As one of the domestic managers noted, the latter includes a special control of HAI training as well. However, the

ICT members were adamant that there is no control of HAI training in the *PFI case*. As one of them stated:

"How can they do infection control training when they don't know what it is? It is our speciality, that's what we do (training and guiding hospital staff on infection control) for living…"

7.3.2 Learning from books/manuals

Book herein means a written work or composition that has been published (The American Heritage Dictionary of the English Language, 2004). Manual on the other hand is a small reference book/handbook, which gives instructions or provides specific information about a subject (The American Heritage Dictionary of the English Language, 2004). In KM terms, books and manuals come under the category of explicit knowledge (refer to section 7.2).

Referring to books/manuals is an on-going practice in the *In-house case* as well as in the *PFI case* (see Table 7.1). Both cases have reference libraries for the staff. In the *In-house case*, copies of books/manuals are also kept in the assistant domestic manager's office, where all the domestic supervisors and staff have easy access. Some of the available books/manuals on the control of HAI, in the *In-house case* are:

▪ Infection control in domestic services: a guide to domestics
▪ Infection control manual published by their own Trust
▪ Scottish Executive Health Department (1998) published by the NHS in Scotland
▪ News bulletins

It was uncovered during the discussions that the *PFI case* does not have any books/manuals developed specifically for the control of HAI.

7.3.3 Knowledge sharing

Knowledge sharing is a people-to-people process, and is one of the main knowledge management processes (Ryu et al, 2003). Knowledge sharing is the process where individuals mutually exchange their knowledge (implicit and

explicit – refer to section 7.2 for types of knowledge) and jointly create new knowledge (Truch et al, 2002). Knowledge sharing is a two-way process. It consists of both the supply of new knowledge and the demand for new knowledge.

Knowledge sharing is often a major preoccupation within knowledge management and is frequently addressed in the literature (MacMorrow, 2001). According to van den Hoof and de Ridder (2004), knowledge sharing involves either actively communicating to others what one knows, or actively consulting others in order to learn what they know. Although knowledge can be acquired at the individual level, to be useful, it must be shared by a community, often described as a community of practice. For instance, if there is only one person who knows organisational rules and procedures, such rules and procedures would be useless and meaningless. Rules and procedures emanate from communities and exist precisely to regulate group activities. Knowledge sharing is then crucial when new employees arrive and others quit (Bouthillier and Shearer, 2002).

Approximately 88% of the interviewees considered knowledge sharing as an important practice of KM (see Table VIII in Appendix 7a). The knowledge sharing process occurs in many ways in domestic services. It includes sharing of knowledge:

- within a domestic team (e.g. domestics to domestics)
- across the domestic teams (e.g. domestics of one ward to domestics of a different ward)
- between ICT and the domestic team
- between the nursing team and the domestic team

Both domestic supervisors and nurses in the *PFI case* believed that they are continuously learning from each other. However, some of the domestics in the *PFI case* noted that the *'nurses consider themselves as superiors'*, thus, it has obstructed the process of knowledge sharing between the two parties. As one of the domestic managers from the PFI explained, it often happens due to the *'fear of losing their (the nurses') dignity'*. As he further explained, the domestics are becoming more and more equipped with the day-to-day knowledge on

'cleanliness and the control of HAI', whilst nurses are becoming more ignorant about the area.

Not surprising, the ICT members from the *PFI case* asserted that the sharing of knowledge between them and the domestic team does not occur. The situation in the *In-house case* was, however, the opposite. The nurses and ICT members appear to be very supportive towards the domestic team. The introduction of 'housekeeping staff' has strengthened this 'conducive' environment. The housekeeping staff is part of the domestic team. They cover some of the basic duties of nurses and domestics such as bed making, meal and beverage services, messenger service and flower arrangements. As one of the domestic managers from the *In-house case* explained:

"We have housekeeping staff who cover some of the nurses' duties……At the beginning the nursing staff were a bit reluctant to share their ideas with them. But after they saw them doing the job, they felt that our staff have taken away quite a lot of their burden on housekeeping duties. Now they are very helpful and very supportive and always try to work hand in hand."

7.3.4   Mentoring

The American Heritage Dictionary of the English Language (2004) defines mentoring as an activity, which is conducted by a person (the mentor) for another person (the mentee), in order to help that other person to do a job more effectively and/or to progress in their career. The mentor was probably someone who had "been there and done that" before. Similarly, the Information Technology at CSU Monetary Bay (2004) describes mentoring as a process in which an experienced colleague is assigned to an inexperienced individual and assists in a training or general support role.

In KM terms, mentoring is a one-to-one learning relationship in which a senior member of an organisation is assigned to support the development of a newer or more junior member by sharing his or her knowledge, experience and wisdom with them (National Electronic Library for Health, 2005). Occasionally, the term "coaching" is used to describe mentoring. Rae (1994; as cited in Hull, 2000) makes the fine distinction between these two terms by stating that mentoring is

"the supportive development of an individual employee through the use of an experienced person", while coaching implies "taking work situations and turning them into learning opportunities". According to the National Electronic Library for Health (2005), while the strength of mentoring lies in transferring the mentor's specific knowledge and wisdom; in coaching, it lies in the coacher's ability to facilitate and develop the other's own personal qualities.

Constant budget limitations applied to the domestic service appear to be a severe problem in the control of HAI (refer to section 4.4.8 and section 8.4.1.1). Thus, many of the domestic managers see 'mentoring' as one of the cost-effective practices that can be used to train the new domestics.

The NHS in Scotland and the NES have introduced a *cleanliness champion's programme* that was initially instigated through a Ministerial action plan in the year 2003. Most of the case study participants considered this as an essential change in the health services. One of the salient features of this programme is that it selects staff from a range of areas from clinical and FM; who will then be given a new role as 'cleanliness champions'. As the NHS Education, Scotland (2003) explains, the champions have to take a series of education programmes in order to become role models for their colleagues. These educational programmes include web-based learning, virtual learning environments (partnership arrangements with higher educational institutions) and life long learning through Personal Development Plans (PDPs). All these will ultimately help the cleanliness champions to perform work as 'knowledge workers' to develop their skills as well as to act as role models to support the other staff members who work in similar areas.

7.3.5   Meetings

Nonaka and Takeuchi (1995) inform us of some processes by which knowledge is transformed between its tacit and explicit forms (see Figure 7.2).

Explicit to tacit **(Internalisation)** e.g. learn from a report	Tacit to explicit **(externalisation)** e.g. dialogue within team, answer questions
Tacit to tacit **(Socialisation)** e.g. team meetings and discussions	**Explicit to explicit** **(Combination)** e.g. e-mail a report

Figure 7.2: **Conversion of knowledge between tacit and explicit form (source: Nonaka and Takeuchi, 1995)**

As Nonaka and Takeuchi (1995) explain, organisational learning takes place as individuals participate in these processes (see Figure 7.2), since by doing so, their knowledge is shared, articulated, and made available to others. The creation of new knowledge takes place through the processes of combination and internalisation. Team meetings are an important practice essentially to transform 'tacit to tacit' knowledge, i.e. *socialisation* (socialisation includes the shared formation and communication of tacit knowledge between people; Nonaka and Takeuchi, 1995).

Thirteen (13) out of the twenty-six (26) participants of the case studies (50%), identified conducting meetings as an important practice of KM. The *In-house case* has both formal and informal meetings between the domestic team and the clinical team. As one of the ICT members from the *In-house case* explained:

"We (ICT) have regular meetings with the domestic managers. Now the senior nurses also come to the meetings, so, we have quite a good group. The minutes of meeting are recorded and checked by the monitoring officer from the FM side to ensure that the actions are being taken. Problems which cannot be solved are taken higher up."

It was apparent that the domestic team in the *PFI case* do not conduct any form of meetings with the ICT.

7.3.6   Seminars and conferences

As Shah (2003) explains, seminars, workshops, conferences, etc. are tools for extracting knowledge, otherwise locked in peoples' heads. Six (07) interviewees

across the two case studies considered conducting seminars and conferences as one of the practices of KM (see Table VIII in Appendix 7a).

The ICC of the *In-house case* organises seminars on the control of HAI. The seminars focus on several issues such as legionella, cleanliness, hand hygiene and salmonella. The *In-house case* participants also get the opportunity to attend seminars and conferences organised conjointly by the NHS in Scotland and the Property and Environment Forum Executive, Scotland. For example, they organise an annual conference on the 'built environment in the control of HAI'. The seminars and the conferences have not only helped them to widen their knowledge on the related subjects, but also, have allowed them to meet professionals/staff from other hospitals across the NHS (England and Scotland).

7.3.7   Information Technology (IT)

Information Technology (IT) can greatly assist in implementing knowledge management practices. As Egbu and Botterill (2002) assert, the role of IT in KM is an essential consideration for any company wishing to exploit emerging technologies to manage their knowledge assets. Information technologies such as the World Wide Web (WWW) offer a potentially useful environment within which to build a multimedia repository for rich, explicit knowledge (Zack, 1999; Denning, 2000). As Denning states, IT may, if well resourced and implemented, provide a comprehensive knowledge base that is speedily accessed, interactive, and of immediate value to the user.

Some of the case study participants identified IT as a vital practice of KM. Many NHS in Scotland related organisations such as SCIEH, NES, PEFEx, and the NHS - QIS make most of their publications available on the World Wide Web. Also, the 'SHOW website' (Scottish Health on the Web) and e-library of the NES serve as pools of knowledge that provide vast amount of literature for all the healthcare professionals and staff. The NHS (in England) have similar web sources as well, such as the NLH (National Library for Health) specialist library for Knowledge Management, the NHS Estates Knowledge Management portal, the NIMHE (National Institute for Mental Health in England) Knowledge Community, CHAIN (Contact, Help, Advice and Information Networks) and the

NHS Networks. All these sites of web-based knowledge (or knowledge portals) share what someone knows with others and encourage a reciprocal approach so that trust and networks can be built within the NHS staff (Robertson, 2006).

The aforementioned libraries are information gateways and digital libraries providing the best available evidence-based knowledge, enhanced with medical quality tags to a wide spectrum of users: clinical experts, public health, general practitioners and general public. However, most of the libraries do not have an FM component added to it. Even if it has FM related information on HAI, the use of the electronic libraries will be limited. The reason being that only the top level managers have access to computers and access to computer networks (e.g. internet, intranet, etc.). Besides, some of even the senior facilities managers lack computer literacy. The other major reasons for limited use of the national libraries are security and confidentiality issues and issues surrounding quality of information over the internet. Scottish Centre for Infection Control and Environmental Health (SCIEH) is the central organisation, which oversees the issues related to HAI in the NHS in Scotland. One of the policies of SCIEH relates to quality and discretion of information to be provided for the NHS staff to tackle the issue of HAI effectively. Therefore, they are displeased with the standard of information laid out in these electronic libraries or other internet sites.

7.3.8 Expert groups

Three of the domestic managers in the *In-house case* were members of some of the Task Force groups formed by the NHS in Scotland. The Task Force groups are multidisciplinary groups that consist of experts who are specialised in particular areas of concern and are assigned to govern the issue of HAI. The main outcomes of the Task Force groups are documents which discuss the issues surrounding the area of HAI and probable solutions. The aforementioned three participants of the *In-house case* identified the introduction of Task Force groups as a vital practice of KM. As they stated, it allows sharing what they know and also gives them the opportunity to coordinate with other experts across the NHS.

The Knowledge Management Specialist Library of the NHS (2005) identifies this process as knowledge harvesting. Knowledge harvesting is an approach that allows the tacit knowledge or know-how of experts and top performers in an organisation to be captured and documented. This know-how can then be made available to others in various ways such as training programmes, manuals, best practices and knowledge management databases.

7.3.9   Hiring external consultants

Two of the domestic managers (including the General Manager – facilities) from the *In-house case* highlighted hiring external consultants as a vital practice of KM. As the name implies the *In-house case* is actioned and managed by an in-house service provision. Therefore, the domestic managers view the acquisition of knowledge from an external consultant as an assistance to make their service better. This, as the General Manager (facilities) stressed, does not imply that the in-house service provider is less knowledgeable or less specialised than an external service provider. The mere idea of hiring an external consultant, as she further explained, is to acquire new knowledge in order to further improve their service.

7.4   FACTORS THAT PROMOTE EFFECTIVE KNOWLEDGE MANAGEMENT - CASE STUDY FINDINGS

It is a known fact that KM is vital to any organisation in order to deal with leveraging existing knowledge, capturing tacit knowledge and preserving knowledge assets for use in the future. Knowledge Management also promotes an organisational culture of sharing processes and learning within the organisation (Sonalina, 2004). It was identified in the previous section that the two case studies taken for this research are also adopting some of the practices of KM; although, the practices are implicit and not necessarily known as KM.

The National Audit Office (NAO, 2000) has identified the importance of conducting regular meetings between staff groups in order to bring them together to discuss major issues of concern. Boocock (2004), during a conference on HAI control and prevention in 2004, explained managing relationships, team working

and communication as a key enabler of KM. As he stated, these create a friendly environment in hospitals whilst improving mutual relationships.

Within the NHS, the changing relationship between clinical and FM teams has been a significant issue for several years (refer to Chapter 6). Ashburner and Fitzgerald (1996) have looked at how these changes affect the management of expertise. The concept of the 'Knowledge Network' is to establish and maintain co-ordinated groups of networked experts. They provide a pool of expertise upon which the NHS may draw. The networks provide sharing of expertise on the built environment and non-clinical support services (i.e. FM). This process is essential to the successful operation of a modern NHS (Ashburner and Fitzgerald, 1996). As Robertson (2006) identifies, the knowledge portals developed by the NHS (refer to section 7.3.7), are a form of 'knowledge network'. The portals encourage a reciprocal approach where the NHS staff can build trust and networks. It is the basis for improving sharing and disseminating knowledge and thus mutual relationships. This was asserted by the NHS Estates (2003d). As it explains, one of the reasons behind developing the knowledge portals by the NHS, was to provide knowledge network groups with a facility for sharing knowledge and expertise, and encourage cross-disciplinary working.

The case study findings revealed some *factors that promote effective KM (N.B. the word 'enabling factors' was also used, interchangeably, in the thesis to discuss this)* in domestic services. These enabling factors of KM are as follows:

- <u>Political endorsement given to the control of HAI</u>: As repeatedly discussed in the previous chapters, it is well understood that the control of HAI is a vital part in the agenda of the NHS (England and Scotland). It has now become more of a political issue rather than a social issue. The political endorsement given to the control of HAI is enormous and is encouraging staff to gain/expand knowledge in this area.
- <u>Priority given to the domestic service:</u> as repeatedly discussed in previous chapters, the domestic service is recognised as a critical area in the control of HAI (refer to section 2.10.1 and section 4.7). Thus, the domestics, once were known as mere cleaners, have gained recognition as an essential entity within the hospital domain. This has provided the opportunity for the domestics to

blend with the clinical staff and to share their experiences with others in confidence.

▪ Increased awareness on the control of HAI: As a result of the high priority given to the control of HAI in domestic services, the staff have become more aware of events related to HAI. For example, in the event of a ward closure due to an occurrence of HAI, not only are the staff promptly informed about the situation, but they are becoming more vigilant over such issues as well. Thus, according to one of the domestic managers from the *In-house case*:

> "the more they become aware of what is happening around them, the more they become knowledgeable"

▪ Web-based knowledge: As discussed in section 7.3.7, the NHS and its related organisations has produced vast amount of web-based knowledge on the control of HAI. This has provided the opportunity for the domestic managers and domestics to acquire knowledge as and when they need it.

▪ Involvement of domestic managers in meetings to do with the control of HAI: As discussed in section 6.4.1, the top-level domestic managers in the *In-house case* are involved in the meetings organised by the Infection Control Committee (ICC) in their particular NHS Trust. This has provided the opportunity for the domestic managers to discuss and share each other's experiences.

▪ Having an In-house service: As some of the participants in the *In-house case* noted, 'being In-house' has created the opportunity for them to integrate well with the clinical teams.

▪ Contracting-out the domestic service: Some of the *PFI case* participants were of the view that contracting-out the domestic service (refer to section 3.7.4 for discussions related to types of domestic services) provide the opportunity to bring specialised knowledge into the domestic service.

Given the above discussions, seven factors that promote effective KM were put together, drawing on the literature and discussion with the participants of the case studies. These are:

1. Initiatives taken by the NHS for the control of HAI (e.g. cleanliness champions programme, Matron's Charter), as a result of the political endorsement

2. The increased prioritisation of domestic services, as a result of the increased concern given to Healthcare Associated Infections (HAI)

3. Increasing level of staff awareness on the control of HAI

4. Web-based knowledge (i.e. knowledge networks/knowledge and information portals)

5. Regular meetings between the domestic teams and clinical teams (e.g. infection control teams) teams

6. Having the domestic service as an in-house service in order to encourage close liaison between clinical (especially ICT) and domestic teams

7. Contracting-out domestic services in order to bring specialised knowledge into hospitals

7.4.1 Key factors that promote effective KM – questionnaire survey findings

The enabling factors identified in section 7.4, at times, differ according to the type of domestic service provision. For instance, the participants of the *In-house case* are of the view that having the domestic service In-house promotes sharing and disseminating knowledge whilst the *PFI case* participants take a different view. It, therefore, prompted the need to investigate whether the enabling factors have an association with the type of domestic service provision. It was investigated using the questionnaire survey approach.

The above was examined using the following hypothesis (see Table 1.2):

D. The key factors that promote effective Knowledge Management differ according to the type of domestic service provision

Both domestic managers and ICT members were asked the questions relating to KM (refer to Appendix 4a).

Table 7.2 provides information on the enabling factors of effective KM. It presents descriptive statistics gleaned from the questionnaire survey. Therein, the enabling factors are ranked according to the ascending order of the overall mean scores.

Table 7.2:   Factors that promote effective KM – descriptive statistics

	N	Overall mean score	*Rank*
Staff awareness on the control of HAI	409	1.60	*1*
Having the domestic service in-house	409	1.95	*2*
Meetings between the teams	409	2.08	*3*
Prioritisation of domestic services	409	2.30	*4*
NHS initiatives	409	3.09	*5*
Web-based knowledge	409	3.57	*6*
Contracting-out domestic services	409	3.69	*7*
Valid N (list wise)	409		

Meaning of scale (enhance the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

A closer observation of Table 7.2 shows that there are three (03) missing data. From the MVA (Missing Value Analysis), it was identified that the data is missing completely at random (MCAR) (refer to section 3.8.6 and Appendix 4b). Also, considering the large amount of data collected (number of responses is 412), it was assumed that the impact of the missing data is minimal.

According to the mean values given in Table 7.2, the highest ranked enabler is the increasing level of the control of HAI with a mean value of 1.60. Interestingly, contracting-out the domestic service take a mean value of 3.69. This denotes that contracting-out the domestic services is the least enabling in terms of KM. In contrast, having the domestic service in-house proves to be better in term of the enabling factors of effective KM, as it is ranked at 2, with a mean value of 1.95.

Comparisons were then made between different groups of respondents in order to identify any variations to the above. Table 7.3 gives a mean value comparison of factors that promote effective KM according to the region where the respondents work.

Table 7.3: **Factors that promote effective KM – mean value comparison according to the region**

	England	*Rank*	Scotland	*Rank*	Overall mean value
Staff awareness on the control of HAI	1.57	*1*	1.63	*1*	1.60
Having the domestic service in-house	1.90	*2*	1.99	*2*	1.95
Meetings between the teams	2.16	*3*	2.01	*3*	2.08
Prioritisation of domestic services	2.48	*4*	2.13	*4*	2.30
NHS initiatives	3.16	*5*	3.03	*5*	3.09
Web-based knowledge	3.58	*6*	3.57	*6*	3.57
Contracting-out domestic services	3.60	*7*	3.77	*7*	3.69

Meaning of scale (enhance the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

A closer look at Table 7.3 shows that the mean values between the two groups of the respondents appear to be very similar. As a result, the ranking order of the factors is also alike. This denotes that the 'region' does not have any impact on the responses.

The responses were then categorised according to the job role of the respondents (refer to Table 7.4).

Table 7.4: **Factors that promote effective KM – mean value comparison according to the job role of the respondents**

	FM	*Rank*	ICT	*Rank*	Overall mean value
Staff awareness on the control of HAI	1.58	*3*	1.62	*1*	1.60
Having the domestic service in-house	2.19	*4*	1.67	*2*	1.95
Meetings between the teams	1.31	*1*	2.98	*3*	2.08
Prioritisation of domestic services	1.32	*2*	3.45	*5*	2.30
NHS initiatives	3.02	*5*	3.15	*4*	3.09
Web-based knowledge	3.04	*6*	4.20	*7*	3.57
Contracting-out domestic services	3.35	*7*	4.06	*6*	3.69

FM – domestic managers   **ICT** – Infection Control Team members

Meaning of scale (enhance the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

Table 7.4 shows a substantial variation in the results of the different groups of respondents. In the ICT members' category, the ranking order appears to have only few deviations to the raking order of the overall mean values (see Table

7.2). The domestic managers' category, however, have some significant differences to the ICT members. For example, meetings between the teams and prioritisation of domestic services appear to be the two key factors that promote effective KM. It reveals that there is a need to recognise and value the work carried out by the domestic teams (i.e. domestic managers, domestic supervisors and domestic staff). This would assist them with working closely with the clinical teams to gain/share knowledge with great confidence.

Taking all the above into consideration, and even though there were some slight deviations; overall, the following can be recognised as the key factors that promote effective KM, which could enhance the exploitation of KM in domestic services:

1. Staff awareness on the control of HAI
2. Having the domestic service in-house
3. Increased prioritisation of domestic services
4. Regular meetings between the domestic and clinical teams

It is now important to recognise whether the type of domestic service provision has an impact on the results discussed above. The test of null hypothesis was used to investigate this.

Null hypothesis H_0 – The key factors that promote effective KM do not differ according to the type of domestic service provision

The above is, first, investigated using a mean value comparison between the two variables (see Table 7.5). Mean values given in Table 7.5 are arranged according to the ranking order obtained from overall mean values given in Table 7.2.

Table 7.5: **Factors that promote effective KM vs. the type of domestic service provision – mean value comparison**

	In-house	*Rank*	Balanced	*Rank*	Out-sourced	*Rank*	PFI	*Rank*
Staff awareness	1.61	*1*	1.79	*2*	1.49	*1*	1.47	*1*
Having the domestic service in-house	1.61	*1*	2.09	*3*	2.44	*2*	3.00	*5*
Meetings between the teams	2.05	*3*	1.72	*1*	2.43	*3*	1.89	*2*
Prioritisation of domestic services	2.28	*4*	2.11	*4*	2.48	*4*	2.28	*3*
NHS initiatives	3.00	*5*	3.21	*6*	3.17	*5*	3.39	*6*
Web-based knowledge	3.59	*6*	3.09	*5*	3.72	*7*	3.86	*7*
Contracting-out domestic services	3.88	*7*	3.68	*7*	3.47	*6*	2.92	*4*

Meaning of scale (enhance the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

The results presented in Table 7.5 do not show any significant variations to the findings presented in Table 7.2. In the PFI domestic service category, the respondents have, obviously, identified contracting-out the domestic service as a better enabler (ranked at 4th place) than having the domestic service In-house. The respondents in the outsourced domestic service provisions, however, have noted otherwise. Likewise, even though there are some slight deviations, the four key factors that promote effective KM, irrespective of their order of ranking, remain unchanged. This suggests that the responses do not differ according to the type of domestic service provision. This was further examined using a Kruskal-Wallis test. The results of the Kruskal-Wallis test is given in Table 7.6.

Table 7.6: **Kruskal-Wallis test statistics for factors that promote effective KM according to the type of domestic service provision**

	Staff awareness	In-housing domestic services	Regular meetings	Prioritisation of domestic services	NHS Initiatives	Web-based knowledge	Contracting-out domestic services
Chi-Square	13.383	12.573	11.053	8.518	2.847	10.860	4.095
df	3	3	3	3	3	3	3
Asymp. Sig.	.104	.120	.135	.211	.416	.131	.248

* results are statistically significant at $p < 0.05$

As *per se*ction 3.8.6, the Kruskal-Wallis statistic measures how much the group ranks differ from the average rank of all groups. Thus, at 5% level of significance, the results suggest that, the type of domestic service provision does

not have an impact on the key factors that promote effective KM. This therefore, rejects hypothesis 'D' of the study (see Table 1.2).

7.5 FACTORS THAT INHIBIT EFFECTIVE KNOWLEDGE MANAGEMENT – CASE STUDY FINDINGS

Boocock (2004), on his presentation on 'opportunities, challenges and winning ways' during a conference on HAI control and prevention in 2004, highlighted human factor, budget constraints and work pressures as factors which hamper effective management of knowledge. The findings of an Infection Control IT Implementation and Evaluation Project, carried out by the Department of Health, recognised the lack of availability of computers as a major limitation on implementing an 'infection control software' in the NHS Trusts (Department of Health, 2004d).

Training and education programmes appear to be very significant in developing the knowledge and skills of domestics and in supporting their career progression. However, the high cost of training and education, staff turnover and budget limitations seem to be restricting the number of training and education programmes to be conducted for staff. A report on 'practical application of available knowledge' highlights some further factors that inhibit effective knowledge management in the control of HAI. These include inconsistency in interaction between the clinical and non-clinical teams and human resource issues such as poorly trained staff (Ann Noble Architects, 2003).

The case study findings revealed some *factors that inhibit effective KM (N.B. the word 'inhibiting factors' was also used, interchangeably, in the thesis to discuss this)* in domestic services. The identified factors are as follows:

▪ Organisational structure: As discussed in section 3.7.5.3, 3.7.6.3 and 5.3.7 the organisational structures of the *In-house case* and *PFI case* lack links between the units within the respective hospitals/Trust. This has not only created confusion on roles and responsibilities of different parties but has also created stagnated services, especially in the *PFI case*.

- <u>Poor working relationships and communication between the domestic and clinical teams:</u> It was evident from the discussions laid out in Chapter 5 and Chapter 6 that there is clear rift between the domestic and clinical teams in the *PFI case*. According to the ICT members from the *PFI case* they neither have a proper working relationship nor communication with the domestic team.

- <u>High workload:</u> The domestics and domestic supervisors have to cover a high amount of workload due to high sickness absence and high turnover rate of staff (refer to sections 5.3.5 and 8.4.1.2). This has reduced the amount of time to learn and acquire new knowledge.

- <u>Lack of IT facilities:</u> Knowledge sharing appears to be the most common practice used in the two cases (see Table 7.1). However, they have not begun to focus their interest on KM in a more systematic and a formal manner. As mentioned in section 7.3.7, the main reason is the issue of access to technology – mainly the use of Information Technology (IT).

- <u>Lack of guidance from ICT members:</u> Two domestic managers and two domestic supervisors in the *PFI case* affirmed that, at present, there is a lack of guidance from the ICT members on issues related to the control of HAI.

- <u>Lack of motivation of the domestics:</u> Staff should be encouraged and motivated to earn extra experience and learn new things in order to widen their knowledge as well to improve their performance. As some of the domestics in the *PFI case* averred, the PFI contractor does not have any motivation schemes for the domestics. This has resulted in staff stagnating in the same role and earning the same wage over a long period.

- <u>Cost of training and education:</u> As explained in section 7.3.1, training and education is one of the most important practices of KM adopted in the two case studies. However, due to budget limitations and high cost of training and education, most of the essential training and education programmes are being given only to a limited number of staff on a need basis.

- <u>Employee retention:</u> The low level of retention of domestics due to an array of issues such as job security and low wages, appears to be another challenge in domestic services. It eventually leads to 'loss of knowledge' and also causes issues relating to training and education. As one of the domestic managers from the *In-house case* highlighted:

> "training and educating the ever-changing domestics is one of the biggest problems we have… it squeezes our budget too"

- <u>Lack of understanding of the goals of control of HAI:</u> One of ICT members from the *PFI case* noted that the PFI consortium and the PFI contractor's lack of understanding of the goals of control of HAI has resulted in ineffective practices in their domestic service. As one of them noted:

  > "they (the PFI consortium and the contractor) don't know the main goals of infection control (control of HAI)…… they miss the whole point of it… they become ignorant of what we can do for them, the service we can offer them, the knowledge we can pass on to them…"

- <u>Absence of a learning culture:</u> Even though the *In-house case* and *PFI case* have reference libraries in their hospitals, the heavy workload of staff has restricted them from using these. As one of the ICT members from the *PFI case* noted:

  > "During their 4 or 6 hours of work, the domestics have to cover many areas of cleaning… even if they have time I don't think they will go to the reference library to read books. It's a learning culture, the staff should be trained to do that or the managers should encourage them to do it."

Given the above discussions, seven factors that inhibit effective KM were put together, drawing on the literature and discussion with the participants of the case studies. These are:

1. Hierarchical organisational structure
2. Lack of IT facilities
3. Poor level of integration between clinical (especially ICT) and domestic teams
4. Human resource issues (e.g. high workload, lack of motivation, lack of empowerment, employee retention)
5. Lack of understanding of control of HAI goals
6. High cost of training and education programmes
7. Absence of a learning culture

7.5.1 Key factors that inhibit effective KM vs. the type of domestic service provision– questionnaire survey findings

The inhibiting factors identified above, at times, differed according to the type of domestic service provision. The best example is that, variation occurs in the 'level of integration' between clinical and domestic teams when the type of domestic service differs (refer to Chapter 6). It, therefore, prompted the need to investigate whether the abovementioned factors have an association with the type of domestic service provision. It was investigated using the questionnaire survey approach.

The above was examined using the following hypothesis:

E. The key factors that inhibit effective knowledge management differ according to the type of domestic service provision

Both domestic managers and ICT members were asked the questions relating to KM (refer to Appendix 4a).

Table 7.7 presents information on the factors that inhibit effective KM. It presents descriptive statistics gleaned from the questionnaire survey. Therein, the inhibiting factors are ranked according to the ascending order of the overall mean scores.

Table 7.7: Factors that inhibit effective KM – descriptive statistics

	N	Overall mean score	*Rank*
Poor level of integration between teams	409	2.01	*1*
HR issues	409	2.76	*2*
High cost of training and education programmes	409	2.81	*3*
Lack of IT facilities	409	3.23	*4*
Absence of a learning culture	409	3.45	*5*
Lack of understanding of HAI goals	409	3.47	*6*
Hierarchical org. structure	409	3.87	*7*
Valid N (list wise)	409		

Meaning of scale (obstruct the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

In Table 7.7, there are three (03) missing data. From the MVA (Missing Value Analysis, it was identified that the data is missing completely at random (MCAR) (refer to section 3.8.6 and Appendix 4b). Also, considering the large

amount of data collected (number of responses is 412), it was assumed that the impact of the missing data is minimal.

According to the mean values presented in Table 7.7, poor level of integration between the domestic and clinical teams takes the highest rank of all, with a mean value of 2.01. Of the findings, human resource issues (e.g. high staff turnover and high level of staff absenteeism due to sickness) are ranked as the second biggest challenge of KM. The hierarchical organisational structure appeared to be the lowest of all with a mean value of 3.87.

Comparisons were then made between different groups of respondents in order to identify any variations to the above. Table 7.8 presents a mean value comparison of inhibiting factors of effective KM according to region (England and Scotland).

Table 7.8:   Factors that inhibit effective KM – mean value comparison

	England	*Rank*	Scotland	*Rank*	Overall mean value
Poor level of integration between teams	2.05	*1*	1.95	*1*	2.01
HR issues	2.69	*2*	2.86	*3*	2.76
High cost of training and education programmes	2.82	*3*	2.80	*2*	2.81
Lack of IT facilities	3.10	*4*	3.40	*4*	3.23
Absence of a learning culture	3.38	*6*	3.54	*5*	3.45
Lack of understanding of HAI goals	3.37	*5*	3.62	*6*	3.47
Hierarchical org. structure	3.69	*7*	4.10	*7*	3.87

Meaning of scale (obstruct the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

The ranks appear to be, more or less similar.

The responses were then categorised according to the job role of the respondents. Table 7.9 presents information on this.

Table 7.9: **Factors that inhibit effective KM – mean value comparison according to the job role of the respondents**

	FM	*Rank*	ICT	*Rank*	Overall mean value
Poor level of integration between teams	2.27	*3*	1.70	*1*	2.01
HR issues	1.84	*1*	3.84	*6*	2.76
High cost of training and education programmes	1.94	*2*	3.83	*4*	2.81
Lack of IT facilities	2.98	*4*	3.52	*2*	3.23
Absence of a learning culture	3.13	*5*	3.83	*5*	3.45
Lack of understanding of HAI goals	3.32	*6*	3.66	*3*	3.47
Hierarchical org. structure	3.56	*7*	4.22	*7*	3.87

FM – domestic managers   **ICT** – Infection Control Team members

Meaning of scale (obstruct the level of exploitation of KM to a):

1 (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

Table 7.9 shows a substantial variation in the results of the different groups of respondents. According to the responses of domestic managers, HR issues (e.g. high staff turnover and high level of staff absenteeism due to sickness), and high cost of training and education programmes appear to be the two key factors that inhibit effective KM. From Table 7.9, it can be seen that the ICT members have not identified HR issues and education and training, which are seemingly more internal issues to the domestic service, as the key factors that inhibit effective KM. This may be because, usually, the ICT members are not physically involved in domestic service activities. They only play an advisory role in the domestic services. For the ICT members 'poor level of integration between them and the domestic team' is the key factor that inhibit effective KM in domestic services (mean value is 1.70).

Taking all the above into consideration, and even though there were some slight deviations; overall, the following can be recognised as the key factors that inhibit effective knowledge management:

- Poor level of integration between domestic and clinical teams
- HR issues (e.g. high staff turnover and high level of staff absenteeism due to sickness)
- High cost of training and education programmes

It is now important to identify whether the type of domestic service provision has an impact on the results discussed above. The test of null hypothesis was used to investigate this.

Null hypothesis H_0 – The key factors that inhibit effective KM do not differ according to the type of domestic service provision

The above was, first, examined using a mean value comparison (see Table 7.10). The mean values given in Table 7.10 are arranged according to the ranking order obtained from Table 7.7.

Table 7.10: **Factors that inhibit effective KM vs. the type of domestic service provision – mean value comparison**

	In-house	*Rank*	Balanced	*Rank*	Out-sourced	*Rank*	PFI	*Rank*	Overall mean value
Poor level of integration between teams	2.13	*1*	2.43	*2*	1.99	*1*	1.78	*1*	2.01
HR issues	2.80	*2*	3.38	*5*	2.76	*2*	3.00	*2*	2.76
High cost of training and education programmes	2.81	*3*	2.81	*3*	2.83	*3*	3.00	*3*	2.81
Lack of IT facilities	3.37	*4*	1.64	*1*	3.09	*4*	3.22	*4*	3.23
Absence of a learning culture	3.47	*5*	3.47	*6*	3.40	*5*	3.64	*6*	3.45
Lack of understanding of control of HAI goals	3.51	*6*	3.51	*7*	3.56	*6*	3.42	*5*	3.47
Hierarchical org. structure	3.89	*7*	3.25	*4*	3.95	*7*	4.31	*7*	3.87

As per Table 7.10, the results do not show any significant variations to the findings presented in Table 7.7. This denotes a significant finding, as the respondents from a PFI domestic service and from a totally outsourced domestic provision consider having the service In-house as a better opportunity as opposed to contracting-out the service. Overall, the results shown in Table 7.10 suggest that most of the responses do not differ according to the type of domestic service provision. This was further examined using a Kruskal-Wallis test. The results of the Kruskal-Wallis test are given in Table 7.11.

Table 7.11: **Kruskal-Wallis test statistics for factors that inhibit effective KM according to the type of domestic service provision**

	Poor level of integration	HR issues	High cost of training and education	Lack of IT	Absence of a learning culture	Lack of understanding of HAI goals	Hierarchical org. structure
Chi-Square	6.603	5.361	1.931	8.691	1.132	3.896	11.341
df	3	3	3	3	3	3	3
Asymp. Sig.	.104	.147	.587	.034*	.769	.273	.010*

* results are statistically significant at $p < 0.05$

As shown in Table 7.11, at 5% level of significance, the p value is statistically insignificant in most of the instances. Thus, the null hypothesis is rejected for the above. This suggests that there are no differences of the key factors that inhibit effective KM, according to the type of domestic service provision. Therefore, hypothesis 'E' of the study is rejected (see Table 1.2).

7.6   KNOWLEDGE MANAGEMENT IN THE CONTROL OF HAI – DATA SYNTHESIS

Today, more than ever, knowledge matters (Baird et al, 2000). New terms relating to knowledge, are creeping into everyday vocabulary. There is the idea of a knowledge-based economy and knowledge-based industries (Organisation for Economic Corporation and Development, 1999). We have knowledge workers. Academics study knowledge-based enterprises. Firms and organisations are concerned about knowledge loss (Cross and Baird, 2000).

Most of the practices of KM in domestic services relate to knowledge sharing (e.g. sharing ideas and learning from each other, meetings, expert groups, etc) and knowledge dissemination (e.g. training and education, mentoring, etc). As defined in section 7.3.3, 'knowledge sharing' is the process where individuals mutually exchange their knowledge. Knowledge dissemination, on the other hand, is diffusing knowledge previously acquired (Conceptual Resource Search Engine, 2003). The case study findings, however, revealed that there is no knowledge sharing between ICT members and the domestic team in the *PFI case*. As the questionnaire survey findings revealed, the level of integration between the domestic team and the ICT is the biggest challenge of KM. As one of the questionnaire survey respondents noted:

"No matter what, NHS is a common place where you always get a breakdown of human communication"

Knowledge has long been recognised as "power" and pundits are persuaded that this "power" intensifies when it is shared (Stehr, 2001). Many experts argue that, even though initiatives exist for promoting KM in the NHS, knowledge sharing needs to become more ingrained amongst healthcare professionals (Parliamentary Office of Science and Technology, 2005), and even amongst staff (i.e. domestics and nurses). Earl (2002) in a study of knowledge sharing practices in a Singapore news company, found that cultural factors have significant impact on an individuals' decision to share or hoard knowledge. His study revealed that lack of motivation, management support, trust, and teamwork spirit are key factors that inhibit effective sharing of knowledge. It was also observed that the 'knowledge is power' mentality was hindering a positive knowledge sharing culture in the company. By changing behaviour of domestic teams and clinical teams and by establishing a 'culture of friendliness/togetherness' amongst them, will enable the issues associated with KM to be tackled. Policies in the control of HAI may, therefore, need to focus on ensuring the implementation of KM initiatives and innovative education and training programmes. Incentives and reward mechanisms can also be considered as favourable components of organisational culture for creating knowledge friendly environments.

The cleanliness champions programme implemented by the NHS in Scotland and NES, and the Matron's Charter introduced by the NHS Estates are two of the major initiatives taken by the NHS. However, no accompanying funds have been made available and there are no ring-fenced funds for NHS Boards/Trusts specifically directed toward these initiatives in the control of HAI (refer to section 8.4.1.1). Boards/Trusts, therefore, have to decide how to fund such measures from existing budgets, which is very difficult.

Training and education seem to be the most common practice of KM in domestic services. High cost of formal training programmes, however, seemed to be one of the key factors that inhibit effective KM (refer to section 7.5.1 – questionnaire survey findings). Budget limitations applied to the domestic services and high staff turnover further hamper this (refer to section 8.4.1.1). The latter, together

with other HR issues, appear to be another challenge of KM in the control of HAI. For example, in the national training and education framework developed for domestics by the Property and Environment Forum Executive, Scotland (2005), the Forum noted that the nature of the domestic role and workforce issues such as rapid staff turnover, variable shifts, and staff working outside normal day shift hours provide unique challenges to training and education programmes. The House of Lords Select Science and Technology Committee (1998) have been in support of this view, while pointing their finger, mainly at contracted-out domestic services. As the Select Committee noted, it is extremely difficult to ensure training of contract cleaners (i.e. domestics in contracted-out domestic services). Although training requirements may be written into the contract, this is often cut because of cost or profit margins.

In the absence of a universal and comprehensive definition of KM, it is a common myth that KM and IT are conceptually interchangeable. However, KM means much more than IT and it is crucial to view them as mutually exclusive. This is because an organisation does not have to employ IT for it to manage some of its knowledge assets (Egbu and Botterill, 2002). However, IT is important in its own right and remains a critical success factor in the development of an effective KM programme (Egbu and Botterill, 2002). As discussed in section 7.3.7, the NHS has developed an array of knowledge portals, which share what someone knows with others and encourage a reciprocal approach so that trust and networks can be built within the NHS staff. As the National Audit Office (NAO, 2000) states, these learning and sharing networks assist in widening staff's knowledge on current issues in the NHS. It also ensures that the staff are kept up-to-date with latest developments in the NHS. However, even if knowledge is captured and stored, getting the staff to utilise this stored knowledge is a challenge in domestic services due to lack of IT facilities. With this have come further challenges, for example, the electronic documents are stagnated because staff are not aware or cannot access the involved technology. This has prevented some staff from knowing the benefits of such an exercise.

A knowledge transfer project on 'mapping knowledge on controlling and avoiding HAI' (Egbu et al, 2004) identified the 'non-existence' of a single

coordinated knowledge map as another reason for the 'non-utilisation' of the knowledge bases. As the project further revealed, there are issues of cultural change and coordinated management of the application of such knowledge bases. Thus, as the aforementioned project suggested, it is essential to track all available knowledge to alert stakeholders to the existing information and knowledge, which can avoid work being repeated unnecessarily. This should involve the communication, sharing, and transfer of knowledge to, and from, a variety of stakeholders with different requirements, different educational levels, and different expectations and understandings of obligation and contribution to the control of HAI. According to one of the main recommendations given in the above knowledge transfer project, there is a need to create a clear resource which signposts the available, but currently under-utilised, knowledge sources (Egbu et al, 2004).

7.7   SUMMARY

This chapter overall addressed part of the fourth objective and research questions V and VI of the study (see Table 1.2).

According to the questionnaire survey findings, four key enabling factors for effective KM in the control of HAI in domestic services were identified. These are:

1. Staff awareness on the control of HAI
2. Having the domestic service in-house
3. Increased prioritisation of domestic services
4. Regular meetings between the domestic and clinical teams

Similarly, the findings revealed three factors that inhibit effective KM in the control of HAI in domestic services. These are:

1. Poor level of integration between domestic and clinical teams
2. HR issues (e.g. high staff turnover and high level of staff absenteeism due to sickness)
3. High cost of training and education programmes

It is imperative for healthcare managers to take necessary steps to overcome the aforementioned factors that inhibit effective KM. If such inhibiting factors are not taken care of, it could lead to further challenges and, ultimately, will result in ineffective practices of KM.

Considering what has been discussed above, the following inferences and implications can be made:

1. A national training and education framework for domestic teams should be developed in order to enable them to carry out their work to the highest standard. Herein, particular emphasis should be given to the training of domestics. This will enable the domestic managers to recognise the domestics' existing skills and identify where more training is needed.

2. The aforementioned framework should provide measures to address problems relating to budget limitations and workforce (e.g. high staff turnover, etc.).

3. The NHS Boards/Trusts/the healthcare managers should ensure that sufficient IT facilities are provided to all the domestic managers and domestic supervisors (at least common facilities for the domestic supervisors and the assistant domestic managers). They should also be given appropriate IT training.

CHAPTER 8 : PERFORMANCE MANAGEMENT AND ITS RELATED ISSUES IN THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

8.1 INTRODUCTION

The chapter reviews different definitions and concepts of Performance Management (PM). It then presents some of the common performance management approaches in-use in organisations. The chapter also analyses and presents data on performance management issues from both the case studies and the questionnaire survey. Overall, Chapter 8 addresses the fifth objective and research questions VII and VIII of the study (see Table 1.2).

8.2 THE SEMANTICS OF PERFORMANCE MANAGEMENT (PM)

8.2.1 Definitions of PM

Section 4.5 highlighted that, measuring performance, developing and reviewing monitoring and supervision arrangements, audit and feedback are vital in the control of HAI in domestic services. As Armstrong (2002) asserts, all these are considered as parts of a Performance Management (PM) process.

The concept of Performance Management (PM) has no generally agreed definition in or across the literature reviewed for this study. According to Martinez (2001), performance management is a term borrowed from the management literature that has only recently been adopted in the healthcare field. The term 'Performance Management (PM)' was first used in the 1970s, but it did not become a recognised process until the latter half of the 1980s (Armstrong and Baron, 1998). Many authors or researchers have different views on PM. The definitions given in Table 8.1 show some differences in the concept of performance management as viewed by a few of the writers in the area.

Table 8.1:   Definitions of Performance Management (PM)

Source	Definition	Remarks
Fowler (1990)	PM is the organisation of work to achieve the best possible results. From this simple viewpoint, PM is not a system or technique, it is the totality of the day-to-day activities of all managers.	
The Institute of Personnel Management (1992)	PM is a strategy, which relates to every activity of the organisation set in the context of its human resource policies, culture, style and communication systems. The nature of the strategy depends on the organisational context and can vary from organisation to organisation.	**Human resource oriented definitions of PM**
Armstrong and Baron (1998)	PM is a process, which contributes to the effective management of individuals and teams in order to achieve high levels of organisational performance. As such, it establishes shared understanding about what is to be achieved and an approach to leading and developing people which will ensure that it is achieved.	
Storey and Sisson (1993)	PM is an interlocking set of policies and practices which have, as their focus, the enhanced achievement of organisational objectives through a concentration on individual performance.	
Fletcher (1992)	PM is an approach to creating a shared vision of the purpose and aims of the organisation, helping each individual employee understand and recognise their part in contributing to them, and, in so doing, manage and enhance the performance of both individuals and the organisation.	
U.S. Agency for International Development (2002)	PM is a systematic process of monitoring the results of activities and collecting and analysing performance information to track progress towards organisational aims and objectives in order to effect positive change in organisation culture, systems and processes.	**Organisational definitions of PM**
Watkins (2005)	Performance management is a process that helps an organisation to meet or exceed its goals. The process brings together the activities of strategy development, planning and targeting with performance information and performance appraisals.	
National Excellence Collaborative (2005)	Performance management is the practice of actively using performance data to improve performance of organisations. This practice involves strategic use of performance measures and standards to establish performance targets and goals, to prioritise and allocate resources, to inform managers about needed adjustments or changes in policy or program directions to meet goals, to frame reports on the success in meeting performance goals, and to improve the performance of organisations.	

As Armstrong and Baron (1998) state, PM is mostly identified as a system which enhances individual performances to support or achieve organisational goals. Adair et al (2003) stress that the term PM cannot be defined in the absolute and that its meaning is contextual in terms of both individuals and activities. According to Table 8.1, some have taken a human resource focus to define performance management, while some provide an organisational view of PM. However, according to Donabedian's (1980) input, process and outcome model (see Figure 8.1), it is not totally appropriate to consider PM in view of individual performance alone.

Resources (Inputs)	Activities (Processes)	Results (Outputs/Outcomes)
People Infrastructure Materials/drugs Information Technology	▪ What is done ▪ How it is done	Health services delivered Change in health behaviour Change in health status Client Satisfaction
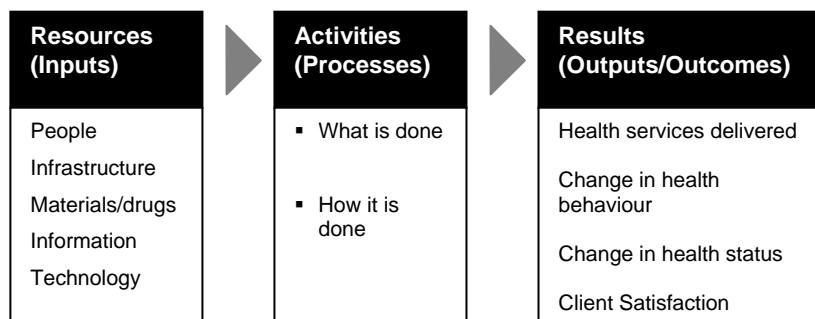
Figure 8.1:   Inputs, processes and outcomes in healthcare (source: Donabedian, 1980)

According to Sumlin (1997), successful organisations are already discovering Performance Management (PM) as a critical business tool, one that plays an important role in translating business strategy into results. According to Adair et al (2003), PM sits within a dizzying array of related theoretical ideas, research and practice based tools, initiatives, perception and rhetoric due to the fact that the term performance itself is acknowledged to be difficult to define and has no universal and generally agreed definition.

Considering what has been discussed above, a broader definition can be provided for Performance Management; i.e. PM should be (adapted from Armstrong and Baron, 1998):

▪ **Strategic** - it is about broader issues and longer-term goals

▪ **Integrated** - it should link various aspects of the business, people management, and individuals and teams.

Further PM should incorporate:

- **Performance improvement** - throughout the organisation, for individual, team and organisational effectiveness.
- **Development** - unless there is continuous development of individuals, teams and activities (processes), performance will not improve.

Performance Management (PM) can be seen as a significant area in the control of HAI in domestic services. However, it has seldom been recognised as a main component in the said area. As Bartely (2000) has recommended, PM is essential to assess the level of adoption of control of HAI standards in FM services. The Audit Commission (2000), also provides some of the benefits of PM as follows:

- Measure progress towards achieving corporate objectives and targets.
- Promote the accountability of service providers to the public and other stakeholders.
- Compare performance to identify opportunities for improvement. Performance indicators may be used to identify opportunities for improvement through comparison both within the organisation over time or between different units or organisations.
- Promote service improvement by publicising performance level.

PM can be used as an effective tool to detect pros and cons of the domestic service and it can also support strategic decision-making. It could be used as a point of reference to compare the past performance levels with the present. Further, it could also be utilised to identify mistakes and assist on remedies to be taken.

Several important conceptual distinctions warrant further explanation on the above. These include:

- Performance vs. quality
- Performance measurement vs. performance management
- Performance measures vs. performance indicators
- Performance management models vs. performance improvement tools

8.2.2 Performance vs. quality

An important distinction seen across the health and business literature is the emphasis on the concept of "quality". Business writers still consider quality to be one of several facets of performance (Neely et al, 1995). Other facets include cost, flexibility and time. Although there is some emphasis on quality in recent business literature; in health, quality appears to be a particularly strong imperative (Adair et al, 2003).

Several interpretations can be given for 'quality' since it differs according to the 'eye of the beholder'. According Long and Harrison (1985), in terms of healthcare, 'quality' can be defined in several perspectives; technical, personal (share holders/owners) or from a public health perspective (customers). However, there is no doubt that cost effectiveness will be an integral part in all these perspectives. This does not mean that good quality should always be cheap but it should be affordable from both healthcare providers' and consumers' point of views.

Some researchers argue that performance should be defined as the outcome of work (Long and Harrison, 1985). In contrast Campbell (1990) is of the view that performance is behaviour and should be distinguished from the outcome because they can be contaminated by system factors, which are outside the control of the performer.

According to the Quality Interagency Coordination Task Force (1999), quality denotes 'doing the right thing at the right time, in the right way, for the right person and having the best possible healthcare results/outcomes'. Interestingly, Otley (1999) defines performance as 'being about doing the work, as well as being about the results achieved'. Thus, it is apparent that the terms quality and performance continue to be used interchangeably. In health, many view quality as the overarching issue which must be addressed by performance measurement, while others still present quality as simply one among several domains of health services performance to be addressed. Kazandjian (1995) postulates that the difference between quality and performance is that quality is the valuation of performance, and reflects expectations and beliefs. This implies that performance is simply the level of achievement of improvement, and that quality is the

evaluation of that level. There is, however, consensus across organisations that both performance and quality are complex, and multi-dimensional concepts (Adair et al, 2003).

8.2.3   Performance Measurement vs. Performance Management

The review of literature revealed that definitions of performance measurement and performance management have become so interwoven that the two are largely inseparable. Even though in this study the acronym PM stands for Performance Management, some authors/researchers have used it to encode "Performance Measurement" (Performance Measurement Association – PMA; Bititci, 2002). Adair et al (2003) attempt to describe the difference concepts of performance management and performance measurement as follows:

> "Performance management has been characterised as the philosophy that is supported by
>   performance measurement. It is the shared vision, team work, training, incentives etc.
> that surround the performance measurement activity. It was viewed as the application of
>   information arising from measurement activities. It now encompasses both the set of
> management activities that set the initial strategy for the improvement efforts leading up
>   to the performance measurement task, as well as the 'actioning' of information which,
>   ideally, follows the task."

Britici et al, in 1997 (as cited in Kagioglou, 2001) also explain the distinction between performance management and performance measurement. According to them, PM is seen as a closed-loop control system, which deploys policy and strategy, and obtains feedback from various levels in order to manage the performance of the system. On the other hand, performance measurement is the information system, which is at the heart of the PM process, and it is of critical importance to the effective and efficient functions of the PM system. Leading organisations agree on the need for a PM system, which is a structured methodology for using performance measurement information to help set agreed performance goals, allocate and prioritise resources, inform managers to either conform or change correct policy or programme direction to meet those goals, and report on the success in meeting those goals (Procurement Executives' Association, 1999).

8.2.4 Performance measures vs. performance indicators

The terms performance measure and performance indicator are also used interchangeably in the literature. Distinguishing these terms provides useful clarification. Performance indicators are not "direct measures of quality; rather, they are flags to alert users to possible opportunities for improvement". Performance measures, on the other hand, are "markers or signs of things you want to measure but which may not be directly, fully or easily measured." (Adair et al, 2003). A performance measure is one of several measurable values that contribute to the understanding and quantification of an indicator. Indicators are named as key performance indicators (KPIs). According to the Public Health Foundation in Washington DC (2004), performance measures are quantitative measures of capacities, processes, or outcomes relevant to the assessment of a performance indicator. Such types of indicators are extremely important to an organisation in achieving its strategic goals, objectives, vision, and values that, if not implemented properly, would likely result in a significant decrease in performance (Benchmarking Study Report, 1997).

8.2.5 Performance management models vs. performance improvement tools

An effective performance management model provides a framework that links the array of initiatives that make up an agenda of an organisation and provides a coherent platform for organisations to drive improvement. Within this, performance improvement tools can be used to improve a specific service or aspect of performance in an organisation or partnership (Davies, 2004). Present researcher observes that the difference between a PM model and a tool is that a model provides a holistic approach to improve performance in an organisation, while the performance improvement tool assists in improving the efficiency of the organisation. Examples of performance management models are balanced scorecard (BSC) and Excellence Model (EFQM). Performance improvement tool is a term that describes many varied methods and approaches ranging from peer reviews to national standards for customer service to focused process improvement techniques (Armstrong and Baron, 1998). Examples of performance improvement tools are six sigma, value management and Kaisen. However, at times, there is some overlap between performance management

models and tools; thus, for the purpose of this study both are discussed together as 'performance management approaches'.

8.3   EXISTING PERFORMANCE MANAGEMENT APPROACHES

8.3.1   Performance management approaches in-use in domestic services – case study findings

As identified in section 4.5 and section 8.2, PM is a significant area in the control of HAI in domestic services (FM services as a whole). Table 8.2 presents the PM approaches in-use in the control of HAI in the two cases. Discussions related to all the above are discussed in detail in subsequent paragraphs.

Table 8.2:   PM approaches in-use

PM approaches	In-house case		PFI case	
	Yes	No	Yes	No
Audits by Audit Scotland	✓	-	✓	-
Audits by Infection Control Committee (ICC)	✓	-	-	✓
Audits by the domestic service	✓	-	✓	-
Audits for reviewing standards ISO 9001:2000	✓	-	-	✓
Environmental audits	✓	-	-	-
Performance appraisal	✓	-	✓	-
Personal Development Plans	-	✓	✓	-
Patient Satisfaction Survey Techniques	✓	-	-	✓
Programme Evaluation Techniques	-	✓	✓	-
Benchmarking techniques	-	✓	✓	-

Both the *In-house case* and the *PFI case*, in the main, have two types of PM approaches, i.e. external audits and internal audits. The audits carried out by Audit Scotland are the main types of external audits in both cases. The Audit Scotland is responsible for investigating whether the domestic services achieve the best possible value for money and adhere to the highest standards of financial management. It does a baseline review of hospital cleaning services and makes several recommendations. The recommendations are aimed at improving the quality and effectiveness of hospital cleaning. The review also incorporates a baseline assessment of compliance with standards for cleaning services issued by the CSBS (2002). The Audit Scotland reviews are carried out together with the domestic managers in hospitals. Its reviews are conducted against a number of criteria relating to floors, fixtures and fittings, sanitary ware, walls, curtains and

screens and waste bins. Each area is rated using a Likert scale of four, i.e. very good, acceptable, need for improvement or concern (i.e. unsatisfactory). This basically provides a 'snapshot' of the levels of cleanliness in hospitals in Scotland. As one of the domestic managers from the *PFI case* noted:

"The Audit Scotland gives us an action plan to comply with for anything that they felt was unsatisfactory. We have to then respond within a given time frame."

Audit Scotland completed its last audit in May 2002. However, it is supposed to carry out its audits in hospitals throughout Scotland, at least, once every three years.

The *In-house case* has two other external audits, the environmental audits and the audits carried out for ISO 9001:2000 quality accreditation. The environmental audits are carried out quarterly (once every three months), by the Health and Safety Executive (HSE) and Environmental Health. It is an independent review, which specifically audits the cleanliness of kitchen areas, ward areas and the conditions of hospitals. The ISO 9001:2000 audit, on the other hand, is a process level quality accreditation. It is carried out by an external organisation called SGS Yardsley. SGS Yardley conducts its audits twice a year across the NHS Trust of the *In-house case*. The audits not only include the domestic service but also areas such as maintenance, catering and portering. As the General Manager (Facilities) noted, this audit is similar to a rolling programme:

"Their (ISO 9001:2000) performance tool is a check list. They (the auditors) come with a list of areas to check. Each time they come, they check different areas, so, they make sure that they cover the whole service every year"

The ISO 9001:2000 audits provide a report on the performance of the *In-house case* at the end of each audit. It identifies any areas of shortfalls and provides a sufficient time period to rectify the problems. As the hotel services manager of the *In-house case* explained:

"It is a fairly robust system. They provide us with a corrective action form. If we have a number of corrective actions then they (the auditors) tell us that we have a poor performance level. Usually they benchmark our system against the number of corrective actions we have."

The main types of internal audits carried out by both cases are known as self-audits. As the name implies, they are carried out by the domestic service itself. The domestic supervisors in the *In-house case* are mainly responsible for these self-audits. The supervisors go round the wards and physically check surfaces, walls, beds, and sanitary areas. to ensure that the wards are free from dust. It is carried out weekly or at times, daily. If there are any under-performing areas then the supervisors have to bring this to the attention of the responsible domestics and the latter have to take necessary actions in order to rectify the problem. In the *PFI case*, the NHS Trust (client) and the PFI consortium carry out individual audits, simultaneously, to ensure performance of the contractor. The PFI contractor also carries out an audit similar to the *In-house case*. The PFI consortium and the NHS Trust adopt a point system when carrying out their audits. They allocate points to each and every of area of the wards (depending on the level of risk involved in terms of control of HAI, e.g. very high, high, low, very low) and finally sum up the points to determine the total (out of 100 points). If the total is more than 90%, then the contractor's performance is very good. One of the domestic managers of the PFI consortium explained the difference between the two audits as follows:

"The PFI consortium will go into a ward and they will check every room and they will score their way around. They might look at a particular output say, cleaned floor for instance. They will check it 15 times if there are 15 rooms. And if two of the rooms have uncleaned floors, the two rooms will fail and the other 13 will pass. When the client (NHS Trust) does an audit, they look at individual outputs. If they find a dirty floor, anywhere in the ward they will fail that output. So, generally it's a 100% fail on that particular output. So, the monitoring and audit systems are different in terms of percentages"

As the domestic manager further explained, the *PFI case* is now in the process of developing an audit system, which is consistent across the two, i.e. NHS Trust and the PFI consortium. As he states, it is very much essential to benchmark their results.

The other types of internal audit in the *In-house case* are the ICT audits. Some of the senior members of the ICT carry out these audits in order to check domestic

service's compliance with the requirements of the control of HAI. They check cleanliness in wards, cleanliness in sanitary areas, different waste segregations, staff's compliance and handwashing procedures. The audits are carried out at least monthly. The ICT members carry out the audits using a checklist with a Likert scale of three, i.e. yes/no/not applicable. If 95% of the 'applicable' areas in the checklist comply with the control of HAI requirements, the domestic service is considered to have a very high performance level. However, if the standards fall below from the 95% level of compliance, then an action plan is given to the domestic services stating their targets and time scale.

Apart from the aforementioned audits, both the *In-house case* and *PFI case* have another PM approach in-use, i.e. the performance appraisal (PA). According to one of the domestic managers in the *In-house case,* performance appraisals and reviews have become a necessary part of the domestic service. However, due to time constraints, in both cases, it is limited to only appraisal and review of performance of domestic managers (including supervisors) not domestics. The domestic manager meets with their subordinates (only domestic managers) once a year and has a personal interview, approximately for one hour. The latter is asked about their job role, job satisfaction and any problems regarding their work.

Apart from the performance appraisals, in the *PFI case*, personal development plans are also used as part of an on-going PM programme. This is also for domestic managers. As one of the domestic managers from the PFI contractor's side highlighted, it is a meaningful part of their career-planning process. It recognises domestic managers' contributions toward achieving organisational goals and identifies training and education needs. Even though it can be part of a performance appraisal and review programme, it also can be considered as a separate document which helps organisations make decisions, mainly, about promotion and training and education needs (Nelson, 2000).

The *In-house case* conducts patient satisfaction surveys at least quarterly, in order to review their performance. The general manager (Facilities) explained the reason as follows:

"… a ward may be very clean but if it looks dilapidated then patients and visitors get the wrong impression… So, it's not always about cleanliness, it is about the appearance as well. Hence we measure public perception to understand the appearance of the wards and hospital…"

During patient satisfaction surveys, the *In-house case* develops a simple, one-page questionnaire (with maximum 5 – 10 questions) and distributes it to both patients and visitors. Each and every question has 'smiley faces' which denote a three-point Likert scale (☺ - happy, ☺ - medium, ☹ - not happy). If the overall responses have more 'happy faces' then overall performance of the *In-house case* is very good. If the results are very positive, a summary of the survey is presented on display boards in wards/general areas to motivate the domestics.

The *PFI case* also extends their use of PM by adopting programme evaluation techniques and benchmarking techniques in their service. The latter is mainly used to identify their current performance levels compared to previous performance levels whilst the former is used to review the performance of their programmes (e.g. effectiveness of training and education programmes for domestics).

8.3.2 Frequently used performance management approaches in domestic services - questionnaire survey findings

The aim of this section is to highlight the performance management approaches, which are widely used in domestic services in the NHS (England and Scotland). This was investigated using a questionnaire survey approach. This is also aimed at addressing research questions VII of the study (see Table 1.2):

- What are the common performance management approaches in-use in the control of HAI in domestic services?

This was examined using the following hypotheses (see Table 1.2):

F. The types of performance management approaches used differ according to the type of domestic service provision

G. There is a positive correlation between the effectiveness and frequency of use of performance management approaches

As identified from the previous section, much of the focus of performance management in the *In-house case* and the *PFI case* is on performance audits. However, it is understood from a thorough review of literature that a number of PM approaches exist in organisations.

Undoubtedly, one of the most widely recognised PM approaches of today is the Balanced Scorecard (BSC). Developed by Kaplan and Norton, and popularised by the marketing efforts of major consulting companies, the phrase 'balanced scorecard' appears to have entered the management vernacular (Neely, 1999). Kaplan and Norton (1992) created the balanced scorecard to assist businesses in moving from ideas to action, to achieve long-term goals, and obtain feedback about strategy. The Balanced Scorecard identifies four fundamental perspectives: financial perspective; customer perspective; internal-business-process perspective; and learning and growth perspective. It expresses an organisation's strategy as a set of measurable goals from the perspectives of owners/investors, other external stakeholders and the organisation itself. If these goals and associated measures, and targets are well chosen, the BSC will help managers focus on the actions required to achieve them, so helping the organisation achieve its overall strategic goals and realise its strategic visions. Even though BSC appears to be successful as a PM approach, it has some criticisms as well. The major challenges of the BSC are the selection of measures and the introduction of new ways of working that actually make use of the information generated by the BSC. According to Atkinson et al (1997), the Balanced Scorecard does not fit together with the stakeholder approach to performance management. They criticise the Balanced Scorecard as failing to highlight employee and suppliers' contributions; the role of the community in defining the environment within which the company works; and identifying performance measurement as a two-way process. Neely et al. (1996) affirm that the majority of Balanced Scorecard implementation initiatives in firms fail, and the four perspectives of the Balanced Scorecard (financial, customer, internal business processes, innovation and learning) have been considered insufficient. Nevertheless, Mooraj et al (1999) indicated that the concept underlying the Balance Scorecard (BSC) appears to embrace both the financial and non-financial measures which are relevant to a company's critical success factors.

Moreover, the sharing of the Balanced Scorecard results should help employees to understand the priorities and objectives of that particular operation.

The Malcolm Baldridge National Quality Award (MBNQA) model, which originated in the US, is another popular approach of PM. It is a self-assessment process that focuses on outcomes. It also focuses on other outputs that impact on the outcomes such as strategic quality planning, human resource utilisation, quality assurance of products and services, quality operation results and customer satisfaction. Overall, it enables organisations to focus on what is important for them and how to put processes and systems in place that empower stakeholders to accomplish the ultimate goals and action plans.

The European Foundation Quality Management (EFQM) model is one of the popular models widely used in organisations. It is the European equivalent of the Malcolm Baldridge National Quality Award criteria. In the EFQM, the two main important criteria are the 'enablers' and the 'people results'. The model consists of nine components, namely: leadership, people management, policy and strategy, resources, processes, people satisfaction, customer satisfaction, impact on society and business results. The assumption behind the model is that, excellent results with respect to performance, customers, people and society are achieved through leadership driving policy and strategy, people, partnership and resources, and processes (EFQM, 1999; as cited in Samuelsson and Nilsson, 2002). The model assists organisations to achieve business excellence through continuous improvement in the management and deployment of processes to engender wider use of best practice activities. It enables the calculation of scores against a number of criteria that can be used for either internal or external 'benchmark' comparisons. It is hoped that the results of these relative comparisons will lead to increased focus on improving key process performance, and so generate 'business excellence' (Andersen et al, 2000). However, the EFQM criteria have been described as vague and underrated in the areas of improvement, innovation, and supplier partnership strategies (Azhashemi and Ho, 1991). The Dolphin EFQM Excellence model and Public Excellence Model are some other PM approaches that have adapted the EFQM model to conducting

self assessments and as an organisational improvement framework respectively (Davies, 2004).

Likewise, there are several other approaches used by organisations in measuring and managing performance. For examples, PQASSO (Practical Quality Assurance System for Small Organisations), the Big Picture (an organisational improvement framework and diagnostic tool for identifying strengths and weaknesses within an organisation or programmes of work), and Investors in People (a national standard for improving organisational performance by training and developing people to achieve organisational goals). All these are a range of models and improvement tools that either provide a performance management framework for the whole organisation or support a particular aspect or area of performance.

A careful observation would suggest that some of these common approaches are used in healthcare organisations as well, e.g. BSC and EFQM. Besides, in the NHS, there is also a national Performance Assessment Framework (PAF) to assess performance in the NHS as a whole (NHS Estates, 1999). It is based on the BSC approach. The PAF highlights six areas of performance which, taken together, give a balanced view of the performance of the NHS: health improvement; fair access; effective delivery of appropriate healthcare; efficiency; patient/carer experience; and health outcomes of NHS care. The PAF is supported by a set of national headline NHS Performance Indicators (e.g. access, mental health, diabetes, cancer and coronary heart disease). Even so, currently, the PAF does not give much attention to infection control as part of their overall assessment in hospitals. In addition, it has also not given any particular attention to domestic services (and FM services as a whole).

Given the above discussions, a list of PM approaches were put together, drawing in the literature and discussions with the participants of the case studies. The views of the respondents of the postal questionnaire (refer to Appendix 3) were sought on a few issues on the following list of performance management approaches:

- Audits by the national audit offices (e.g. UK National Audit Office, Audit Scotland)

- Audits by Infection Control Committee

- Self - audits by the domestic service for reviewing its services

- Audits for reviewing standards of ISO 9001:2000 for quality accreditation

- Environmental audits for reviewing cleanliness of the hospitals

- Performance appraisal techniques for domestics

- Performance appraisal technique for managers

- Personal development plans

- Patient satisfaction survey techniques

- Programme evaluation techniques

- The performance Assessment Framework (PAF) introduced by the NHS

- Balance Scorecard (BSC)

- Business Excellence (EFQM) Model

- Benchmarking techniques

The question relating to PM approaches in-use in the control of HAI in domestic services was only asked from the domestic managers as they are directly involved in such operations.

Table 8.3 presents the overall mean scores and the ranking (by region – England and Scotland) the frequency of use of the PM approaches in the control of HAI in domestic services.

Table 8.3:   PM approaches in-use in the control of HAI in domestic services

Frequency	PM approaches	Mode	Overall mean score	Rank	England	Rank	Scotland	Rank	Mann-Whitney U Asymp. Sig (2-tailed)
Very Frequent	Audits by domestic service	1	1.62	1	1.57	1	1.71	1	.056
Frequent	Audits by ICC	2	2.57	2	2.48	2	2.73	3	.075
Frequent	Environmental audits	3	2.58	3	2.51	3	2.69	2	.572
Frequent	Audits by the National Audit Office	3	2.86	4	2.90	5	2.80	4	.591
Frequent	Patient satisfaction survey	2	2.95	5	2.89	4	3.05	5	.494
Fairly Frequent	PA for domestic managers	3	3.31	6	3.24	6	3.43	7	.151
Fairly Frequent	Benchmarking techniques	3	3.37	7	3.45	8	3.24	6	.108
Fairly Frequent	PA for domestics	3	3.44	8	3.25	7	3.75	9	.001*
Fairly Frequent	Personal Development Plans	3	3.48	9	3.45	9	3.52	8	.534
Fairly Frequent	PAF by the NHS	3	3.74	10	3.72	11	3.77	10	.614
Fairly Frequent	Programme evaluation techniques	5	3.87	11	3.69	10	4.15	11	.052
Not Frequent	ISO 9001:2000	5	4.25	12	4.21	12	4.31	12	.759
Not Frequent	BSC	5	4.41	13	4.23	13	4.70	13	.061
Not Frequent	EFQM	5	4.72	14	4.61	14	4.88	14	.025

Frequently used PM approaches

*The mean difference is significant at the 0.05 level

Meaning of scale (frequency of use of the performance management approaches): **1** (Very frequent), **2** (Frequent), **3** (Fairly frequent), **4** (Not frequent), **5** (Not Applicable/not at all used)

Of the fourteen performance management approaches, only one, i.e. audits by the domestic service, is 'very frequently used', based on the overall mean score being 1.62. It is further affirmed by its mode value being in the scale of 1 (see Table 8.3). Four other approaches are also significant and fall in the category of 'frequently used' with mean scores in the range of 2.57 (audits by the ICC) to 2.95 (patient satisfaction survey). Out of the nine remaining approaches, only three approaches are 'not frequently used', as they have mean values greater than 4. These approaches are the audits for ISO 9001:2000 quality accreditation, Balanced Scorecard and the Business Excellence model. Even though it was identified at the beginning of this section that the latter two are the most used approaches in organisations in general (Neely, 1999); from a domestic service point of view, they can be identified as the least used approaches of PM as their mode values are 5 (i.e. not at all used). Further analysis shows that the aforementioned results are fairly similar even with regard to the different groups of respondents by region (i.e. England and Scotland). This was evident from the Mann-Whitney U test where the test results are not significant (with only one exception) at 5% significance level.

The mean values of the PM approaches are further compared according to the type of domestic service provision (see Table 8.4). This is to verify whether the frequency of use of PM approaches differ according to the type of domestic service provision. This was examined using the test of null hypothesis.

Null hypothesis H_0 – there is no difference in the frequency of use of PM approaches, according to the type of domestic service provision

Table 8.4 does not show any significant differences to the results discussed above. For example, audits by the domestic service still remain the 'very frequently used' approach by the respondents in performance management, irrespective of the type of domestic service provision. Thus, it can be concluded that the performance approaches used by domestic services do not change according to their service provision. However, the results of the ANOVA test for a k-independent sample (i.e. Kruskal-Wallis test) show some differences in three approaches at the 5% significance level. These are: patient satisfaction surveys,

performance appraisal for domestic managers and personal development plans. As a result, the null hypothesis in relation to these cannot be accepted. Table 8.5 shows a non-parametric Mann-Whitney U test of two independent samples. It suggests that a statistically significant difference in the frequency of patient satisfaction survey approach exist mainly due to its wide use in the outsourced services. Conversely, the performance appraisal for managers and performance development plans are used more in In-house services compared to other types of domestic services.

Irrespective of the small variations discussed above, overall, five PM approaches are identified as the common approaches used in the control of HAI in domestic services. They are:

- Audits by the domestic service
- Audits by the ICC
- Environmental audits
- Audits by the national audit office
- Patient satisfaction surveys

Table 8.4:   PM approaches in-use according to the type of domestic service provision

PM approaches	Overall mean score	In-house	Rank	Balanced	Rank	Outsourced	Rank	PFI	Rank	Kruskal-Wallis Sig. p
Audits by domestic service	1.62	1.76	1	1.60	1	1.22	1	1.35	1	.061
Audits by ICC	2.57	2.62	2	2.49	2	2.59	4	2.35	2	.509
Environmental audits	2.58	2.63	3	2.83	3	2.13	3	2.53	3	.055
Audits by the National Audit Office	2.86	2.87	4	2.86	4	2.97	5	2.53	3	.363
Patient satisfaction survey	2.95	3.17	6	2.97	5	2.03	2	2.88	5	.000*
PA for domestic managers	3.31	3.13	5	3.51	8	3.47	7	4.06	7	.000*
Benchmarking techniques	3.37	3.33	8	3.17	6	3.50	8	3.82	6	.287
PA for domestics	3.44	3.42	9	3.57	9	3.09	6	4.06	7	.051
Personal Development Plans	3.48	3.31	7	3.49	7	3.78	9	4.18	9	.001*
PAF by the NHS	3.74	3.61	10	3.57	10	4.22	11	4.18	9	.013
Programme evaluation techniques	3.87	3.85	11	3.80	11	3.87	10	4.18	9	.773
ISO 9001:2000	4.25	4.16	12	4.40	13	4.47	12	4.24	12	.609
BSC	4.41	4.49	13	3.94	12	4.69	13	4.24	13	.008
EFQM	4.72	4.76	14	4.49	14	4.72	14	4.82	14	.292

Frequently used PM approaches

*The mean difference is significant at the 0.05 level

Meaning of scale (frequency of use of the performance management approaches): **1** (Very frequent), **2** (Frequent), **3** (Fairly frequent), **4** (Not frequent), **5** (Not Applicable/not at all used)

Table 8.5:   Group differences test using Mann-Whitney U test of two independent samples

PM approaches	In-house/ Balanced	In-house/ Outsourced	In-house/ PFI	Balanced/ outsourced	Balanced/ PFI	Outsourced/ PFI
Patient satisfaction survey	.271	.202	.000*	.708	.087	.056
PA for domestic managers	.327	.009*	.000*	.281	.033*	.203
Personal Development Plans	.533	.000*	.171	.000*	.309	.063

*The mean difference is significant at the 0.05 level

In an attempt to identify the reasons for the above, there was a need to verify whether the effectiveness of the PM approaches has an association with its frequency of use. Effectiveness is different from efficiency. In the context of PM, efficiency refers to such issues as strong management and utilisation of equipment and workforce, whereas effectiveness is concerned with the achievement of outcomes (Smith, 1998). Therefore, in this study, effectiveness denotes 'the quality of being able to bring about an effect' (Oxford Dictionary, 1994) in order to achieve the goals of domestic services.

The association between the effectiveness and frequency of use of PM approaches is examined using the test of null hypothesis. The results are presented in Table 8.6.

Null hypothesis H_0 – there is no correlation between effectiveness and frequency of use of PM approaches

Table 8.6:   Effectiveness vs. frequency of use of PM approaches

PM approaches	Frequency of use [a]	Rank	Level of effectiveness [b]	Rank	Kruskal -Wallis Sig. p	Cramer's V
Audits by domestic service	1.62	1	1.95	1	.000*	0.542
Audits by ICC	2.57	2	2.50	4	.000*	0.596
Environmental Audits	2.58	3	2.43	2	.000*	0.400
Audits by the national audit office	2.86	4	2.43	2	.000*	0.550
Patient satisfaction survey	2.95	5	2.97	6	.000*	0.494
PA for domestic managers	3.31	6	2.75	5	.000*	0.517
Benchmarking Techniques	3.37	7	3.15	9	.000*	0.457
PA for domestics	3.44	8	3.11	8	.000*	0.502
Personal Development Plans	3.48	9	3.10	7	.000*	0.513
PAF by the NHS	3.74	10	3.40	10	.000*	0.523
Programme evaluation techniques	3.87	11	3.76	11	.000*	0.537
ISO 9001:2000	4.25	12	4.10	12	.000*	0.537
BSC	4.41	13	4.33	13	.000*	0.515
EFQM	4.72	14	4.73	14	.000*	0.507

*The mean difference is significant at the 0.05 level
a, b overall mean scores

a - <u>Meaning of scale (frequency of use of the performance management approaches):</u>
1 (Very frequent), **2** (Frequent), **3** (Fairly frequent), **4** (Not frequent), **5** (Not Applicable/not at all used)

b - Meaning of scale (level of effectiveness of the performance management approaches):
1 (Very effective), **2** (Effective), **3** (Fairly effective), **4** (Not effective), **5** (Not at all used)

Table 8.6 presents some interesting findings. A close observation of Table 8.6 reveals that the ranking of PM approaches according to the level of effectiveness is akin that of the frequency of use. This suggests that there is an association between the two variables. This was verified by a Kruskal-Wallis test (see Table 8.6). The test results appear to be very significant as all the p values are approximately zero. Therefore, the null hypothesis is rejected, at the 5% level of significance. This denotes that there is a correlation between the effectiveness and the frequency of use of PM approaches. This was further supported by using Cramer's *V* values of a cross tabulation test (see Table 8.6). The Cramer's *V* values range from 0.400 (environmental audits) to 0.596 (audits by the ICC), thus, it suggests a 'modest' positive relationship between the two variables (refer to section 3.8.6).

Overall, section 8.3.2, rejected hypothesis 'F' but accepted hypothesis 'G' of the research study (see Table 1.2).

8.4   ISSUES RELATING TO PERFORMANCE MANAGEMENT

The idea of this section is to present some of the critical issues that hinder successful performance in the control of HAI in domestic services.

8.4.1   Issues relating to performance in the control of HAI in domestic services – case study findings

Performance issues have always been, and still remain, difficult hurdles faced by many organisations. This can be due to various reasons such as communication barriers, lack of training and education and lack of motivation of employees. (Glennan and Melmed, 1996). According to the twenty-six (26) case study participants, they encounter some practical difficulties during the successful implementation of strategies (refer to Chapter 5). In the context of PM, these can be identified as critical issues that obstruct performance of professionals/staff. These issues are presented in Table 8.7.

Table 8.7: Issues relating to performance

Description	In-house case						PFI case							Total (26)
	FMGR (CS1) Total 3	FMGR - SUP (CS1) Total 2	STAF (CS1) Total 3	ICT (CS1) Total 3	NURS (CS1) Total 2	Total for In-house case	FMGR (CS2) Total 2	FMGR - OUT (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	STAF (CS2) Total 3	ICT (CS2) Total 2	NURS (CS2) Total 2	Total for PFI case	
Shortage of staff	3	2	3	1	2	11	1	-	2	3	-	2	8	19
Time-scale difficulties	2	2	3	-	1	8	-	1	2	1	1	2	7	15
Lack of training and education	-	2	1	3	2	8	-	-	1	-	2	2	5	13
Equipment and materials constraints	-	1	2	1	1	5	-	-	-	1	2	1	4	9
Budget limitations	3	1	-	1	1	6	-	-	-	-	-	2	2	8
Difficulties related to guidance documents	2	1	-	1	-	4	-	-	-	-	1	-	1	5
Division of work between staff	-	2	1	-	2	5	-	-	1	-	-	2	3	8
Built environment constraints	2	1	-	-	-	3	-	-	-	-	-	-	0	3
Lack of infection control team's involvement	-	-	-	-	-	0	-	-	-	-	2	-	2	2

* See Table 3.10 for codes given for the interviewees. Also, see Table 3.11 to identify the way results are derived in this table.
** Refer to Appendix 2b to identify the number of interviewees

It was obvious from findings laid out in Chapters 5, 6 and 7 that, out of the two case studies chosen, the *PFI case* has comparatively more challenging issues relating to strategies, involvement and integration of key players and KM. However, this was in stark contrast to the findings presented in Table 8.7. According to most of the domestic managers from the *PFI case* they do not come across many issues associated with operationalising performance in their domestic practices. As one of them noted:

'When activities are well-planned and if the necessary resources are in place, there will hardly be any problems'

In contrast, the domestic managers from the *In-house case* identified many issues relating to performance such as staff shortages and budget limitations.

A summary of the issues faced by the two cases are as follows:

- Resource constraints
- Time-scale difficulties
- Lack of training and education
- Difficulties relating to guidance documents (guidance documents herein means the specifications, standards, policies and guidelines)
- Division of work between staff
- Built environment constraints (e.g. layout of wards and age of the hospital building)
- Lack of involvement of the ICT members

8.4.1.1 Resource constraints

The interviewees presented their views on resource constraints under three major categories, i.e. shortage of staff, budget limitations, equipment and material constraints.

Nineteen out of the twenty-six interviewed (nearly 73%) identified shortage of staff as the biggest challenge in domestic services. According to them 'high levels of staff absenteeism due to sickness' is one of the main reasons for high

levels of staff shortages. As one of the domestic managers from the PFI contractor's side of the *PFI case* revealed:

'it (sickness absence) is not consistent but periodical'

In both cases, their level of absenteeism due to sickness is less than 3%. It is very much lower than the overall national level, which is about 7.2% in Scotland, and 4.2% all over UK (Auditor General for Scotland, 2003).

High rates of staff turnover, and high level of staff vacancies due to difficulties in staff recruitment are other reasons for the high level of staff shortages. These recruitment and retention issues, overall, cause complications in the management and operations of domestic services.

Discussions with the domestics and domestic supervisors uncovered some factors that lead to the above:

1. Lack of training (refer to sections 7.3.1 and 8.4.1.3)
2. Division of teams (refer to section 8.4.1.5)
3. Low wages: this appears to be a prevailing problem in many domestic services. Even though the domestic managers in both the *In-house case* and the *PFI case* suggest that their domestics' rate of pay is on par with the recommended national rate of pay, the domestics believe otherwise. According to them, the wages are 'less attractive'.
4. Job security: nearly 99% of the domestic workforce is female in both the *In-house case* and *PFI case*. Besides, most of them work on a part-time basis or at times, change their working arrangements due to personal reasons. Due to this, many domestics are hired on a temporary or on a contract basis. Thus, not having any job security and pension schemes have resulted in difficulties in terms of attracting new staff to the domestic service as well in retaining existing staff.
5. High workload and pressure: this is another major problem faced by the domestics and domestic supervisors in both the *In-house case* and the *PFI case*. The cleaning frequencies have been enormously increased due to the high priority given to the control of HAI in domestic services. This has added a lot of pressure to staff and thus has resulted in time-scale difficulties (refer

to section 8.4.1.2). This has also resulted in high stress levels and to high levels of sickness absenteeism.

6. Rewards and recognition: The *In-house case* appears to have many motivational schemes for domestics. As few of the domestic managers asserted:

"If staff meets the standards we have small refreshment sessions to encourage them. We also personally thank them or put articles in the team briefs thanking them. "

"Anytime we get compliments from the patients, we forward it to the relevant domestics"

"Last year one of our staff members received an award for the best support worker of the year in Scotland. She was nominated by the ward sisters. It boosted the morale of all our domestics"

However, the situation was completely different in the *PFI case* in terms of rewards and recognition. Most of the domestics believed that their services are not valued and recognised by the PFI contractor.

On several occasions, in the *In-house case*, the level of monitoring and supervision has fallen due to the shortfall in the number of domestics; with supervisors having to cover domestic tasks or spend time arranging staff to cover the duties. In the *PFI case*, however, the PFI contractor has taken steps to fill the staff shortages through a staff bank. A staff bank is an agency where the PFI contractor can hire staff, immediately, on a temporary basis. There are disadvantages in this as well, predominantly due to lack of training of staff.

The lack of equipment and materials was another difficulty faced by the two cases. For example, not having sufficient cleaning mops create problems during peak hours in the hospitals. As revealed by the two ICT members from the *PFI case*, there is a deficiency of appropriate equipment and materials in their domestic services.

In the *In-house case*, budget limitations also appear to be a challenge. As many of the interviewees from the *In-house case* highlighted, there is only a limited sum of money available for them to carry out practices.

8.4.1.2   Time-scale difficulties

Nearly 58% of the interviewees (see Table 8.7) identified time-scale difficulties as another issue in achieving the required levels of performance in domestic services. It was apparent that, cleaning frequencies in both cases are in line with, or above, minimum national recommendations (e.g. SCOTMEG frequencies – refer to sections 5.3.4, 5.3.5 and 5.3.6). However, it was revealed that the actual staffing hours spent on cleaning fall below planned levels in some wards when staff shortages occur. As a result actual monitoring and supervision hours also seemed to be falling below the planned levels. The time-scale difficulties have become more apparent, especially after recent and increased attention focused on the need for better control of HAI, e.g. high frequencies of cleaning. Further, with the prevailing difficulties in terms of budget limitations (refer to section 8.4.1.1), achieving the required levels of frequencies has become even more difficult. These shortfalls raise concerns that the two cases are not able to perform tasks to the required quality.

8.4.1.3   Lack of training and education

It was apparent during the case study interviews that the lack of training and education also causes difficulties in domestic services. This has also resulted in staff shortages. The issue of lack of training and education has been discussed in section 7.3.2.

8.4.1.4   Difficulties relating to guidance documents

Having guidance documents alone, without effectively 'marketing' them among the professionals and staff, would fail to deliver their main objectives. It needs to be supported by comprehensive implementation arrangements such as: ensuring easy accessibility and making sure that everybody understands its contents.

The guidance documents in both case studies are well distributed among the staff or easily accessible (refer to sections 5.3.5, 5.3.6 and 5.3.7). However, some interviewees from both case studies noted that the level of staff understanding of policies and guidelines is very low. Two main reasons for this are frequent inflow of new staff and continuous changes to staff rotas.

According to some of the interviewees from the *In-house case*, practical difficulties are encountered frequently when adhering to the guidance documents. The practical difficulties mostly relate to cleaning methods, while some of them relate to the domestic structure, e.g. impossible to implement with the available resources. One of the domestic supervisors from the *In-house case* stated that they face difficulties in terms of identifying exact cleaning responsibilities. As he explained:

"There are some grey areas ….. It is basically regarding cleaning responsibilities. We cover most of the cleaning duties but still we are not convinced that we should be doing some of these"

8.4.1.5 Division of work between staff

Division of work between staff was a major problem in the *PFI case*. Due to the fact that the domestic service is contracted-out (handled by a PFI contractor), the clinical teams in the wards treat the domestics as 'externals'; thus they seem to be separated from the rest of the ward team. As the findings suggest, the most common point of dispute between the domestics and the nurses occur due to the confusion on 'where their duties begin and end'.

8.4.1.6 Built environment constraints

Sufficient space for movement and handling of patients, evenness of surfaces to reduce dust accumulation, easy to clean materials, and furniture and equipment are essential in terms of control of HAI rather than the physical appearance of a hospital. During the design and construction stages, the design team's (i.e. architects, consultants and engineers) responsibility is to create an environment which is easy to clean and pleasant. Also, it is the domestic teams' responsibility to maintain the built environment in order to provide a visibly clean and safe environment. However, as some of the interviewees from the *In-house case* noted, the domestics sometimes face difficulties in achieving this due to the following reasons:

1. Lack of storage
2. Lack of space in wards

8.4.1.7   Lack of ICT's involvement

As repeatedly mentioned, mainly in Chapter 6, it is apparent that there is a clear rift between the domestic team and the ICT in the *PFI case*, and thus has resulted in poor performance of work practices.

8.4.2   Critical issues of performance in the control of HAI in domestic services – questionnaire survey findings

NHS is very complex and it is very sensitive. For instance, one change in the political agenda could affect the complex structure of the NHS. Similarly, a single issue in a service could result in an array of erroneous outcomes in the NHS. Improving the quality of the services, therefore, could only be done if such critical issues that inhibit its performance levels are identified and well addressed. Failing to do so would not only result in poor performance but, would also create a poor public perception.

Sections 4.4 and 8.4.1 of the thesis attempted to identify some issues surrounding the area of control of HAI in domestic services (and FM services as a whole). The idea of this section is to identify and document the main/critical issues that affect levels of performance in the control of HAI in domestic services. This was achieved using a questionnaire survey approach.

The above was examined using research question VIII of the study (see Table 1.2):

▪   What are the critical issues that affect the level of performance in the control of HAI in domestic services?

As identified in Chapter 6, contracting-out services could lead to a list of issues as follows:

▪   Poor financial and management information which is often not shared due to confidentiality of information
▪   Lack of flexibility in contracts
▪   Lack of trust and monitoring, leading to a negative impact on performance
▪   Difficulties of imposing sanctions
▪   Separation of cleaning services from the rest of the healthcare team

▪ Damage to the public sector ethos

▪ Problems of health and safety, including training to do with the control of HAI

According to Davies (2005), contracting-out is the biggest cause of falling standards in domestic services. As he notes:

"The contract culture atomises functions within a hospital and contributes to the breakdown of a team-based approach that unifies clinical and non-clinical staff, thereby damaging flexibility and overall effectiveness"

UNISON (2005), Britain's largest trade union, has called for more domestics to be employed in the NHS to help prevent the falling standards of domestic services. They point to the decreasing numbers of cleaning staff as a possible cause of a decline in cleanliness:

"The number of hospital cleaners has halved in the last 20 years and we have huge vacancy rates across the NHS… the bottom line is we need a recruitment drive to bring more cleaners into the NHS"

Lack of clarity in policies detailing working relationships among departmental staff is another cause of poor performance in domestic services (NHS Estates, 2004b). Not only this, but as identified in section 5.3.7, the lack of clarity of roles and responsibilities can also impact on performance. It can lead to confusion as to the cleaning responsibilities of domestics and nurses, and some tasks not being covered appropriately. The review of levels of cleanliness identifies this as a particular issue in relation to responsibility for cleaning clinical equipment.

According to the Scottish Executive Health Department (2003a), a lack of a formal monitoring system can lead to ad hoc arrangements, leading to risks such as incomplete coverage, variation in standards and results not being collated, reviewed and acted on. If hospitals do not monitor both inputs and outputs, they will not have the information to amend cleaning plans as required to deal with lower inputs or poor outcomes. This was also apparent from an audit carried out by the Auditor General for Scotland (2003) as well. As the audit findings revealed, the eight hospitals in Scotland, where standards of cleanliness fell

below acceptable levels of cleanliness, there were also shortfalls in the monitoring arrangements in place. The Department of Human Services - Australia (2005b) has also highlighted some crucial issues relating to poor performance levels in domestic services. It includes lack of flexibility in standards, lack of staff training and lack of monitoring and supervision.

Taking all the above into consideration, eleven issues that obstructs performance levels in domestic services were identified. These are (refer to Appendix 3):

- Budgetary limitations
- Lack of equipment and materials for cleaning
- Low level of involvement of ICT members in domestic services
- High level of staff shortages (e.g. Sickness absence and high turnover)
- Lack of appropriate performance indicators/measures
- Lack of clarity of roles and responsibilities
- Lack of training and education
- Practical difficulties relating to guidance documents
- Time constraints
- Contracting-out services
- Inappropriate design (in terms of functionality and spatial arrangements) of hospitals

In the questionnaire, the respondent's views were sought on the levels of criticality of the aforementioned issues, in order to address the research question VIII of the study. Information on this was sought from both domestic managers and ICT members.

Table 8.8 presents the overall mean scores and the ranking of the respondents' views (according to the region) on the criticality of issues to do with performance in the control of HAI.

Table 8.8:   Critical issues of performance

Criticality	Issues of performance	Mode	Overall mean score	Rank	England	Rank	Scotland	Rank	Mann-Whitney U Asymp. Sig
Critical	Budgetary limitations	1	2.14	1	2.02	1	2.29	1	.066
Critical	Staff shortages	1	2.27	2	2.11	2	2.50	2	.003
Critical	Time constraints	2	2.42	3	2.30	3	2.58	3	.066
Fairly critical	Lack of appropriate performance indicators	3	3.04	4	2.84	5	3.31	6	.000*
Fairly critical	Lack of training and education	4	3.05	5	2.82	4	3.37	8	.000*
Fairly critical	Contracting-out services	4	3.17	6	3.08	7	3.29	5	.072
Fairly critical	Inappropriate design	4	3.20	7	3.12	8	3.32	7	.055
Fairly critical	Lack of clarity of roles and responsibilities	4	3.20	7	3.06	6	3.38	9	.090
Fairly critical	Low level of involvement of ICT	4	3.44	9	3.56	9	2.99	4	.088
Not critical	Practical difficulties relating to guidance documents	4	4.68	10	4.59	10	4.73	10	.080
Not critical	Lack of equipment and materials	5	4.76	11	4.70	11	4.84	11	.060

Critical issues of performance

*The mean difference is significant at the 0.05 level

Meaning of scale (the level of criticality of the issues):

1 (**Very critical** – the effect of the issue on performance is very high effect on performance, thus, needs to be addressed very urgently)

2 (**Critical** – the effect of the issue on performance is high, thus, needs to be addressed urgently)

3 (**Fairly Critical** – the issue only has a moderate effect on performance, thus, needs to be addressed whenever possible)

4 (**Not critical** – the issue exists in the domestic service but its effect on performance is negligible compared to other issues)

5 (**Not applicable** – the issue does not exist in the domestic service at all)

A close observation of Table 8.8 shows that, of the eleven issues, only three, i.e. budgetary limitations, staff shortages and time constraints, are 'critical' based on the overall mean score being approximately 2. Of these, the first two issues can also be interpreted as very critical issues of performance in domestic services as they have a mode value of 1. There is an increasing pressure on the NHS for domestic services to adhere to the requirements of the control of HAI, with no provision for extra budget. With the salary bill by far the largest in the recurrent domestic services budget, it is an obvious target for the domestic managers to aim at reducing costs by cutting down staff wages or hiring domestics on a temporary/part-time basis rather than taking them as permanent staff. This is perhaps a reason for the high level of staff turnover occurs. Therefore it is obvious that these two interrelated issues, i.e. budget constraints and staff shortages, are prevalent in the NHS. Audits carried out throughout the UK in recent years (National Audit Office, 2003 and 2004; Auditor General for Scotland 2000 and 2003, Audit General Wales, 2003) revealed similar results. However, the National Health plan (2003) claims otherwise. According to them 'Extra funds have been made available that were intended to help Trusts meet specific NHS Plan targets… (also) a huge effort has been put into filling staff vacancies'.

Out of the remaining eight issues, two fall within the category of 'not critical' as their mean values are between 4 (not critical) and 5 (not applicable). These two are practical difficulties relating to guidance documents and lack of equipment and materials.

Further analysis shows that the aforementioned results are fairly similar even when the data are categorised according to regions (see Table 8.8) or according to the job roles of the respondents (see Table 8.9). For example, in both England and Scotland the budget limitations, staff shortages and time constraints remain as the three critical issues whilst the practical difficulties relating to guidance documents and lack of equipment and materials continue to be the least critical issues in terms of performance in domestic services. In terms of job role of the respondents, the level of criticality of the issues also appeared to be similar, with only some slight deviations.

Table 8.9:   Critical issues of performance vs. job role

Criticality	Issues of performance	Mode	Overall mean score	FM	Rank	ICT	Rank	Mann-Whitney U Asymp. Sig
Critical	Budgetary limitations	1	2.14	2.13	1	2.14	1	.945
Critical	Staff shortages	1	2.27	2.25	2	2.30	2	.418
Critical	Time constraints	2	2.42	2.27	3	2.59	3	.007*
Fairly critical	Lack of appropriate performance indicators	3	3.04	3.20	5	2.86	4	.001*
Fairly critical	Lack of training and education	4	3.05	3.16	4	2.93	5	.092
Fairly critical	Contracting-out services	4	3.17	3.24	7	3.09	7	.192
Fairly critical	Lack of clarity of roles and responsibilities	4	3.20	3.31	8	3.07	6	.063
Fairly critical	Inappropriate design	4	3.20	3.20	6	3.21	8	.994
Fairly critical	Low level of involvement of ICT	4	3.44	3.53	9	3.35	9	.253
Not critical	Practical difficulties relating to guidance documents	4	4.68	4.67	10	4.69	11	.832
Not critical	Lack of equipment and materials	5	4.76	4.88	11	4.62	10	.270

Critical Issues of performance

*The mean difference is significant at the 0.05 level

Meaning of scale (the level of criticality of the issues):

1 (**Very critical** – the issue has a very high effect on performance, thus, needs to be addressed very urgently)

2 (**Critical** – the issue has a high effect on performance, thus, needs to be addressed urgently)

3 (**Fairly Critical** – the issue only has a moderate effect on performance, thus, needs to be addressed whenever possible)

4 (**Not critical** – the issue exists in the domestic service but its effect on performance is negligible compared to other issues)

5 (**Not applicable** – the issue does not exist in the domestic service at all)

The mean values of the issues were then compared with the type of domestic service provision (see Table 8.9). This is to verify whether the level of criticality of issues differs according to the type of domestic service provision. This was examined using the test of null hypothesis.

Null hypothesis H_0 – there is no difference in the level of criticality of performance issues, according to the type of domestic service provision

Table 8.10 does not show any significant differences with the results discussed above. Thus, it can be concluded that the criticality of the issues of performance do not change according to their service provision. The results of the ANOVA test for a k-independent sample (i.e. Kruskal-Wallis test) further support this at the 5% significance level (see Table 8.10), thus the null hypothesis, in relation to this, is accepted. There is only one exception. According to the test results, the p value for the lack of clarity of roles and responsibilities appears to be significant at the 5% significant level. Table 8.11 shows a non-parametric Mann-Whitney U test of two independent samples. It suggests that a statistically significant difference in the lack of clarity of roles and responsibilities exists mainly due to the matters related to the PFI service. As discussed in section 3.7.6.3, the organisational structure of the PFI is complex due to the fact that there is an array of parties involved and accountable in a PFI partnership, ranging from the client, client's representative, PFI consortium to the PFI contractor. Therefore, there may be a great need for PFI domestic service provisions to define roles and responsibilities clearly and explicitly, in order to avoid any confusion and any issues relating to the involvement and integration of the key players.

In essence, irrespective of the minor variations discussed above, overall, it is understood that the there are three critical issues of performance in domestic services in terms of control of HAI. They are:

1. Budgetary limitations
2. Staff shortages
3. Time constraints

Of the above, undoubtedly, the first appears to be the most crucial issue of all.

Table 8.10: Critical issues of performance according to the type of domestic service provision

PM approaches	Overall mean score	In-house	Rank	Balanced	Rank	Out-sourced	Rank	PFI	Rank	Kruskal-Wallis Sig. p
Budgetary limitations	2.14	2.13	1	2.00	1	2.23	1	2.17	1	.824
Staff shortages	2.27	2.21	2	2.19	2	2.37	3	2.58	3	.104
Time constraints	2.42	2.46	3	2.31	3	2.36	2	2.42	2	.068
Lack of appropriate performance indicators	3.04	3.23	4	2.83	5	2.76	4	2.69	4	.203
Lack of training and education	3.05	3.32	6	2.37	4	2.76	4	2.86	6	.051
Contracting-out services	3.17	3.29	5	3.06	7	2.91	6	3.06	7	.063
Inappropriate design	3.20	3.35	7	2.89	6	3.00	8	3.14	8	.080
Lack of clarity of roles and responsibilities	3.20	3.38	8	3.09	9	2.92	7	2.69	4	.024*
Low level of involvement of ICT	3.44	3.60	9	3.06	7	3.32	9	3.28	9	.073
Practical difficulties relating to guidance documents	4.68	4.77	10	4.43	10	4.52	11	4.75	11	.093
Lack of equipment and materials	4.76	4.51	11	4.46	11	4.48	10	4.64	10	.812

Critical issues of performance

*The mean difference is significant at the 0.05 level

Meaning of scale (level of criticality of the performance issues): **1** (Very critical), **2** (Critical), **3** (Fairly critical), **4** (Not critical), **5** (Not Applicable)

Table 8.11: Group differences test using Mann-Whitney U test of two independent samples

PM approaches	In-house/ Balanced	In-house/ Outsourced	In-house/ PFI	Balanced/ outsourced	Balanced/ PFI	Outsourced/ PFI
Lack of clarity of roles and responsibilities	.104	.102	.003*	.479	.042*	.033*

*The mean difference is significant at the 0.05 level

8.5   PERFORMANCE MANAGEMENT IN THE CONTROL OF HAI –
DATA SYNTHESIS

It is necessary for organisations to measure and manage their performance in order to know where they stand in terms of performance levels, to compare the results with past performance levels or with others and to set goals for future improvements.

As mentioned throughout the previous sections of this thesis, the importance of domestic services within the NHS should not be underestimated. Standards of cleanliness can vary enormously and have a direct influence on the quality of care received by the patients (NHS Estates, 2001b). Therefore, PM should be an integral part of domestic service provision and best carried out with the full involvement of service providers. Robust approaches of PM should exist in domestic services across the NHS covering all aspects of cleaning and the control of HAI – from the activities of staff carrying out day-to-day cleaning tasks to the strategic responsibilities of managers engaged in the longer term planning of the service (Auditor General for Scotland, 2003).

From the case study findings (refer to section 8.3.1), it was identified that several PM approaches, most of which are related to performance audits, are in place in the two cases (i.e. *In-house case* and *PFI case*). This may be due to the fact that audits have been the prime methodology for the assessment of service costs across departments and functions within Facilities for some years with national compulsory audit systems (Heavisides and Price, 2001). Even though, in this study, audits are taken as PM approaches, in reality; it is only part of the PM cycle. The latter not only includes performance audits, but also performance measurement and performance control. According to the American Heritage Dictionary of the English Language (2004), 'audit' is an unbiased examination and evaluation of the financial accounts of an organisation. Nowadays, performance audits do not only relate to financial accounts, but also to so many other functions in an organisation. Wikipedia (2006a) gives a comprehensive definition of 'audits'. It is an independent review and examination of records and activities to assess the adequacy of system controls, to ensure compliance with

established policies and operational procedures, and to recommend necessary changes in controls, policies, or procedures. It can be done internally (by employees of the organisation) or externally (by an outside firm). In this study context, internal audits (carried out by the domestic services and ICC) appear to dominate the PM approaches (refer to section 8.3.2). External audits such as environmental audits and audits by the National Audit Office also seem to be relatively common. These approaches, although essential for domestic services to ascertain snapshot reviews of the service, and, at times, cost and output positions, are not geared towards measuring efficiency, efficacy and economy with respect to service provision. Further, it does not assist in continuous improvement. Thus, there is a need for domestic services to use rather more robust PM approaches that cover most aspects of PM.

BSC and EFQM are leading examples of frameworks that appear to deliver continuous improvement. Although different, they share many common characteristics such as:

- They encourage whole-organisation thinking and management (Adair et al, 2003)
- They highlight the importance of effective stakeholder management, stakeholder's integration, staff involvement and continuous improvement (Atkinson et al , 1997)
- They clarify the links between strategy, processes, and outcomes (Amaratunga et al , 2000); and, most importantly,
- They focus strongly on measuring and managing performance results

The Facilities Management 'Good Practice Guide' published by the NHS Estates (2001b), which has been designed to enable domestic services to assess their current performance in comparison with others, is integrated with the principles of EFQM. This is based on the premise that excellent results are achieved through the enablers of commitment, effective leadership, clear and realistic policies, good management of people and finance and the understanding and management of well-defined processes. Also as discussed in section 8.3, the performance assessment framework developed by the NHS follows the principles of BSC. According to NHS Estates (1999), the use of the balanced scorecard

allows organisations to get a more rounded view of performance by identifying different key elements of performance and understanding how changes in them may have implications for others. However, even though BSC and EFQM are thought to be the most used approaches in organisations in general, surprisingly, they are the two least used approaches in domestic services (refer to section 8.3.2).

The overall research findings suggest that the use of performance indicators and measures is very limited in domestic services. Financial performance is considered the prime performance indicator. Resources (including staff) are the other main indicator used by the domestic services in the control of HAI. An example of a performance measure used by the *In-house case* is also given as follows (see Table 8.12):

Table 8.12:   An example of a performance measure

Description	Performance measure	Target	Signed by	Action plan
Beds are effectively cleaned and prepared for use with fresh clean linen	yes/no/not applicable	95%	ward sister/ auditor	(target and time scale)

An absence of a robust PM approach could be the main reason for the lack a comprehensive set of performance indicators and measures in domestic services. PM approaches like BSC or EFQM enable the domestic managers to measure the effectiveness of all aspects of their working practices, and of the results they achieve from a number of different perspectives (e.g. financial and non-financial). What it provides is a basis for identifying strengths and improvement opportunities leading to focused and prioritised planning. It also stimulates continuous improvement both in what the domestic services do and in the results they achieve. Rather than having a plethora of frequent audits that mostly do snapshot reviews of the service, BSC or EFQM bring together the key indicators and measures of managing performance. If these are not properly identified and measured, the domestic service, without a doubt, could face with many challenges.

8.6   CURRENT SITUATION WITH REGARD TO THE CONTROL OF HAI IN DOMESTIC SERVICES – OVERALL FINDINGS

The aforementioned discussions laid out in Chapter 8 together with findings presented in Chapters 5, 6 and 7, overall, attempted to address fourth and fifth objectives of the research study. The overall findings relating to these two objectives can be encapsulated as shown in Figure 8.2. Figure 8.2 is an extended version of the conceptual framework, which was developed during the first stage of the research study (see Figure 4.2). The overall findings presented in Figure 8.2 depict the central focus of the study, significant areas taken into consideration, further descriptions of the significant areas, key issues identified during the study and finally some success factors, which can promote effective control of HAI in domestic services (FM services as a whole).

Figure 8.2:   A summary of overall findings of the research study

One of the main findings of the research, as discussed in Chapters 5, 6 and 7, was that the type of domestic service plays a major role in the control of HAI in domestic services. A domestic service which is operated by an internal team seems to have more established practices and more team coordination than a contracted-out domestic service (i.e. outsourced or PFI contracts). As some of the findings of the research suggest, the following can be considered as the reasons for having comparatively better practices in In-house services:

- An In-house service delegates more responsibilities to the domestic team, this allows the domestic team to take more control and have more influence in terms of decision-making and taking corrective actions

- The domestic teams are more motivated as they feel as though they are part of the wider hospital team.

- Being an In-house service allows close integration with the clinical teams.

- Being an In-house service offers less hassle for the NHS Trust to get the job done without going through the complex routine of contractual requirements

- Better communication between the domestic and clinical teams.

- The domestic service will understand and adhere to the national requirements, whereas a contracted-out service (e.g. PFI or outsourced service) focuses on the contractual requirements.

- The domestic service will understand the importance of the clinical team's involvement in the control of HAI.

- The domestic service will value the service provided by the clinical teams.

However, it was apparent that contracted-out domestic services are better-resourced compared to in-house services. Besides, a contracted-out service also can provide a better service due to the following reasons:

- An array of parties are involved: for example, in a PFI contract, the client (NHS Trust), a PFI consortium and the PFI contractor are all involved in managing, overseeing or operating the service.

- The service is provided by a specialised contractor: most of the time, a contractor (outsourced or PFI) will be chosen based on their previous performance and their speciality.

- Prompt attention to client's requirements: due to contractual obligations the contractor is bound to respond promptly to the client's needs.

- Service Level agreements: the contractor is well aware of what they have to accomplish, since these agreements are stipulated at the inception of the contract.

- Penalties for performance defects: Most of the contractors are penalised if there are any faults in their performance levels, thus, the contractor is compelled to rectify any issues speedily.

Therefore, it is apparent that both In-house and contracted-out services have their own pros and cons. Besides, even if In-house services appear to be better than contracted-out services, it is a known fact that the latter exist, and given the increasing number of contracted-out services such as PFI contracts, it is fair to say that 'they are here to stay' (refer to section 6.5.3). Thus, it is important to establish appropriate and effective processes in order to enhance the control of HAI in domestic services, irrespective of the type of domestic service provision.

8.7   SUMMARY

Different definitions of Performance Management (PM) have been reviewed and presented in this chapter. In addition, different PM approaches in-use have been reviewed and documented. A summary of the findings presented in Chapter 8 is as follows:

- According to the case studies and questionnaire survey findings, the three most used PM approaches in domestic services are; audits by the domestic service, audits by the Infection Control Teams (ICT) and environmental audits.

- The main critical issues of that affect performance in domestic services are; resource constraints (especially budget limitations and staff shortages), time scale difficulties and lack of effective training and education.

- Different types of domestic services are equally affected by the critical issues that impact on performance.

- There is significant correlation between the frequency of use and effectiveness of performance management approaches.

While the domestic managers, nationally, would agree that they are striving to improve their services in hospitals; standards of performance remain extremely variable, mostly due to resource limitations. Besides, unavailability of an overall yardstick (i.e. benchmark) to compare the variations in performance standards exacerbates the problem. A new mindset is, therefore, needed that moves away from the traditional one-sided 'cost' or 'snapshot' audits to a new multi-faceted approach of performance management.

CHAPTER 9 : THE DEVELOPMENT OF A PERFORMANCE MANAGEMENT FRAMEWORK FOR THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS

9.1 INTRODUCTION

The main idea of Chapter 9 is to present a Performance Management Framework (PMF) for the control of HAI in domestic services. This addresses the 6th and fourth stage of the research study. The findings collected from the previous stages of the research study were taken into consideration in the development of the framework. Due cognisance was also given to issues such as performance goals, Key Performance Indicators (KPIs) and performance measures for the control of HAI in domestic services. The chapter also discusses the results of the structured interviews carried out to refine the PMF. Overall, Chapter 9 attempts to address objective 6 and research question IX of the study (refer to Table 1.2).

9.2 ASSESSING THE NEED FOR A PERFORMANCE MANAGEMENT FRAMEWORK

The NHS needs objective ways to measure how well they are doing, to plan appropriate action and to monitor changes over time. Performance results, which can be used for benchmarking and for comparison across different hospitals, can assist the NHS to improve its practices by identifying best practices. Good management of performance can also ensure that the NHS is focusing on key priorities and that areas of poor performance are questioned.

Even though there is little empirical evidence, it was identified from the research findings that hospitals that have the highest standards of cleanliness have proportionally fewer instances of HAI. Raising awareness is, of course, one of the first hurdles in the struggle to reduce incidents of HAI and to improve performance in the said area. This must be addressed at all levels before HAI can be significantly reduced and controlled. However, variations in the quality and costs of domestic services, within hospitals in the NHS, have also been attributed to a number of critical issues in domestic services (refer to section 8.4). Research evidence from this study suggests that planned frequency of cleaning is

sometimes below the baseline established by SCOTMEG. Some hospitals are experiencing difficulties in keeping to these levels because of staff absence and sickness, and also high staff turnover.

While frequency of cleaning can be measured, assessing the quality of such work is more problematic. As the effectiveness of the overall domestic services is the issue in question, this represents a large problem. Currently, there is a lack of clear indicators upon which comparisons of effective domestic practices can be made (refer to section 8.5).

In recent years, many guidelines and reports, published by the NHS (both England and Scotland), have emphasised the importance of a Performance Management Framework in the control of HAI. The Scottish Health Plan (Scottish Executive Health Department, 2000), which has given priority to the setting and monitoring of national clinical standards for NHS in Scotland, has extended the remit of CSBS (presently known as QIS) to set standards for hospital services. The CSBS, therefore, had implemented a system for assessing performance throughout NHS in Scotland against the set hospital standards, and has put in place a feedback mechanism. This system is widely known as the quality assurance and accreditation system. However, it focuses only on clinical services.

The Glennie report (Scottish Executive Health Department, 2001b), on 'decontamination of medical devices', has specified the importance of developing an 'action plan' to ensure that appropriate arrangements are in place to oversee and improve, where necessary, decontamination processes. According to the report, the 'action plan' should undertake an audit of decontamination practices to address any issues of potential risk to staff and/or patients and make an assessment of the age and condition of decontamination facilities and equipment in both central and local decontamination units. Further, the report emphasises the need for a 'fast track review' process. This should allow the identification of deficiencies in processes in relation to key standards or requirements and to define measures to achieve compliance with key standards within a defined time scale.

The Carey Group report (Scottish Executive Health Department, 2001a) has also underlined the need for a comprehensive framework for managing risks in terms of HAI. Further, it emphasises the importance of a common approach to promote an organisational culture, which actively seeks openness and sharing of knowledge on managing risk and performance.

The HAI Task Force groups are a major step towards strategic control of HAI, which fits with wider societal values, and expectations in the NHS. According to the Chief Medical Officer's letter (September, 2003 – Scottish Executive Health Department, 2003b), one of these groups has also been appointed to administer the development of a performance management framework in order to assess the process of control of HAI.

The Department of Health, UK (2001b) has emphasised the need to produce a performance framework (especially for clinical services) for two reasons;

- **Continual service improvement** – to help clinicians and managers identify scope for improvement, and demonstrate achievement
- **Accountability** – NHS is accountable to Parliament and the public. A key element of accountability is to clarify the outcomes and outputs achieved for the resources invested

Having considered the above, it is evident that PM is evolving as a significant area in the NHS (refer to section 4.5). However, during the informal interviews and case studies carried out as part of this research it was apparent that there is uncertainty over the meaning and implications of PM in domestic services. Further, there was only a vague understanding of the wider dimensions of performance. The domestic managers from the *In-house case* and *PFI case* did not fully explain the processes and terminology/ies associated with their performance agenda. As a consequence, the performance discourse lacked clarity. Performance Management was envisaged by management merely as auditing, monitoring and supervision. The lack of a feedback mechanism to provide information performance results for the domestics, supervisors and managers (both domestic and infection control teams) was another drawback. The overall findings, therefore, suggested two key issues. Firstly, within the

performance context, issues relating to the control of HAI in domestic services cannot be seen in isolation; and secondly, an absence of a framework for understating how performance is operationalised within domestic services.

The main findings of the initial stages of the research that are used to assess the need for a Performance Management Framework (PMF), are outlined below (see figure 8.2):

1. **Strategies are crucial in designing and deploying an effective PMF:** A clear system of accountability, clear organisational structure that denotes the links between the key players, clear guidance documents and effective resource deployment are all necessary parts of a successful PMF. Clear, consistent and visible involvement of managers (domestic managers and ICT members) is also a necessary part of it. Domestic managers and ICT members should be actively involved in planning, monitoring and supervision, taking corrective actions and changing practices, whilst the staff (domestics and nurses) should be involved in carrying out practices at floor level. This way, at least the senior domestic managers and senior ICT managers should not only articulate the goals of control of HAI in domestic services, but also, should be involved in the dissemination of performance expectations and results throughout the organisation. At present, this is what is missing in the domestic services (refer to Chapter 8).

2. **Accountability must be clearly assigned and well understood:** Some problems exist in terms of defining accountability in the domestic service. Therefore, there is a need to ensure that all managers and staff understand their responsibilities in achieving the organisational goals.

3. **Effective integration is key to successful performance management:** One of the main issues in the control of HAI in domestic services is the low level of integration between the key players involved. This needs to be improved, and it is vital to develop and deploy a PMF. Thus, all parties should clearly understand how 'successful results in performance' is defined and their roles in achieving that success.

4. **Staff motivation should be linked to performance management:** High staff turnover and sickness absence appeared to be obstructing many of the

effective practices of domestic services. Rewards, recognition, and job security are needed to retain staff in the service as well as to ensure their daily attendance. Therefore, linking financial and non-financial incentives directly to performance could send a clear message to the staff as to what is important.

5. **PM should be used as a positive approach:** It was understood from the case studies that, in the *PFI case*, the PFI contractor is penalised if he underperforms. This penalty system has three main categories, starting from category 1 (loss of 1 point in each and every failure), category 2 (loss of 2 points) to category 3 (loss of 3 points). The three categories have a financial penalty and the penalty rate is charged through 'performance failure point unit value (PFP)'; the number of points lost is multiplied by the PFP value to get the financial value of the penalty (refer to Appendix 9 for one of the interview transcriptions on this penalty system). Due to this penalty system, the PFI contractor is bound to achieve the required levels of performance within a specified period of time, which could eventually avoid continuous improvement and innovation. A successful PM criteria should be a positive approach, which can encourage the domestic parties to identify and learn the best practices in order to continually improve their service.

6. **Performance management does not mean just a compilation of data:** It was understood from Chapter 8 that most of the domestic services have only performance audits. Even if they have other performance management approaches, most of them do not use its results to, *per se*, manage performance. For example, the results are not even fed back to the staff and managers, which can eventually cause repetition of mistakes. The domestic managers should not collect performance data simply because it is available, or because having large amount of data proves that they work. Instead, they should choose performance measures that can help describe the overall performance of their service, and directions towards the required goals and accomplishments. The performance results should be shared openly with all the staff and patients.

7. **A framework is needed for performance management:** PM should be used as a means, but not as an end. It is well understood that the domestic services, at present, do not have a comprehensive framework to guide them

through the routine of performance management. The developed performance management framework should be clear and cohesive and it should be understood by all level of professionals and staff. It should support goals and the collection of results well. The said framework should be used as a balanced set of measures to benchmark their results with other hospitals/domestic services. These measures should also align with the goals and indicators at the national level. It should be approached as an iterative process in which continuous improvement is a critical and constant objective.

9.3 THE PROPOSED PERFORMANCE MANAGEMENT FRAMEWORK (PMF)

"A performance management framework is a way to link micro activities of managing individuals and groups to the macro issue of corporate objectives, with three steps: setting of clear objectives for individual employees derived from organisation's strategy; formal monitoring and review of progress towards meeting objectives; utilisation of outcomes of the review process to reinforce desired behaviour through differential rewards and/or to identify training and development needs"

Storey and Sisson (1993; as cited in Boston, Martin, Pallot and Walsh, 1996)

The proposed PMF will only focus on the control of HAI in domestic services. Its purpose is to allow domestic services to complete the full performance management cycle by adding appropriate indicators and measures that assess the performance of control of HAI in domestic services. The performance management framework developed is only a means, not an end. The framework could be further developed by hospitals/Boards/Trusts to include their service level requirements.

The significant areas considered in the PMF are as follows:

- Inputs, processes and outcomes of control of HAI in domestic services
- Performance goals
- Set of performance indicators
- Alignment of performance goals and indicators to the national level performance goals and indicators
- The performance management cycle

- Benchmarking

- Feedback loop to complete the performance management cycle

The PMF was first developed using the aforementioned areas and then was refined and validated using data collected from structured interviews (refer to section 3.9.2). The refined version of the PMF is presented in Figure 9.1 (refer to Appendix 10a and Appendix 10b for the draft version of the PMF) with some useful descriptions of the PMF (e.g. benefits, parties involved at relevant stages and certain limitations and issues worthy of consideration). Key Performance Indicators (KPI) and performance measures developed for the study are also included at the end of the PMF and its descriptions.
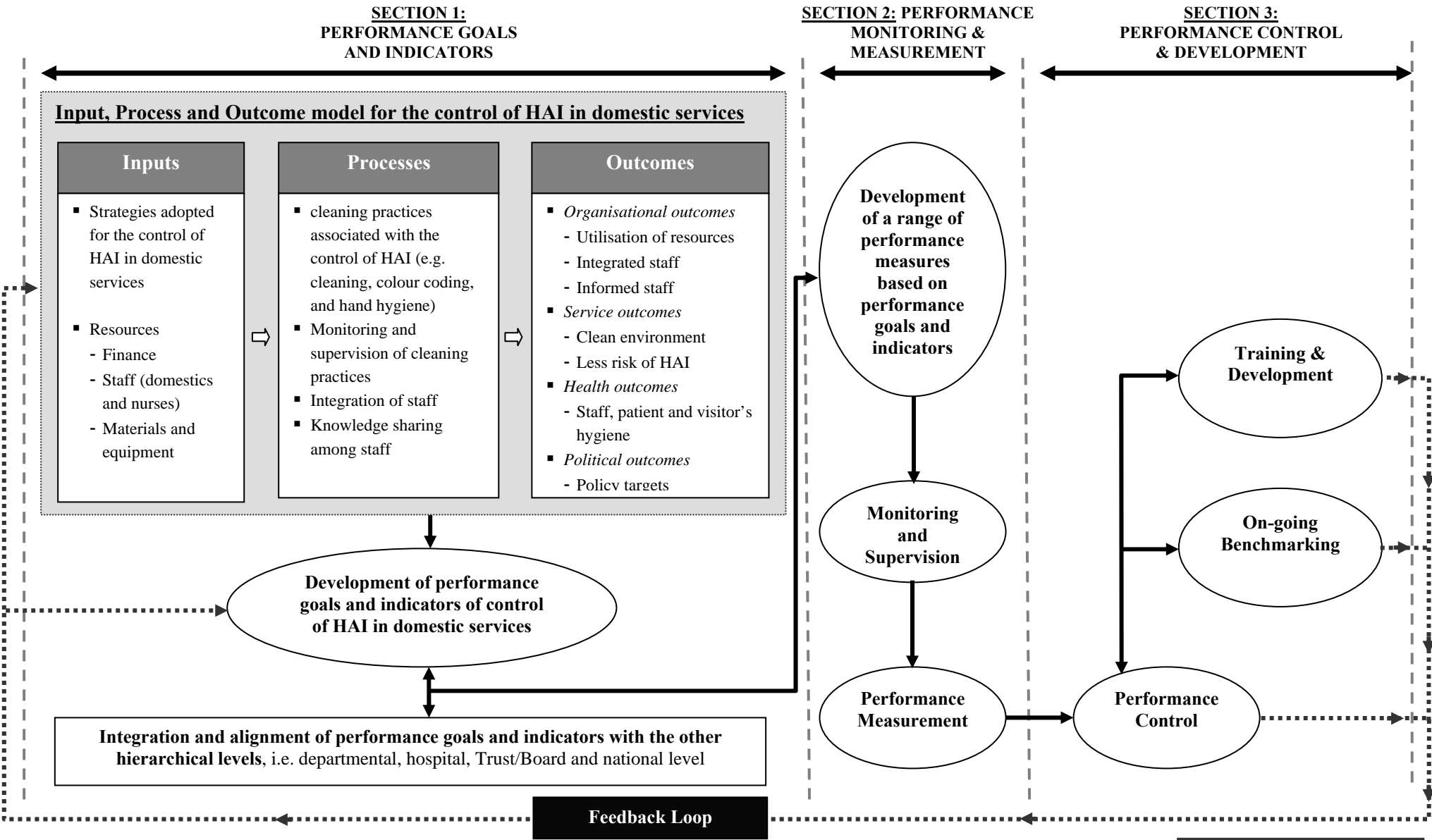
Figure 9.1:   A Performance Management Framework (PMF) for the control of HAI in domestic services

Introduction to the PMF: PMF is a process and not a stand-alone approach. It starts with the development of performance goals and indicators (section 1), this then leads to the setting up of performance measures to track the progress towards the predetermined goals (section 2). Finally, it assists to rectify any problems relating to the domestic service and also with improving the overall practice (section 3). During performance measurement the domestic services could either obtain numeric or categorical data. The idea of the PMF, therefore, is to turn these data into something meaningful and then linking the data directly to performance. Descriptions of the three sections of the PMF are given below. It is then followed by the set of goals, indicators and measures specifically developed for the control of HAI in domestic services.

SECTION 1: PERFORMANCE GOALS AND INDICATORS	
Choosing the right set of goals and indicators	The set of indicators chosen by the domestic service/ Trust should be large enough to provide a reasonably comprehensive idea of performance by conveying information about progress toward major performance goals. At the same time, the set of indicators must be small enough to be manageable for data retrieval purposes. If there are 'too many' indicators, it will not only be overly complicated but will also limit its use in decision-making. The selection of the 'right' indicators, without a doubt, is difficult. Therefore, assessing individual indicators against certain criteria (e.g. against the national standards of HAI) may help with choosing an appropriate indicator set. Glover and Kamis-Gould (1996) suggest the following criteria for good performance indicators: • Conceptual clarity • Clear link to an organisational goal • Operationally defined, reliable and valid measures • Measures derived wherever possible from available management information systems • Consisting of proportion and ratios rather than raw numbers • Desired direction for performance is clear • Indicators suitable for comparison (risk adjusted where necessary) • Sufficiently universal for comparison with other services • Decision rules for significant deviations from chance and for establishing high and low performance.
Parties involved	Mostly the domestic managers and healthcare managers, together with the ICT members, could carry out this process.
Limitations to avoid:	• As aforementioned the idea should not be to produce a comprehensive set of performance goals and indicators that cover everything in domestic services. It is impossible, but having too many goals and indicators risks obscuring where the real priorities lie. Achieving a number of targets in the priority areas (e.g. control of HAI) can create a mechanism which boosts further improvements at all levels of the domestic service. In this study, overall, few performance goals and indicators were chosen for the control of HAI in domestic services. • The goals and indicators were then refined/modified using the data collected from the structured interviews. • If the goals and indicators chosen are unrealistic, inappropriate or not the real priorities, it can lead to distraction from the day-to-day practices of domestic services. • The goals and indicators chosen should not be isolated from other departmental/hospital/Trust/national level targets. If it lacks consistency with the latter, the domestic service will be unable to benchmark its standards with the likes.

SECTION 2: PERFORMANCE MEASUREMENT

Setting up appropriate performance measures	Performance measurement is the second stage of the PMF which monitors and reports the domestic service's accomplishments, particularly progress towards the pre-established goals and indicators. It can be typically conducted by the domestic service itself or by other internal (e.g. Trust management teams/ICT) or external (e.g. National Audit Office) parties. During this 2nd stage, the main priority should be to develop a comprehensive performance measure set which can reflect the actual performance of domestic services. The measures should be credible and useful to the domestic managers and other healthcare managers and; clear and understandable to the staff and, at times, the public. This is one of the main challenges of PM as the selected measures should generally meet as many characteristics at a time as possible. A broad list of such characteristics is listed below (Harris and Nicholas (2002); Adair et al, 2003; NHS Estates, 2003a, Ballantine et al, 1998; Behn, 2003; Calkins, 2005): • Relevant – the measure logically and directly relates to the required purpose (measure the right thing) • Responsive – the measure accurately reflects changes in level of performance • Valid – the measure captures the information intended • Reliable – the measure provides accurate, consistent information over time • Cost-effective – the measure justifies the cost of collecting and maintaining the data • Useful – the measure provides information of value to decision makers • Accessible – the measure provides periodic information about results • Comparable – the measure can compare current performance with performance in the past or against others' performance • Compatible – the measure integrates with financial and operational systems • Clear – the measure presents information in a way that different people can understand it
What to measure?	Regardless of the size of the hospital or number of staff involved in carrying out domestic practices, the domestic service should precisely understand the performance measures they need to use. This includes: • Financial considerations • Domestic operations (only the control of HAI practices in the case of this study) • Staff satisfaction • Patient satisfaction • Other stakeholder satisfaction
Performance monitoring	The purpose of performance monitoring is a routine management methodology. This is widely used in the NHS as an ad hoc activity instituted for the purpose of an internal/external performance audit. Being part of the PMF, performance monitoring can be used to examine what is happening in the domestic services; how do staff carry out practices? Are there any deficiencies? Is sufficient number of staff available. It can play a facilitating role in generating effective communication and interaction between parties involved in the domestic service, which is essential for iterative problem solving.
Performance monitoring tools	These monitoring activities sometimes can be done using tools such as checklists, matrices and computer-aided tools. The use of checklists is a common practice in domestic services. Thus, the parties who are involved in performance monitoring can continue this established practice for performance monitoring. Performance monitoring needs to take place against the number of clearly defined goals, indicators and measures developed at the previous stages of the PMF.
Performance Measurement	Data are collected and then analysed for each performance measure to determine if and how well performance goals are being met. This can be a tedious and a time-consuming process. And at the same time it can be challenging. Using a computer-aided tool or a scoring system will ease this

	process. Considering the types of data to be collected, the domestic services could use any number of mechanisms, at both regular intervals and on an on-going basis. Through it all, the domestic managers and staff should remain focused on the questions they are trying to answer (refer to the performance measures developed). This focus makes data collection a dynamic and vital, rather than tedious and never-ending exercise.
Reporting performance data	Data analysis in performance measurement is the process of converting raw data into performance information and knowledge. One of the major weaknesses in the current approaches used by the domestic services is the lack of using the performance data to 'make sense'. The performance data should be processed and synthesised so that the domestic services can make informed assumptions and generalisations about their levels of performance. They can then compare the results with their performance requirements to identify any variances, and determine the corrective actions, if needed. The latter will be discussed in detail in the next section, section 3. Many tools can be used for performance analysis. These include statistical analysis, charts, forecasting and trend analysis. Considering the type of performance measures developed for this study, the performance data collected can be displayed in a wide variety of ways, including graphical presentations such as bar charts or pie charts. Use of spreadsheets and databases to organise and categorise the performance data is also possible.
Establishing accountability for performance	The domestic services need to establish who is responsible for performance measurements. Someone must be responsible for getting the information needed and for reporting it in a timely manner. Domestic supervisors, matrons and ICT members are prime candidates for this. Others need to be responsible for the actual outcomes of the measurements; for example, healthcare managers or domestic managers.
Parties involved	Mainly the domestic supervisors, matrons and the ICT members can carry out performance monitoring. The National Audit Office could also get involved in this process during their external audits. They can ensure that the domestic service being provided is consistent with their national requirements. In terms of performance measurement, the domestic managers and healthcare managers, together with the ICT members should be more involved in this process.
Limitations and issues to avoid	• The idea should not be to come up with a comprehensive set of performance measures that cover everything in domestic services but to develop sensible, realistic and appropriate measures that can focus the domestic practices towards their real priorities. • Lack of clear guidance on 'who measures', 'what to measure' and 'how to measure' can lead to ineffective results during performance measurement. Therefore, both organisational and individual roles and responsibilities need to be identified for the performance measures. • The following should be used as guidelines during the performance measurement (Benchmarking Study Report, 1997; Douglas, 1996; Loosemore and Hsin, 2000): • **Keep it focused** - this focus ensures that the right data and only the right data are collected, that repetitious or tangential compilations are avoided, and that the questions originally posed by the performance measures are being answered. • **Keep it flexible** - data can be collected from a variety of sources and through a variety of media. Any one system is not necessarily right or wrong. Although using automation is preferable, using manual systems, when needed, can be cost efficient. • **Keep it meaningful** - useful and relevant data can be gathered if the correct measures were set up in the first place. A few basic, well-aligned measures taken seriously are better than a number of complex measures. With simple measures, it is clear what data needs to be collected; with well-aligned measures, it is easy to see the relevance of data. • **Keep it consistent** - data collection should be based on a set of agreed-upon definitions. These definitions need to be universally understood by managers, staff and other parties involved. Data collected within a common framework of understanding can be easily compared and analysed, allowing subsequent evaluations to be "apples to apples".

SECTION 3: PERFORMANCE CONTROL AND DEVELOPMENT

What is it?	The performance measurement results derived from the previous stage convey movement in a particular direction over time. The first step of section 3 is to correct/rectify the performance problems identified from the performance data, i.e. performance control. It also attempts to compare the results with the past performances or with others' performance results, i.e. benchmarking. Depending on the results, the domestic managers could also carry out training and development programmes for staff. Last but not the least, the domestic manager should ensure that the results are fed back to the system in order to continue the performance cycle.
Benefits	An array of benefits could be gained from section 3 as follows (Adair et al, 2003, Benchmarking study report, 1997; Ransley, 1994; Alexander, 1994; Armstrong and Baron, 1998): **Feed it into resource allocation decisions** – as identified from the research findings, domestic services constantly suffer from resource constraints. There are important linkages between resource allocation, strategic planning, and performance management. The domestic managers should try and relate strategic planning process to the allocation of its resources in meeting the required goals and objectives. In this process, the use of performance information into resource allocation decision is important. Resource allocation decisions should also be based on strategic planning relating to new initiatives, technologies or other factors (e.g. new standards). **Use it in staff/management evaluations** – it is essential to empower and reward staff and managers based on the performance results. Therefore, the domestic services should develop some means to link accountability with incentive compensation or wage increases based on performance. For example, factoring performance results into reward schemes (financial/non-financial) and also to training and development programmes. This cannot only motivate the staff and managers but also will address the problem of staff shortages. **Use it to determine gaps between goals and reality** - performance results can be used to determine gaps between specific strategic goals and actual achievement. The root causes of these gaps should be analysed and countermeasures should be developed and implemented. Whenever there is a gap between current results and goals of the domestic service, it is an opportunity for process improvement. **Use it to drive re-engineering** – the performance results can be used to re-engineer the domestic processes in terms of frequency of cleaning, outsourcing and teamwork. **Use it in benchmarking** – benchmarking is a useful methodology for organisational improvement; developing the PM approach; validating the performance results; and to maintain a high level of performance. The domestic services can either use internal benchmarking where they compare their performance results with the previous results or external benchmarking where they compare the results with other hospitals/domestic services. The benchmarking could also be used to discover best practices. **Use it to improve organisational processes** – domestic services could use the performance results to discover how process improvements can be made. For example, domestic managers can set up trial and control processes in such a way that staff could try various process improvements in a controlled manner and selectively identify changes that would improve process performance. **Use it to adjust goals -** if performance goals are not met, corrective action should be implemented. Conversely, if goals are exceeded, the "expected results should be reset to establish stretch goals." **Use it to improve measures** – This can be done using several methods. For example, the domestic services can display performance results on bar charts (or in any other graphical form) and use raw data in its first year of PMF implementation. Next, the data should be validated and normalised. In the following year, the bar chart should include the normalised data with a trend line. In the next following, it can be used to

	obtain a 'better fit' using this trend line. Over the years this trend line keeps rising if section 3 of the PMF is applied successfully. This indicates that the performance levels of the domestic service are getting better.
Parties involved	Mostly the domestic managers and healthcare managers, together with the ICT members, could carry out this process.
Limitations to avoid:	As identified in the first two sections, explaining the goals, indicators and measures is the first step of the PMF. If these are not properly identified different domestic services could develop different measurements that could lead to different outcomes. This will then obstruct benchmarking. When using the PMF it is also important for all the staff and managers to understand what is to be measured, why it is measured and how it should be measured. Standards will fall below expectations if staff or managers do not understand the above. The most important thing of the PMF is that it has to be a formal process, i.e. a clearly defined process that everyone understands and accepts. The formality of the process demands that it becomes part of the domestic service routine. Identifying the challenges of implementing PMF is also important. The nature of healthcare, organisational culture, the size of the hospitals and the different regions (e.g. England and Scotland). can have an impact on how the PMF works. For example, the key performance indicators will most likely be different in a 350-bed hospital in England than in a 350-bed hospital in Scotland, as it can have different service offerings or requirements. What is important here is to recognise these differences and manage the PMF accordingly. Both during implementation and also during the process of the PMF, the domestic services could encounter some hurdles. Timeliness of the performance data, and monitoring the progress are two of these. Another hurdle is the organisational structure. Most of the hospital organisational structures do not show any relationship between the different units of the hospital. In terms of the control of HAI, this appears to be one of the major issues of performance management. Political issues could also hamper the practices of domestic services, i.e. budget constraints.

Performance goals, key performance indicators and performance measures for the control of HAI in domestic services

Goal 1 - Ensure effective utilisation of strategies for the control of HAI in domestic services		

Key Performance Indicators	Performance Measures	Points Allocation (total per group = 100)
Control of HAI	Improvements in domestic service performance have reduced HAI rates? - Yes/No Control of HAI has been prioritised within domestic services? - Yes/No All staff are fully aware of the concept of control of HAI? - Yes/No All subsequent changes of practice and/or procedure have been communicated effectively? - Yes/No All subsequent changes of practice and/or procedure have been implemented effectively? - Yes/No	
		Total = 100
Organisation and Policy	Organisational structure for controlling HAI is consistent with national level? - Yes/No Has management clearly defined relevant roles and responsibilities? - Yes/No Has management clearly defined and communicated policies to staff? - Yes/No All policies have been adhered to this period? - Yes/No All policies introduced are appropriate? - Yes/No Have policies been revised and amended where necessary? - Yes/No	
		Total = 100
Service Levels	All Service Levels are clearly defined and consistent with national level? - Yes/No Are all Service Levels suitable and appropriate? - Yes/No Are all Service Levels revised on a regular basis and amended if necessary? - Yes/No Are all Service Levels communicated effectively by Management to all relevant staff? - Yes/No	
		Total = 100
Standards	All service standards are clearly defined and consistent with national level? - Yes/No Are all standards communicated effectively by Managementto all relevant staff? - Yes/No Are all standards suitable and appropriate? - Yes/No Are all standards revised on a regular basis and amended if necessary? - Yes/No	
		Total = 100

Goal 2 - Ensure effective utilisation of resources in the control of HAI in domestic services

Key Performance Indicators	Performance Measures	Points Allocation (total per group = 100)
Finance	All domestic service costs are operating within allocated budget? - Yes/No The budget is reviewed on a regular basis and consistent with national levels? - Yes/No There are plans in place to deal with any financial shortages? - Yes/No	
		Total = 100
Staff	Clearly defined training and development plans exist? - Yes/No Clearly defined recruitment and retention plans exist? - Yes/No There exists a regularly administered staff satisfaction questionnaire? - Yes/No There are procedures in place for the operation of a staff pay scheme? - Yes/No There have been no staff shortages during this time period? - Yes/No A staff motivation scheme is in operation? - Yes/No	
		Total = 100
Material and Equipment	Do clearly defined plans for material and equipment use exist? - Yes/No Are the plans for the use of materials and equipment adhered to? - Yes/No Procedures exist for revising the deployment of materials and equipment plans? - Yes/No Plans exist for dealing with materials and equipment constraints? - Yes/No	
		Total = 100

Goal 3 - Ensure effective improvement in the control of HAI practices in domestic services

Key Performance Indicators	Performance Measures	Points Allocation (total per group = 100)
Knowledge Management	Are suitable communication methods in place for management to share knowledge with operational staff and vice versa? - Yes/No Are computers being made available to staff at a satisfactory level? - Yes/No Is information being collected in a suitable and structured manner e.g. through surveys, minutes of meetings, Is the knowledge collected being used to continuously improve the service and satisfy staff requests? - Yes/No	
		Total = 100
Involvement and integration	Are domestic teams involved in infection control committee meetings? - Yes/No Regular minutes of the meetings are produced with evidence of participation and agreed actions? - Yes/No There is evidence that practices are carried out with the input and advice of other participants (e.g. infection control teams, ward nurses)? - Yes/No	
		Total = 100
Cleaning Arrangements	Plans exist for the division of work? - Yes/No If plans exist they are clearly defined and clarified? - Yes/No Division of work plans are being adhered to? - Yes/No Division of work plans are revised on a regular basis? - Yes/No	
		Total = 100
Monitoring and supervision	Monitoring and supervision plans are in place for domestic services? - Yes/No A feedback system is in place for domestic services? - Yes/No	
		Total = 100

Goal 4 - Ensure effective benchmarking in the control of HAI practices in domestic services

Key Performance Indicators	Performance Measures	Points Allocation (total per group = 100)
Benchmarking over time	Information for benchmarking purposes is provided on a regular basis? - Yes/No Benchmarking takes place on a regular basis? - Yes/No Benchmarking trend reports are available? - Yes/No	
		Total = 100
Benchmarking with other hospitals	Benchmarking is carried out to make comparisons with the top performing hospital in the UK? - Yes/No Benchmarking is carried out to make comparisons against regional and national averages? - Yes/No	
		Total = 100

9.4   COMPOSITION OF THE PMF

The cycle of PMF consists of three main sections (see Figure 9.1). The first is the 'development of performance goals and indicators'. It recognises the expected level of performance standards in domestic services, which is then followed by 'performance monitoring and measurement'. This assists in identifying the actual level of performance in domestic services. Finally, it leads to 'performance control and development', which is further supported by a feedback loop. The main idea of this section 3 of the PMF is to rectify performance issues as well as to continually improve the service. Descriptions of the said three sections are given below.

9.5   SECTION 1: PERFORMANCE GOALS AND INDICATORS

Performance management is a topic thrown around a lot in executive suites, but its key tenets are sometimes misunderstood. To be successful, performance management involves setting strategy at the board and executive levels and making day-to-day decisions at the line-manager level (Lauer, 2006). However, the process will not work unless the latter have clearly defined goals as well as relevant, reliable and timely information to assist them in monitoring their performance and making operational decisions to improve outcomes.

Setting the right goals and indicators is critical for effective performance management (Lichiello, 1999). It is a primary feature of establishing a performance management framework (Educational policy reform research institute, 2002; Neely et al, 1995). According to van der Bij and Vissers (1999), discussions about performance goals and indicators are far from completed in healthcare processes. As identified by Saltmarshe et al (2003), to assess performance, it is essential to have a clearly defined set of goals against which to measure and manage performance.

As Handler et al (2001) state, the majority of published research on healthcare performance has focused on the implementation of a specific categorical public health intervention and its potential or actual impact on one or more health

outcomes. As they further state, very little of this work has also linked healthcare outcomes to public health system processes such as assessment and planning or to the inputs of the system. Emmanuel et al (1990) argue that organisational success is a multi-dimensional concept whose attributes change over time and between one individual or group in the organisation and another. For example, while patients are naturally concerned with medical outcomes, they may only feel competent to comment on the process with which they are handled (e.g. waiting times, both before and after they enter the service delivery process). Clinical staff, however, may be more concerned with measures of medical outcomes (e.g. infection rates) and measures of non-clinical outcomes (e.g. environmental cleanliness). Therefore, in order to achieve satisfactory levels of performance, the control and co-ordination of all these aspects are necessary. Thus, defining the goals and indicators adopted the model articulated by Donabedian (1980). This is the input, process and outcome model. Donabedian's model is the most frequently cited model in the literature relating to acute healthcare (Turnock, 2004; Eisen, 1996; Srebnik et al, 1997; Denton et al, 1999; Walker, 2005; Handler et al, 2001). Acute healthcare is a subset of the broader healthcare and as Srebnik et al (1997) state, in acute healthcare, implementation and validation of performance management in general are in comparatively advanced stages than in other healthcare subsets (e.g. mental health, primary healthcare).

According to Murray and Frenk (2000), it is necessary to relate performance of various subcomponents of healthcare to performance of the entire health system in order to maintain consistency and robustness with the overall goals and indicators. Therefore, what was important in this section of setting performance goals and indicators of the performance management framework was the integration and alignment of the developed goals and indicators of control of HAI in domestic services with the other hierarchical levels of healthcare. The hierarchical levels identified in this research are:

1. Department level, i.e. FM department
2. Hospital level
3. Trust/Board level

4. National level

A detailed discussion of the inputs, processes and outcomes considered for the control of HAI in domestic services is given below.

9.5.1 Inputs

Under inputs, two main organisational inputs were identified for the control of HAI in domestic services. These are consistent with other approaches to understand health service performance (Fuchs, 1973). The two main inputs identified are strategy and resources. Strategy formulates the main part of the inputs when executing organisational practices; it may lead to new working arrangements and possibly service outcomes. Strategy, in this study, includes policies and guidelines, specifications; standards, organisational structure, etc (refer to Chapter 5). The second input, i.e. resources, has been identified in three sections, i.e. finance, staff, and materials and equipment (refer to section 5.3.5). Hospital resources are constantly under pressure, given the wider context of the NHS (Abel-Smith, 1994) and therefore the way in which they are employed is constantly under organisational, political and public scrutiny. Therefore, all the organisational inputs described above must be used both efficiently and effectively to enable the development of hospital practices (Abel-Smith, 1994), including the control of HAI in domestic services. Organisational performance, therefore, should make reference to the way in which these are used by the hospital/department.

9.5.2 Processes

Processes are a combination of activities with a common purpose to deliver products and services to the market place (Phillips, 1999). Therefore, organisational processes include all those factors involved in achieving the organisational task, both directly and indirectly (Waring, 2000). Performance management in domestic services embraces those elements involved in managing, delivering and supporting the domestic service and those involved in actual delivery of domestic services. In terms of the control of HAI in domestic services there is an array of processes including control of HAI in cleaning practices (e.g. hand hygiene practices and colour-coding), and monitoring and

supervision. These are specific elements of processes of control of HAI in domestic services. Waring (2000) explains that organisational processes are clearly diverse and frequently reflect managerial activity and components of service delivery. Therefore, as he notes, hospital processes simultaneously can be classified as outcomes. This means that while organisational processes are important in their own right it is their impact upon, and features they share with outcomes that makes them important; they are the means.

9.5.3 Outcomes

Considering the focus of this research, outcomes of control of HAI in domestic services are identified based on a basic organisational performance model of an NHS hospital developed by Waring (2000). They are:

1. *Organisational outcomes:* organisational outcomes represent many of the performance criteria emphasised in traditional performance management approaches. They are important because, firstly, they are frequently used indicators of managerial performance, and secondly, they have the capacity to feedback into the way a hospital functions and therefore influence other aspects of performance.

2. *Service outcomes:* service quality is an important organisational outcome as it reflects the actual service or product that the entire organisation is geared for at the individual level.

3. *Health outcomes:* at its most basic, every NHS hospital should provide a contribution to health: this is the "bottom line". This is a crucial technical difference between an NHS and a private sector hospital. In the NHS, therefore, organisational performance should not ignore health outcomes. It is enormously difficult, however, to define, let alone measure 'health' and this problem probably lies behind the consistent failure of most performance frameworks to incorporate such an indicator.

4. *Political outcomes:* given that the NHS is a political organisation that occupies a special position in both the public sector and public opinion it is necessary to examine the ability of its constituent parts (the hospitals) to comply with political goals, both long-standing and current. One longstanding political concern for every NHS hospital is the ability to

manage demand effectively, because the demand for care frequently outstrips the ability to supply. Quite simply a hospital cannot meet all the needs in the community simultaneously and with equal priority. It is, therefore, important to reveal how well each hospital deals with its demands. It is also necessary to assess performance in terms of transient political goals.

9.6   SECTION 2: PERFORMANCE MONITORING AND MEASUREMENT

The second section of the PMF is performance monitoring and measurement. According to Behn (2003), performance monitoring and measurement is not an end in itself. These form part of performance management (Rouse and Putterill, 2003; Lingle and Schiemann, 1996). Performance measurement is the process of quantifying the efficiency and effectiveness of action (Neely et al, 1995). As Turnock (2004) asserts, the ultimate aim of implementing a performance measurement system is to improve the performance of the organisation. If organisations can get performance measurement right, the generated data will tell the organisations where they are, how they are doing, and where they are going.

As van der Bij and Vissers (1999) note, monitoring means portraying the current status of a clearly defined object system by measuring certain aspects; thus, performance monitoring is a representation of performance measurement. Nani et al (1990) state that performance measurement was historically developed as a means of monitoring and maintaining organisational control which is the process of ensuring that an organisation pursues strategies that lead to the achievement of overall goals and objectives. According to Theurer (1998) performance measurement is helpful in achieving many purposes, including to such as evaluate, control and improve performance of organisations. Van der Bij and Vissers (1999) state that the aim of performance monitoring is also control and evaluation of performance of organisations. Therefore, defining and identifying the performance measures are integral in performance monitoring and measurement.

Simply, a performance measure is a metric used to quantify the efficiency and/or effectiveness of an action (Neely et al, 1995). McGlynn (1998) provides three

main steps to develop performance measures that will be useful for performance management:

1. Choosing the performance goals
2. Selecting performance indicators within each performance goal/s
3. Designing the areas to be measured under the performance indicators

With reference to the aforementioned steps, the first section of the PMF developed for the control of HAI already focused on developing performance goals and performance indicators. Thus, it provides means to develop performance measures, which will allow commencement of performance monitoring and measurement.

9.7   SECTION 3: PERFORMANCE CONTROL AND DEVELOPMENT

As Kagioglou et al (2001) explain, organisations can use results obtained through PM to benchmark performance against other organisations. It can also be used to set organisational goals. However, according to Amaratunga and Baldry (2002), the strength of benchmarking is not in identifying best performance but in learning best practices. That is, the organisations should identify, study, analyse, and adapt the best practices that lead to the best performance and understand the best practices that help managers to make better-informed decisions about where and how to change their organisational practices.

As Lichiello (1999) describes, performance measurement is not an end itself, but rather a means to an end. Measuring performance is of little value unless it leads to further decisions and actions that seek to improve performance. Therefore, the third section of the PMF deals with performance control and development. As described in the second section of the PMF, the performance of control of HAI in domestic services must be monitored and measured regularly. The results achieved through performance monitoring and measurement (the achieved level of performance) should then be compared with the expected level of performance. This will highlight any deviations, if there are any. Failing to achieve the required levels of performance, i.e. performance gaps, needs subsequent corrective actions in order to improve performance. Achieving the

required level of performance means that there is a need to maintain or further improve the required levels of performance. This is simply identified as performance control (Walker, 2005).

Pasteur and Scott-Villiers (2004) affirm that the training and development of staff are central to improving the performance of organisations. This is very much true in the context of domestic services, as it is more labour-intensive. Conducting timely, practical and relevant training and development programmes for staff enables them to deal with problems effectively and gain relevant insights, which can lead to further improved performance. Thus, training and development of staff was also considered as part of the PMF.

On-going benchmarking was also taken into consideration when developing the PMF. Jordan et al (2001) identified benchmarking as measuring an organisation's products or services against the other existing products or services of the same type. Benchmarking is a management strategy, pioneered in the late 1970s by Xerox Corporation (Ransley, 1994). Benchmarking is needed to facilitate meaningful feedback to complete the cycle of performance management. Findings derived from the case study approach carried out during the mid-stages of this research study revealed that domestic services staff and infection control teams are not informed about the performance results of the domestic services. Further, it was identified that the performance results are hardly used to revise or improve the performance standards. Therefore, domestic services must communicate the performance results to the staff involved in the control of HAI. Providing staff with feedback can lead to improved job performance of staff and to ascertaining training and development needs. Moreover, there is a need to use the performance results to implement required changes in order to improve the performance levels of control of HAI.

9.7.1 Overall benefits of the PMF

Having an effective PMF has multiple benefits for the control of HAI in domestic services, ultimately resulting in better and more efficient practices.

Firstly, it means everyone knows where the domestic service is going, as there is a clear focus on goals and priorities. This level of clarity helps to correctly direct resources, which means there are fewer instances of resource limitations. Secondly, the domestic managers and the staff (both domestics and nurses) have a clear idea of what is expected from them, and how this fits into the bigger picture. Besides, they can also develop their skills or knowledge through performance development in order to perform well. Thirdly, because the emphasis of PMF is on meeting the set goals, indicators and measures, it is easier to monitor the progress of the services and to take appropriate corrective actions if and where necessary. Fourthly, the PMF would allow the carrying out of benchmarking practices, which at present is at its infant stages in domestic services. Benchmarking is essentially about finding and implementing best practices. The aim here will be to reduce duplication by learning from experiences (internal benchmarking) or from others (external benchmarking). Finally, it would allow the domestic services to continually improve the domestic practices as a whole. The PMF is a continuous cycle and hence will make sure that performance results are fed back to the domestic services in order to revise the performance targets, as and when required.

9.8   VALIDATION OF THE PMF

The proposed PMF was finally validated using the structured interviews carried out during the fourth stage of the research (refer to section 3.9.2 for detailed discussions on refining and validating the PMF).

Table 9.1 presents details of the 30 professionals (10, academics, 10 domestic/facilities managers, 10 ICT members) who participated in the structured interviews. A combination of these different professionals ensured an appropriate balance of expert opinions (criteria for selecting the experts are given in section 3.9.2). As Fox et al (2003) suggest, validation assessment will not be effective unless it comprises an appropriate balance of all necessary expert knowledge.

As Table 9.1 reveals, most of the participants noted that, in terms of the contents, the PMF has a very high level of coverage of performance management issues

(with a mean value of 1.43). The participants again noted that the PMF has a very high level of coverage with regard to the logic used in the PMF (i.e. the flow and the principles that guide reasoning within a given area). In terms of the goals and indicators, they were of the view that it has a high level of coverage. However, in terms of performance measures, the participants commented that it has room for improvement considering the other areas of domestic services and FM departments. Overall, many of the participants commented that the model could be used as a systematic framework to measure, monitor and manage performance of the domestic services. The following are some of their comments:

"The framework highlights the value of our service (service given by the ICT). This could be a major step to change the way they (domestic services) work." – an ICT member

"The framework looks very good…. Cultural change and a change of the ad hoc systems are a must to make use of this" – A domestic manager

"This PMF covers all the important aspects of managing performance. It's excellent… there could be challenges though… mainly in terms of relating this to other branches of FM" – An academic

Table 9.1: PMF validation – overall results

Participant Category	Codes given to Participants	Area of expertise/ Job role	Level of Coverage					Is the PMF useful for the area
			Contents	Logic	Goals	Indicators	Measurs	
Academics	**A1**	PM, FM (including Healthcare FM), control of HAI	2	2	3	3	4	Yes
	A2	PM, FM	1	2	1	1	2	Yes
	A3	PM, KM, FM (including Healthcare FM)	2	3	3	3	3	Yes
	A4	PM, Risk Management, PFI	1	3	2	5	5	Yes
	A5	IT, Supply Chain Management, PM	1	1	1	1	2	Yes
	A6	FM, PM	2	2	2	3	3	Yes
	A7	PM, Construction Management, Supply Chain Management	1	2	1	1	1	Yes
	A8	Supply Chain Management, PFI, FM	2	3	5	5	5	Difficult to say
	A9	FM, Sustainability, KM	1	1	1	1	2	Yes
	A10	FM, PM	2	3	2	2	3	Yes
Practitioners	**P1**	Head of Facilities	2	1	2	3	4	Yes
	P2	General Manager - Facilities	1	1	1	2	2	Yes*
	P3	Head of Facilities	2	2	2	2	2	Yes
	P4	Head of Property and Support Services	1	2	1	2	3	Yes
	P5	General Manager - Operations	1	1	3	3	3	Yes*
	P6	Director of Facilities	1	1	1	1	2	Yes
	P7	Domestic Services Manager	2	2	2	2	3	No
	P8	Hotel Services Manager	1	1	2	2	2	Yes*
	P9	Hotel Services Manager	1	1	2	3	4	Yes
	P10	Hotel Services Manager	2	2	3	3	4	Yes
	P11	Infection Control Nurse	1	1	1	1	2	Yes
	P12	Senior Infection Control Nurse	2	2	4	4	4	Yes
	P13	Senior Infection Control Nurse	1	1	3	3	4	Yes
	P14	Infection Control Specialist	1	1	3	4	4	Yes
	P15	Infection Control Nurse	1	1	1	1	1	Yes*
	P16	Senior Infection Control Specialist	1	1	2	3	3	Yes
	P17	Infection Control Nurse	2	2	2	2	3	Yes
	P18	Infection Control Nurse	2	1	2	3	4	Yes*
	P19	Senior Infection Control Nurse	2	2	2	2	3	Yes
	P20	Infection Control Nurse	1	1	2	3	4	Yes
Mean score/ Overall result			**1.43**	**1.63**	**2.07**	**2.47**	**3.03**	**Yes**

* needs further modifications considering other FM services/other control of HAI requirements

Meaning of scale (Level of coverage): **1** (Very High), **2** (High), **3** (Low), **4** (Very Low), **5** (Not Applicable)

Overall, the PMF and its validation attempted to address objective 6 of the research study.

9.9   FUTURE OF THE PMF

Researchers as well as practitioners interested in the control of HAI have been slowly generating a body of work that examines certain aspects of control of HAI performance (Cahill, 2005; Department of Health, 2005; Gopalakrishna et al, 2004; New South Wales Health, 2004; Reingold, 1998; Scottish Executive Health Department, 2002a).   Some of these efforts have been linked to performance in the control of HAI in domestic services (Scottish Executive Health Department, 2004; Joint Commission Resources – Performance Improvement, 2005) However, these efforts have not yet led to performance management, with a unified conceptual framework and with an agreed-upon set of measures. To improve the performance of control of HAI in domestic services and its ability to respond effectively, it is essential that researchers and practitioners channel their efforts with an agreed-upon framework that specifies the components of control of HAI in domestic services and how these components interact. The PMF introduced in this thesis can guide the development of strategies and research tools for managing performance in this aspect.

Whilst it is hoped that such a framework will be embraced by the domestic services, there are some typical challenges that are likely to restrain its implementation. The main challenges, in view of this particular study, include the nature of healthcare, political issues, organisational culture, organisational structures and deficiency of resources. Most of these challenges could be overcome by better integration, raising the awareness of performance management across the NHS. Also, from the point of view of the political agenda, the challenges could be overcome by developing resource plans and deriving standards through surveillance and research.

9.10 SUMMARY

This chapter, overall, addressed objective 6 and research question IX of the study (see Table 1.2). The findings of the research uncovered two issues relating to performance management. Firstly, there was no framework for understanding how performance is operated within domestic services and, secondly, that within a performance context, issues relating to the control of HAI in domestic services could not be seen in isolation. In order to address these issues, a framework was produced, which explains the relationships between the various issues perceived as constituting a performance cycle.

This framework, which is named a PMF, offers an ideal starting point for a change in direction of domestic services from traditional audits to performance management. In addition, a framework embraces both the need for service improvement and performance measurement. Equally as important is its ability to offer comparison of performance results with past results or with others, which is known as benchmarking. The PMF consists of a broad and balanced set of goals, indicators and measures linked specifically to the control of HAI. These can be further developed under the umbrella of FM services.

CHAPTER 10 : CONCLUSIONS AND RECOMMENDATIONS

10.1 INTRODUCTION

This chapter summarises the aim and objectives of this study, the research process and presents the key research findings. It also presents the main conclusions and recommendations. Areas for further research are also given at the end of this chapter.

10.2 THE RESEARCH PROCESS

Leading writers and researchers in the field of HAI, as well as reports published by health service organisations and related organisations worldwide have affirmed the important role of FM services in the control of HAI. Nevertheless, up until now, there is a paucity of evidence-base literature, which suggests the association/relationship between FM services and the control of HAI. Besides, thus far, attention seems to have been levelled more towards clinical practice over FM issues in this process.

Therefore, the main aim of this research study was to identify the role of FM in the control of HAI with a view to providing plausible solutions for the control of HAI from an FM point of view. In doing so, specific focus was given to domestic services. Overall, the research attempted to address the following objectives:

1. To explore and document the main causes of HAI and areas associated with the control of HAI.
2. To ascertain and investigate the role of FM services, in the control of HAI in hospital wards.
3. To develop a conceptual framework for the control of HAI in FM services.
4. To examine the current situation of control of HAI in domestic services.
5. To investigate, assess and document the Performance Management (PM) approaches in-use.
6. Develop, refine and validate a Performance Management Framework (PMF) for the control of HAI in domestic services.

A four-stage approach was adopted for the study in order to fulfil the aforementioned aim and objectives. The first stage of the study employed a review of literature and informal interviews with twenty-five (25) experts in the area of HAI and FM from the National Health Service (NHS) in Scotland. This stage ascertained the areas associated with the control of HAI (objective 1), identified the role of FM in the control of HAI (objective 2) and developed a conceptual framework encompassing the key issues associated with the control of HAI in FM (objective 3).

Stage 2 of the study employed a qualitative case study approach involving twenty-six (26) semi-structured interviews with key parties in the control of HAI. Stage 3 employed a questionnaire survey. Stage 2 and 3 identified and documented the current context of the control of HAI in domestic services (objective 4). The two stages also documented the performance management approaches in-use in the control of HAI in domestic services (objective 5).

The fourth and final stage of the study focused on developing the Performance Management Framework (PMF) for control of HAI in domestic services (objective 6). The PMF was refined and validated using thirty (30) structured interviews with ten (10) academics and twenty (20) practitioners (domestic managers – 10, Infection Control Team members – 10) in the areas of HAI and FM.

Altogether 81 interviews were carried out during these four stages of the study. The qualitative data collected was analysed using a content analysis approach. A total of 412 questionnaires completed by experts in the areas of FM and HAI in the NHS (UK) augmented the interviews conducted. The quantitative data sets were subjected to rigorous statistical analyses.

10.3 CONCLUSIONS OF THE RESEARCH STUDY

The main conclusions drawn from the research study are presented in subsequent sections.

10.3.1 Areas associated with the control of HAI

The study findings reconfirmed what has been said in the literature in terms of the areas associated with the control of HAI. However, thus far, enough attention has not been paid to some of these areas. Therefore, if HAI is to be effectively controlled, the following issues need to be thoroughly addressed:

- staff contact (through effective handwashing techniques)
- infectious patients (through isolation techniques)
- waste (through effective handling of clinical and non-clinical waste)
- laundry (through effective handling of clean and dirty linen)
- food (through food safety and catering hygiene)
- cleaning (through routine hospitals cleaning and disinfection)
- air (through proper handling of ventilation systems)

10.3.2 The role of Facilities Management (FM) in the control of HAI

- FM has a major role to play in the control of HAI.

- The role of FM in the control of HAI extends from the design and construction stage to the building occupancy stage.

- Despite FM's rapid development as an important function in organisations, FM still suffers from an identity crisis. This issue remains critical in healthcare as the place and contributions of FM remain unclear and are still to feature prominently in the 'control of HAI agenda'. This is a significant problem, which needs prompt attention.

- There is evidence from the study to suggest that a move from a reactive approach in the NHS with regard to the role of FM in the control of HAI to a more proactive approach is needed. Helathcare managers, in this regard, need to be more vigilant and proactive in finding solutions and should not wait until problems become critical.

10.3.3 Current situation with regard to the control of HAI in domestic services

10.3.3.1 Strategies

- Some of the main strategies adopted in domestic services in the control of HAI are as follows:

- accountability arrangements

- development of an organisational structure

- consideration of importance given to the control of HAI

- development of standards

- development of service specifications

- development of policies and guidelines

- resource deployment

▪ Contracted-out services appear to have a relatively high level of resources than the in-house services, especially in terms of staff and budget.

▪ A domestic service, which is run by an in-house service provision, however, appears to have relatively established practices than contracted-out services in the control of HAI.

▪ In recent years, the NHS (UK) has taken steps to publish an array of guidance documents to raise the standards of FM services in the control of HAI. The findings from the present study and recent news headlines (BBC, 2005), however, suggest that the problem of HAI is still severe in FM services. This raises an issue in terms of whether the guidance documents that are produced are effectively used. There is, therefore, a need to examine the efficacy of the guidance documents published by the NHS.

▪ Even though there are some guidance documents relating to FM in the control of HAI, the current study noted that there are concerns in some quarters that the role and contribution of FM to the control of HAI have not been given the due recognition it deserves. There is, therefore, a need to promote the profile of FM service in the control of HAI.

10.3.3.2 Level of involvement and integration

▪ There is evidence of clarity of roles and clear lines of communication between the major players in the control of HAI.

▪ There is a relatively low level of integration between the FM teams and clinical teams. This is more pronounced when the domestic service is managed by an external party. This has resulted in an array of other significant issues such as lack of knowledge sharing, lack of training and education, lack of awareness of issues associated with the control of HAI, and inconsistencies between national and local level standards.

10.3.3.3 Knowledge Management

- The role of KM is not fully exploited in domestic services in the control of HAI. One of the main reasons for this is the limited use of Information Technology by staff in domestic services.

- Training and education, learning from books/manuals, sharing ideas and learning from each other, mentoring, meetings, seminars and conferences, expert groups and hiring external consultants are the main practices adopted by domestic services in terms of KM.

- The key factors that promote effective KM are; increases awareness of staff on the issues associated with the control of HAI, having the domestic service in-house, increased prioritisation of domestic services, and regular meetings between the teams (clinical and non-clinical teams).

- The key factors that inhibit effective KM are; poor level of integration between key players (e.g. domestic managers and ICT members), human resource issues (e.g. high staff turnover, high level of staff absenteeism due to sickness) and high cost of training and education programmes.

10.3.4 Performance Management in the control of HAI in domestic services

- Despite its importance, little has been researched or published in the areas of performance management in healthcare organisations, and even less so in the context of domestic services.

- There is evidence of a lack of common understanding of what is meant by performance, or how performance could be measured in practice, especially with regard to the control of HAI in domestic services.

- The main approach to performance management in domestic services is performance audit. The performance audits are either carried out by internal teams of the hospital (e.g. the domestic services or ICTs) or external teams (e.g. the National Audit Office or environmental agencies).

- The standards of performance remain extremely variable, mostly due to resource limitations such as budget constraints and staff shortages (because of high staff turnover and sickness absence) and tight time schedules. Besides, the lack of an overall yardstick (i.e. benchmark) to compare the variations in performance standards has exacerbated the problems in domestic services.

10.3.5 The proposed Performance Management Framework (PMF) for the control of HAI in domestic services

▪ In response to the complex issues surrounding the areas of HAI, higher expectations by stakeholders, the demand for greater accountability, and the need for more effective practices, there is a need to develop more holistic approaches for performance management. In response to this, a comprehensive Performance Management Framework (PMF) was developed in this study in order to guide the domestic services through the routine of PM.

▪ The developed PMF is clear, cohesive and can be well understood by all levels of managers and staff. It is well supported by the overall goals of control of HAI in domestic services and uses a balanced set of Key Performance Indicators and measures to benchmark the results with one another. Every attempt has been made to align these goals and indicators with the national level control of HAI agenda. Finally, the PMF has been developed as an iterative process that can enhance continuous improvement in domestic services through effective staff training and development and through effective feedback.

▪ The PMF developed in this study gives due cognisance to FM (specifically to domestic services). The successful implementation of this PMF, however, needs careful consideration of a host of challenges, which can impinge on staff and process performances. The main challenges, include segregation of clinical and non-clinical practices, cultural issues, deficiency of resources, time constraints and lack of evidence-based standards.

10.4 RECOMMENDATIONS AND FUTURE WORK

10.4.1 Recommendations for practitioners

Having considered the overall findings of the research, some recommendations can be presented as follows. This is to improve practices relating to the control of HAI in FM services (including domestic services):

1. The control of HAI is a collective effort. Irrespective of the type of service provision, every attempt should be made to introduce clear and direct links

and accountability lines between units within hospitals (e.g. FM services and the Infection Control Teams). If the FM service is contracted-out, senior management responsible for developing the contract should make formal arrangements to incorporate the ICT component in their contractual agreements and thereby into the day-to-day practices of the FM service.

2. Both FM and clinical teams should attempt to work as a team. They should maintain good relationships and communication with each other. The clinical teams should appreciate and value the work performed by FM teams. At the same time, the FM teams should understand the roles and responsibilities of the clinical teams.

3. Guidance documents (standards, specifications, policies and guidelines), which contain information on the control of HAI, should be in place in any FM service. The guidance documents should be reviewed regularly with the national best practice guidance and local needs, based on a risk assessment programme.

4. FM services should ensure that dedicated resources are available to cover essential practices in relation to FM services. They should ensure that they have contingency plans in place to deal with resource constraints, e.g. staff shortages.

5. If an FM service is to be contracted-out, at the time of negotiations/agreements, the client (the NHS Boar/Trust) should make an attempt to get the ICT input to develop the specifications/service level agreements. If the contract has already been started, and if such an attempt was not taken, the client should make an effort to rectify this immediately.

6. A national training and education framework for FM teams should be developed in order to enable them to carry out their work to the highest standards. Particular emphasis should be given to the training of domestics. It will enable the facilities managers to recognise the domestics' existing skills and identify where more training is needed.

7. The NHS Boards/Trusts/the healthcare managers should ensure that sufficient Information Technology (IT) facilities are provided, at least, for all the facilities managers and supervisors (at least common facilities for the supervisors and the assistant facilities managers). They should also be given appropriate IT training.

8. All FM services should put in place formal monitoring and supervision procedures, including relevant documentation and reporting arrangements.

10.4.2 Recommendations for academics

1. The developed Performance Management Framework (PMF), its indicators and measures can be further developed to a Performance Management Tool with practical utility for the benefit of the key players in the control of HAI. The developed PMF, its indicators and measures are limited to the control of HAI in domestic services. Therefore, efforts can be made to further develop this using the Key Performance Indicators (KPIs) of overall FM services. Transforming the PMF into a tool using other FM measures will not only be useful for the FM practitioners and the NHS but will also be useful for the researchers to identify future scope of Performance Management in the FM and the NHS as a whole.

2. There is ample scope for more empirical studies to explore and document the factors that impact on the low level of integration of key players in the control of HAI. Such studies should attempt to uncover issues to do with job roles, professionalism, cultures and sub-cultures of the different parties, and education and training backgrounds. Such studies should also aim to provide recommendations and guidance for improved integration of the key players.

3. The research methodology employed in this study could be replicated in different countries, including developing countries. This should lead to the generation of benchmark data and best practices in the control of HAI worldwide.

4. There is also scope for more empirical research on the key motivational constructs associated with effective knowledge sharing between the domestics and ICT teams in the control of HAI.

REFERENCES

Abel-Smith, B. (1994). *An introduction to Health: Policy*, *Planning and Finance*. London: Longman.

Acute Health Division Victorian Government. (2000). *Cleaning Standards for Victorian Public Hospitals*. Inner and Eastern Healthcare Network. *ISBN 07311 60509*.

Adair, C., Simpson, L., Birdsell, J., Omelchuk, K., Casebeer, A., Gardiner, H., Newman, S., Beckie, A., Clelland, S., Hayden, K., and Beausejour, P. (2003). *Performance Measurement Systems in Health and Mental Health Services: Models, Practices and Effectiveness A State of the Science Review*. The Alberta Heritage Foundation for Medical Research. Alberta.

Adler, P. S., and Riley, P. (2002). *Performance Improvement Capability: Keys to Accelerating Performance Improvement in Hospitals*. University of Southern California. California. pages 23. Accessed date 05/07/02. http://www.marshall.usc.edu/MOR/docs/diffusion/PIC5.13.pdf

Albers, J. A., and Brewer, S. (2003). Knowledge management and the innovation process: the eco-innovation model. *Journal of Knowledge Management Practice*. **4**. pp. 1-10.

Alberta Health. (1995). Evidence-based decision-making: a guide to using indicators in health planning.

Alder, P. S., and Riley, P. (2002). *Performance Improvement Capability: Key to Accelerating Performance Improvement in Hospitals*. University of Southern California. California. pages 23. Accessed date 05/07/02. http://www.marshal.usc.edu/diffusion/index.html

Alexander, K. (1994). A Strategy for Facilities Management. *Facilities*. **12** (11). pp. 6-10.

Alexander, K. (1994). *Facilities Management*. Blenheim Publishing: Centre of Facilities Management (CFM).

Alexander, K. (1996). *Facilities Management - Theory and Practice*. London: E & FN Spon.

Allison, P. D. (2001). *Missing data*. Thousand Oaks: California: Sage Publications.

Amaratunga, D., and Baldry, D. (2002). Moving from performance measurement to performance management. *Facilities*. **20** (5). pp. 217-23.

Amaratunga, D., Baldry, D., and Sarshar, M. (2000). Assessment of facilities management performance - what next? *Facilities*. **18** (1). pp. 66-75.

Amaratunga, D., Haigh, R., Sarshar, M., and Baldry, D. (2002). Assessment of Facilities Management Process Capability: a NHS facilities case study. *International Journal of Health*. **15** (6). pp. 277-288.

Amaratunga, R. D. G. (2001). *Theory Building in Facilities Management Performance Measurement: Application of some core Performance Measurement and Management Principles*. PhD thesis. University of Salford. Manchester.

Amberg, E. (2003). *Nosocomial Infections*. Montana State Hospital Policy and Procedure. 3.

American Heritage Dictionary. (2000). *Dictionary of the English Language*. Houghton Mifflin Company. Accessed date 16/04/2005.
http://www.bartleby.com/61/26/R0182600.html

An Expert working group of the Australian Infection Control Association. (2001). *National Surveillance of Healthcare Associated Infection in Australia*. 232. Accessed date 23/04/2004. http://www.health.gov.au/pubhlth/strateg/jetacar/pdf/scope.pdf

Andersen, H., Lawrie, G., and Shulver, M. (2000). *The Balanced Scorecard vs. The EFQM Business Excellence Model*. 2GC Limited. *2GC working paper*. Berkshire.

Ann Noble Architects. (2003). *Reduction of Hospital Acquired Infections by Design*. Health Facility Planning and Architecture. NHS Estates Research & Development Project B(01)06 - Final Report.

Armstrong, M. (2002). *The performance management audit: an eight-step audit to help analyse, develop and improve performance management processes so that the organisation achieves its business goals*. Cambridge: Cambridge Strategy Publications. ISBN 1902433505

Armstrong, M., and Baron, A. (1998). *Performance Management: The new realities*. London: Institute of Personal and Development.

Arnold, D., Capella, L., and Sumrall, D. (1987). Organisation culture and the marketing concept: diagnostic keys for hospitals. *Journal of Healthcare Management*. **7** (1). pp. 8-41.

Atkin, B., and Brooks, A. (2000). *Total Facilities Management*. Oxford: Blackwell Science.

Atkinson, A. A., Waterhouse, J. H., and Wells, R. B. (1997). A stakeholder approach to strategic performance measurement. *Sloan Management Review*. **38** (3). pp. 25-37.

Auditor General for Scotland. (2000). *A Clean Bill of Health?*. A review of domestic services in Scottish Hospitals. pages 41.

Auditor General for Scotland. (2001). *Waste Management in Scottish Hospitals*. Performance Audit.

Auditor General for Scotland. (2003). *Hospital Cleaning - Performance Audit*. Audit Scotland. Report nr. *AGS/2003/2*.

Auditor General for Wales. (2003). *The management and delivery of hospital cleaning services in Wales*. National Audit Office Wales. Cardiff.

Ayliffe, G. A. J., and Babb, J. R. (1995). *Pocket Reference to Hospital Acquired Infections*. London: Science press.

Ayliffe, G. A. J., Babb, J. R., and Taylor, L. J. (1999). *Hospital Acquired Infection: Principles and prevention*. 3rd Edition. London: Arnold: A member of the Hodder Headline Group. ISBN 0750621052

Ayliffe, G. A. J., Babb, J. R., Davies, J. G., and Lilly, H. A. (1988). Hand disinfection: a comparison of various agents in laboratory and ward studies. *Journal of Hospital Infection*. **11**. pp. 226-43.

Ayliffe, G. A. J., Lowbury, E. J. L., Geddes, A. M., and Williams, J. D. (1992). *Control of hospital infection: A practical Handbook*. Third Edition. London: Chapman and Hall. ISBN 0142284405.

Ayrshire and Arran Acute Hospitals NHS Trust – NHS in Scotland. (2000). *Infection Control: Guidance for hotel services domestics*. Practical Hand Book. Ayrshire and Arran, NHS in Scotland.

Ayrshire and Arran Acute Hospitals NHS Trust – NHS in Scotland. (2004). *A review of domestic services*. Ayrshire and Arran , NHS in Scotland.

Azhashemi, M. A., and Ho, S. K. M. (1999). Achieving service excellence: A new Japanese approach versus the European framework. *Managing Service Quality*. **9** (1). pp. 40-46.

Bailey, A. G. (1997). The inhalation and deposition of charged particles within the human lung. *Journal of Electrostatics*. **42**. pp. 25-32.

Baird, L., Deacon, S., and Holland, P. (2000). From Action Learning to Learning from Action: Implementing the After Action Review. *Strategic Learning in a Knowledge Economy: Individual, Collective and Organizational Learning Process (Resources for the Knowledge-Based Economy Series)*. R. Cross and S. Israelit. Butterworth-Heinnemann: Woburn. pp. 185-202.

Baldwin, E., Carter, J., Lee, A., Payne, J., Rogers, J., and Williams, C. (2002). *Ethnography - Methodology Recipe*. Accessed date 20/06/2003. http://www.stephenscountyschools.com/schools/ees/staff/alee/ethnography.htm

Ballantine, J., Brignall, S., and Modell, S. (1998). Performance measurement and management in public health services: a comparison of UK and Swedish practice. *Management Accounting Research*. **9**. pp. 71-94.

Barley, C., Bird, S., and Morgan, A. (2003). *A report on provision of education and training*. Wales: Public Health Practitioners.

Barrett, P. (1995). *Facilities Management: Towards best practice*. Oxford: Blackwell Science Ltd. ISBN 0632050438

Barrett, P., and Baldry, D. (2003). *Facilities Management: Towards Best Practice*. Oxford: Blackwell Science Ltd.

Bartley, J. M. (2000). APIC State-of-the-Art Report: The role of infection control during construction in healthcare facilities. *American Journal of Infection Control*. **28** (2). pp. 159-68.

Bartley, J., and Bjerke, N. B. (2001). Infection control considerations in critical care unit design and construction: a systematic risk assessment. *Critical Care Nursing Quarterly*. **24** (3). pp. 43-58.

Batchelor, C., Owens, D. J., Read, M., and Bloor, M. (1994). Patient Satisfaction Studies: Methodology, Management and Consumer Evaluation. *International Journal of Healthcare Quality Assurance*. **7** (7). pp. 22-30.

BBC News. (2002). *Controlling hospital infection.* Accessed date 03/02/2004. 21/01/2002.

BBC News. (2005). *Standards and Guidelines*. Accessed date 13/06/2006. http://www.bbc.co.uk

Beggs, C. (2003). Control of the Environment. *Report on Bed Spacing - NHS Scotland*. Glasgow: Property and Environment Forum.

Behn, R. D. (2003). Why Measure Performance? Different Purposes Require Different Measures. *Public Administration Review*. **63** (5). page 586.

Belerson, B. V. (1954). Content Analysis. *Handbook of Social Psychology*. G. Lindzey. Readings: Addison Wesley.

Benchmarking Study Report. (1997). *Serving the American Public: Performance Measurement*. Accessed date 13/02/2004. http://govinfo.library.unt.edu/npr/library/papers/benchmrk/nprbook.html#summarybest

Bender, S., and Fish, A. (2000). Transfer of knowledge and the retention of expertise: the continuing need for global assignments. *Knowledge Management*. **4** (2). pp. 125-37.

Bennet, A. (2000). *Knowledge management: unlocking the potential of our intellectual capital*. Accessed date 15/08/2003. http://www.chips.navy.mil/archives/00_jan/km.htm

Bennet, J., and Brachman, P. (1998). Hospital Infections. Lippincott-Raven Publishers.

Berens, M. J. (2002). *Infection epidemic carves deadly path: Poor hygiene, overwhelmed workers contribute to thousands of deaths*. Chicago Tribune.

Berwick, D. Medical Associations: Guilds or Leaders? *British Medical Journal*. **314**. pp. 1564 - 1565.

Bititci, U. S. (2002). *Managing with Measures - Using performance measures to manage the performance of your business*. University of Strathclyde. Glasgow. Accessed date 12/03/2003. http://www.smartlink.net.au/library/bititci/managingwithmeasures.rtf

Blenkharn, J. I. (1995). The disposal of clinical wastes. *The Journal of Hospital Infection*. **30** (Supplement). pp. 514-20.

Block, P. (1987). *The Empowered Manager*. San Francisco: Jossey-Bass.

Boocock, G. (2004). *The opportunities, challenges and expectations in Winning Ways*. Infection prevention and control. DIPC S&O Acute Trust.

Boston, J., Martin, J., Pallot, J., and Walsh, P. (1996). *Public Management: The New Zealand Model*. Auckland: Oxford University Press.

Bouthillier, F., and Shearer, K. (2002). Understanding knowledge management and information management: the need for an empirical perspective. *Information Research*. **8** (1). pp. 141.

Boyd, N., Mindorff, C., and Bruce, D. (1995). *Infection prevention during construction/renovation in hospitals: sample policies and bibliography*. Sarnia, Ontario: St. Joseph's Health Centre.

Boyle, J. (2001). MRSA patients: proven methods to treat colonisation and infection. *Journal of Hospital Infection*. **48** (Supplement A). pp. S9 - S14.

Brachman, P. S. (1998). Chapter 1: Epidemiology of nosocomial infections. *Hospital Infections*. J. Bennet and P. Brachman. Lippincott-Raven Publishers.

British Institute of Facilities Management (BIFM). (2005). *Facilities Management Introduction*. Accessed date 02/12/2005. http://www.bifm.org.uk/bifm/about/facilities

Brooking, A. (1997a). The management of intellectual capital. *Journal of Long Range Planning*. **30** (3). pp. 364 - 65.

Bruijn, H. D., van-Wezel, R., and Wood, R. C. (2001). Lessons and issues for defining "facilities management" from hospitality management. *Facilities*. **19** (13-14). pp. 476-83.

Bureau of Justice Assistance. (2005). *Content Analysis - definition*. Accessed date 13/04/2006. http://www.ojp.usdoj.gov/BJA/evaluation/glossary/glossary_c.htm

Burmhal, B. (2003). Risky business - Organizations tackle infection control during construction. *Hospitals & Health Networks / AHA*. **77** (6). pp. 78-82.

Butler, P., and Batty, D. (2001). Filthiest NHS hospitals cleaned by private contractors. *Guardian*. **April issue**.

Byrne, M. (2001). Grounded theory as a qualitative research methodology. *AORN Journal*. **June issue**. (brief article).

Cahill, C. (2005). *Surveillance, Prevention and Control of Healthcare Associated Infections - Quality Standards*. Department of Health Services. New York. Accessed date 15/04/2006 http://www.dhs.ca.gov/home/publicnotices/PDFs/Surveillance_Prevention%20and%20Control%20of%20Healthcare-Associated%20Infections%20%E2%80%93%20Quality%20Indicators%20by%20Chris%20Cahil%20MS%20BS%20RN.pdf

Calkins, K. G. (2005). Definitions, uses, data types and levels of measurement. *An introduction to statistics - Lesson 1*, Andrews University. Accessed date 04/10/2005. http://www.andrews.edu/~calkins/math/webtexts/stat01.htm#QUANTITATIVE

Camillus, J. C. (1999). Putting strategy to work. *Quarterly Journal on Management*. **2** (4 - November issue).

Campbell, J. P. (1990). Modelling the performance prediction problem in industrial and organisational psychology. *Handbook of industrial and organisational psychology*. M. D. Dunnette and L. M. Hough. Palo Alto, California: Consulting Psychologists Press. pp. 687–732.

Canada Communicable Disease Report. (1998). *Infection Control Guidelines - Hand washing, cleaning, disinfection and sterilization in healthcare*. Volume 24S8. *ISSN 1188-4169*.

Carey, J. W. (1993). Linking qualitative and quantitative methods: Integrating cultural factors into public health. *Qualitative Health Research*. **3**. pp. 293-318.

Carley, K. (1990). *Content Analysis*. Edinburgh: Pergamon Press: The Encyclopaedia of Language and Linguistics.

Carrasco, M. (1987). Spanish activities in prevention and control of hospital infection. *Chemioterapia: International Journal of the Mediterranean Society of Chemotherapy*. **6** (3). pp. 164-68.

Casebeer, A. L., and Verhoef, M. J. (1997). Combining qualitative and quantitative research methods - considering the possibilities for enhancing the study of Chronic Diseases. *Chronic Diseases in Canada*. **18** (3). pp. 1-10.

Cash, J. I., and Lawrence, P. R. (1989). *The Information Systems Research Challenge: Qualitative Research Methods*. Harvard Business School.

Centres for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee (HICPAC). (2001). *Draft Guideline for Environmental Infection Control in Healthcare Facilities*. pages 198. Accessed 16/07/2005. http://www.cdc.gov/ncidod/hip/enviro/env_guide_draft.pdf

Chefurka, T., Nesdoly, F., and Christie, J. (2005). *Concepts in Flexibility in Healthcare Facility Planning, Design, and Construction*. The American Institute of Architects (AIA). Knowledge Communities.

Cho, H.-J. (1997). *Introduction to Categorical Data Analysis*. Accessed date 05/07/2004. http://www.socialresearchmethods.net/tutorial/Cho/intro.htm

Christensen, R. A. (2004). *How does accountability affect mission?*. ARNOVA. Los Angeles. Accessed date 08/05/2005. http://www.iga.vt.edu/papers/ChristenseEbrahimARNOVA2004.pdf

Chrusciel, D., and Field, D. W. (2003). From Critical Success Factors into Criteria for Performance Excellence – An Organizational Change Strategy. *Journal of Industrial Technology*. **19** (4). pp. 2 -10.

Clinical Standards Board for Scotland. (2002). *Healthcare Associated Infection (HAI) – Cleaning Services Standards*. pages 68. Accessed date 03/04/2002. http://www.clinicalstandards.org/pdf/finalstand/HAI_CLEANING.pdf

Code of Practice. (2003). Code of practice for cleaning. NHS Scotland Task Force groups for Infection control. Glasgow.

College of Audiologists and Speech Language Pathologists of Ontario Edition. (2006). *Infection control for regulated professionals*. Accessed date 14/06/06. http://www.caslpo.com/english_site/documents/InfectionControlCASLPOEDITION.pdf

College of Nurses of Ontario. (2004). *Infection Prevention and Control*. Practices standard. Report. No. 41002. ISBN 1-897074-34-4.

Colorado State University. (2003). *Conducting Content Analysis*. Accessed date 12/12/2003. http://writing.colostate.edu/guides/research/content/index.cfm

Communicable Diseases Network of Australia. (2002). *Infection control guidelines for the prevention of transmission of infectious diseases in the healthcare setting (Draft Version 3)*. Report nr. ICG PRELIMS 2002. Canberra. Accessed 12/06/2003. http://www.health.gov.au/pubhlth/strateg/communic/review/icg_pdf/icg_guide.pdf

Community Forestry Field Manuals, (1990). *The community's toolbox: The idea, methods and tools for participatory assessment, monitoring and evaluation in community forestry*. FAO. Accessed date 02/08/2004. http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/x5307e/x5307e08.htm

Comptroller and Auditor General. (2000). *The Management and Control of Hospital Acquired Infection in Acute NHS Trusts in England*. Report nr. HC 230 Session 1999–00. pages 121. Accessed date 12/02/2003. http://www.nao.gov.uk/publications/nao_reports/9900230.pdf

Comptroller and Auditor General. (2004). *Improving patient care by reducing the risk of hospital acquired infection: a progress report*. National Audit Office. *Report nr. HC876*.

Conner, M. L. (2005). *Informal Learning*. Ageless Learner. Accessed date 30/03/2006. http://agelesslearner.com/intros/informal.html

Creswell, J. W. (1994). *Research design - qualitative and quantitative approaches*. Thousand Oaks, California: Sage.

Creswell, J. W. (1998). *Qualitative inquiry and research design - choosing among five traditions*. Thousand Oaks, California: Sage.

Creswell, J. W. (2003). *Research design - qualitative, quantitative and mixed methods approaches*. 2nd edition. Thousand Oaks, California: Sage.

Crosby, P. B. (1979). *Quality is free - the art of marking quality certain*. New York: McGraw-Hill.

Cross, R., and Baird, L. (2000). Technology is not enough: Improving performance by building organizational memory. *MIT Sloan Management Review*. **41** (3). pp. 69-78.

Cupchik, G. (2001). Constructivist realism: An ontology that encompasses positivist and constructivist approaches to the social sciences. *Forum Qualitative Social Research*. **2** (1).

Curran, E. (2003). *Hospital Acquired Infection Prevention Guidelines (HAIPG) - Version 14*. Greater Glasgow NHS Board. Based on the Published EPIC Guidelines, Guidelines from the Centres for Disease Control and Hospital Infection Society Guidelines Part II - Explanations & Details of Guidelines.

Damani, N. N. (2003). *Manual of Infection Control Procedures*. A. M. Emmerson. 2nd Edition. London: Greenwich Medical Media Limited. ISBN 1841101079

Damian, D. E. (2001). *A research methodology in the study of requirements*, Negotiations in geographically distributed software teams. Victoria: University of Victoria.

Dancer, S. J. (1999). Mopping up hospital infection. *The Journal of Hospital Infection*. **43** (2). pp. 85-100.

Daschner, F. D., and Dettenkofer, M. (1997). Protecting the patient and the environment new aspects and challenges in hospital infection control. *Journal of Hospital Infection*. **36**. pp. 7-15.

Davenport, T. H., and Prusak, L. (1998). *Working Knowledge - How organisations manage what they know*. Harvard Business School Press.

Davies, A. (2004). *Review of performance management models and performance improvement tools*. Improvement through Performance Management, Measurement and Information.

Davies, S. (2005). *Hospital contract cleaning and infection control*. UNISON. Accessed date 13/08/2005. http://www.unison.org.uk/acrobat/14564.pdf

Denning, S. (2000). *Technology for Knowledge Management*. The website for business and organisational storytelling. Accessed date 15/04/2004. http://www.stevedenning.com/technology_knowledge_management.html

Denton, M., Wentworth, S., Yellowlees, P., and Emmerson, B. (1999). Clinical pathways in mental health. *Australasian Psychiatry*. **7** (2). pp. 75-77.

Denzin, N. K. (1978). *The Research Act*. New York: McGraw-Hill.

Denzin, N. K., and Lincoln, Y. S. (1994). *Handbook of Qualitative Research*. Beverly Hills: Sage publications.

Denzin, N. K., and Lincoln, Y. S. (1998). *Collecting and Interpreting Qualitative Materials*. Beverly Hills: SAGE Publications.

Department of Defence – United States. (1996). *Air University Sampling and Surveying Handbook - Guidelines for planning, organizing, and conducting surveys*. 4th Edition. pages 89.

Department of Health and Social Security - DHSS. (1972). *Cleaning frequencies in Acute and General Hospitals*. Hospital Domestic Management Advice notes No. 1.

Department of Health and Social Security - DHSS. (1979). *Quality Control*. Hospital Domestic Management Advice notes No. 4.

Department of Health. (1993). *Risk management in the NHS*. National Health Service Management Executive.

Department of Health. (1995). *Clinical Governance in the new NHS*. Accessed date 15/03/2003. http://www.doh.gov.uk/nyro/clingov/links.htm

Department of Health. (1999a). *Improving Quality and Performance in the New NHS: Clinical Indicators and High Level Performance Indicator*. NHS-Executive. Report nr. HSC 1999/139. London.

Department of Health. (1999b). *New framework for managing hospital acquired infections*. A Plan for Action.

Department of Health. (2000). *Corporate Governance in the new NHS: controls assurance standards 1999/2000: risk management and organizational controls*. Report nr. HSC 1999/23. Accessed date 15/06/2003. http://tap.ccta.gov.uk/doh/rm5.nsf/publications?openview

Department of Health. (2001a). EPIC Guidelines. *Journal of Hospital Infection*. **47 (Supplement): S5 - S9**.

Department of Health. (2001b). *NHS Performance Indicators: A consultation*. Accessed date 15/08/2003. http://www.doh.gov.uk/piconsultation/haicar.htm

Department of Health. (2001c). Standard Principles for preventing hospital acquired infections. *Journal of Hospital Infection*. **47(Supplement): S21-S37**.

Department of Health. (2002). *Getting ahead of the curve: a strategy for combating infectious diseases including other aspects of health protection*. Crown Copyright.

Department of Health. (2003). *Winning Ways*. Department of Health - Chief Medical Officer. Working together to reduce healthcare associated infection in England. London.

Department of Health. (2004a). *NHS sets up the fight against hospital infections*. DoH Headquarters. Report number 2004/0368. London.

Department of Health. (2004b). *Infection control training for over one million NHS staff*. DoH Headquarters. *Report number 2004/0395*. London.

Department of Health. (2004c). *Towards cleaner hospitals and lower rates of infection*. A Plan for Action.

Department of Health. (2004d). *Infection control IT implementation and evaluation project*. Health Protection Agency Centre for Infections. Healthcare Associated Infection and Antimicrobial Resistance Department (HCAI and AMR). London.

Department of Health. (2005). *NHS Performance Ratings 2004/05*. Accessed date 12/07/2005. http://www.addenbrookes.org.uk/resources/pdf/governors/2005/mar2005/c2_perform_240305.pdf

Department of Human Services – Australia. (1998a). *Infection Control in Victorian Public Hospitals*. Work practice guidelines. Acute Health Division Victorian Government. Accessed date 03/03/2004. http://www.health.vic.gov.au/infcon/infcon2/work.htm

Department of Human Services – Australia. (1998b). *Infection Control - Literature Review*. A Victorian State Government Department. Accessed date 23/04/2003. http://infectioncontrol.health.vic.gov.au/infcon/index.html

Department of Human Services – Australia. (2000). *Guidelines for Infection Control Strategic Management Planning*. Victorian Government, Melbourne. Accessed date 30/06/2005. http://infectioncontrol.health.vic.gov.au/ic/manplan4.htm

Department of Human Services – Australia. (2005a). *VICNISS hospital acquired infection project*. Infection Control & Prevention in Victoria's Hospitals. Victorian Government. Victorian Government, Melbourne. Accessed date 30/06/2005. http://infectioncontrol.health.vic.gov.au/links.htm

Department of Human Services – Australia. (2005b). *Cleaning Standards for Victorian Public Hospitals - Revised version*. State of Victoria. *ISBN 07311 60509*. Victorian Government, Melbourne. Accessed date 15/04/2005. http://www.health.vic.gov.au/cleaning/vicclean.pdf

Department of Medicine. (2003). *Infection Control/Hospital Epidemiology*. University of Rochester Medical Centre. Accessed date 25/06/2004. http://www.urmc.rochester.edu/infdis/infcntrl.htm

Department of Public Health and Policy. (2001). *Research brief - hospital acquired infections*. London School of Hygiene and Tropical Medicine. *Report no. 5*. The press office, London. Accessed date 21/08/2003. http://www.lshtm.ac.uk/php/publications/briefing5.pdf

Dereshiwsky, M. (1999). *Introduction to Interviewing*. Northern Arizona University.

Dettenkofer, M. (2001). Current challenges on hospital hygiene. *Gesundheitswesen (Bundesverband Der Arzte Des Offentlichen Gesundheitsdienstes - Germany)*. **63** (Supplement 2). pp. S139-S41.

Dettenkofer, M., Seegers, S., Antes, G., Motschall, E., Schumacher, M., & Daschner, F. D. (2004). Does the architecture of hospital facilities influence nosocomial infection rates? - A systematic review. *Infection Control and Hospital Epidemiology*. **25** (1). pp. 21-25.

Dick, B. (1993). *You want to do an action research thesis?*. Action research thesis. Accessed date 25/11/2004. http://www.scu.edu.au/schools/gcm/ar/art/arthesis.html

Donabedian, A. (1980). *The definition of quality and approaches to its assessment*. Ann Arbor, MI: Health Administration Press.

Douglas, J. (1996). Building performance and its relevance to facilities management. *Facilities*. **14** (3). pp. 23-32.

Drummond, M. F. D., L M. (1991). Evaluation of the costs and benefits of reducing hospital infection. *The Journal of Hospital Infection*. **18** (Supplement A). pp. 85-93.

Du Moulin, G. (1989). Minimizing the potential for nosocomial pneumonia: architectural, engineering, and environmental considerations for the intensive care unit. *European Journal of Clinical Microbiology & Infectious Diseases: Official Publication of the European Society of Clinical Microbiology*. **8** (1). pp. 69-74.

Earl, L. (2002). *Are we managing our knowledge?*. Science, Innovation and Electronic Information Division. Results from the pilot Knowledge Management Practices Survey, 2001. Canada.

Easterby-Smith, M., Thorpe, R., and Lowe, A. (1991). *Management Research - An Introduction*. London: Sage Publications.

Educational Policy Reform Research Institute. (2002). *Creating Performance Goals and Indicators in Special Education*. The Institute for the Study of Exceptional Children and Youth. University of Maryland. Maryland.

Egbu, C. O., and Botterill, K. (2002). Information technologies for knowledge management - their usage and effectiveness. *ITcon*. **Vol. 7** (Special Issue ICT for Knowledge Management in Construction). pp. 125-37.

Egbu, C. O., Liyanage, C. L., and Kashiwagi, D. (2004). Non-integration of FM to the core processes of healthcare - problems and solutions. *CIB W070 Symposium*. Hong Kong. December 7th and 8th 2004. pp. 295-306.

Eickhoff, T. C. (1994). Airborne nosocomial infection: a contemporary perspective. *Infection Control and Hospital Epidemiology: The Official Journal of the Society of Hospital Epidemiologists of America*. **15** (10). pp. 663-72.

Eisen, S. (1996). Client satisfaction and clinical outcomes. Do we need to measure both? *Behavioural Healthcare*. **5** (4). pp. 71-73.

Emmanuel, C., Otley, D., and Merchant, K. (1990). *Accounting for Management Control*. London: Chapman and Hall.

Emmerson, A. M., and Ayliffe, G. A. J. (1996). *Surveillance of Nosocomial Infections*. Bailliere's clinical infectious diseases. London: Bailliere Tindall.

Environmental Services Working Group Report. (2001). *Part 3: Recommendations*. Economic Review Committee Sub-committee on Domestic Enterprises. Environmental Services Working Group report.

Environmental software and services. (2002). *GAIA: A Multi-Media Tool for Natural Resources Management and Environmental Education*. ESS - Environmental Information Systems. Austria. Accessed date 11/04/2004. http://www.ess.co.at/GAIA/gaia_intro.html

Fielder, I. R. (2003). *What is Facilities Management*. Facilities Management Introduction. BIFM - British Institute of Facilities Management. Essex. Accessed date 17/11/2004. http://www.bifm.org.uk

Fielding, N., and Fielding, J. (1986). *Linking data: the articulation of qualitative and quantitative methods in social research*. London: Sage Publications.

Fielding, N., and Schreier, M. (2001). Introduction on the Compatibility between Qualitative and Quantitative Research Methods. *Forum Qualitative Social Research*. **2** (1).

Filetoth, Z. (2003). *Hospital Acquired Infection: Causes and Control*. London: Whurr Publisher Ltd. ISBN 1861563442

Frankfort-Nachmias, C., and Nachmias, D. (1996). *Research methods in the social sciences*. London: Arnold.

Froud, J., and Shaoul, J. (2001). Appraising and Evaluating PFI for NHS Hospitals. *Financial Accountability and Management*. **17** (3). pp. 247.

Fuchs, V. (1973). *The output of the health industry*. Health Economics. M. Cooper and A. Culyer. Harmondsworth: Penguin.

Gastmeier, P. G., Christine, S.D., Dettenkofer, M., Daschner, F., Rüden H. (2003). Five years working with the German nosocomial infection surveillance system (Krankenhaus

Infektions Surveillance System). *American Journal of Infection Control*. **31** (1). pp. 316-321.

Gittins, R. (1997). *Qualitative research: an investigation into methods and concepts in qualitative research*. School of Informatics, University of Wales Bangor

Glaser, B. G., and Strauss, A. L. (1967). *The discovery of grounded theory - strategies for qualitative research*. Chicago: Aldine.

Glasgow Caledonian University. (2004). *Mapping knowledge on controlling and avoiding healthcare associated infections*. Glasgow Caledonian University. Knowledge Transfer Project report. Glasgow.

Glennan, T. K., and Melmed, A. (1996). *Fostering the use of educational technology: elements of a national strategy*. Santa Monica: RAND Corporation. ISBN 0833023721

Glover, G., and Kami-Gould, E. (1996). Performance indicators in mental health services. *Commissioning mental health services*. G. Thornicroft and S. Strathdee. London: HMSO.

Goethem, G. V. (2005). Research and development projects of EC in Nuclear Fission area: research, education and innovation. *International conference on role of nuclear energy in the energy policy of Slovakia and EU*. Bratislava, Slovakia.

Gopalakrishna, G., Choo, P., Leo, Y. S., Tay, B. K., Lim, Y. T., Khan, A. S., and Tan, C. C. (2004). SARS transmission and hospital containment. *Emerging Infectious Diseases*. **10** (3).

Government of Ontario. (2003). Chapter two - Infection Control. *Ministry Reports (Walker Panel 2003)*. Ontario, Canada: Ministry of Health and Long-Term care.

Gray, J. H., and Densten, I. L. (1998). Integrating quantitative and qualitative analysis using latent and manifest variables. *Quality and Quantity*. **32**. pp. 419- 431.

Greene, J. (2003). Design & construction. A Pebble at a time. *Hospitals & Health Networks / AHA*. **77** (6). pp. 18 - 20.

Griffith, C. J., Cooper, R. A., Gilmore, J., Davies, C., and Lewis, M. (2000). An evaluation of hospital cleaning regimes and standards. *Journal of Hospital Infection*. **45**. pp. 19-28.

Gundlapalli, A., and Eutropius, L. J. (2004). *Nosocomial Infections*. The Healthcare of Homeless Persons - Part III - Nosocomial Infections. Accessed date 17/04/2005. http://www.bhchp.org/BHCHP%20manual/pdf_files/Part3_PDF/Nosocomial_Infections.pdf

Gunroth-Olsson, C. (2000). *Analyse of workplace management and workplace design in Swedish companies*. M.Sc. Dissertation, Royal Institute of Technology. Sweden.

Haas, M. R. (2002). *The benefits of healthcare beyond health - an exploration of non-health outcomes of health*. PhD thesis. Faculty of Medicine, University of Sydney.

HAI Task Force Secretariat. (2004). *Minutes of the meeting - Group No. 6*. Property Environment Forum Executive. Scotland

HAI Task Force Secretariat. (2005). *Infection Control: Organisational Issues*. Scottish Executive Health Department. Chief Executive NHS Boards. Edinburgh.

Haines, M. (2002). *'Knowledge Management' a new approach to improving health and social care*. NHS modernization agency. Accessed date 19/12/2003.
http://www.wmswdc.nhs.uk/Presentations/KM/worcester227.ppt

Hammersley, M., and Atkinson, P. (1983). *Ethnography: principles in practice*. London: Tavistock.

Handler, A., Issel, M., and Turnock, B. (2001). A conceptual framework to measure performance of the public health system. *American Journal of Public Health*. **91** (8).

Handy, C. (2002). *The elephant and the flea: new thinking for a new world*. p. 84-94. Vibrog: Norhaven Paperback.

Hansard. (2000). Written Answers: Cleaning and Hygiene Services. **12** (col. 211).

Hanson, P. J., Jeffries, D. J., Batten, J. C., and Collins, J. V. (1988). Infection control revisited: dilemma facing today's bronchoscopists. *British Medical Journal*. **297** (6642). pp. 185-87.

Harris, J., and Nicholas, J. R. (2002). *Maine's guide to performance measurement*. Bureau of the Budget and State Planning Office. Augusta.

Harris, M., and Johnson, O. (2000). *Cultural Anthropology*. 5th edition. Needham Heights: MA: Allyn and Bacon.

Harrison, S. (2004). Battling to beat the bugs - an analysis. *Nursing Standard*. **18** (45). pp. 11-13.

Health Canada. (1998). *Hand washing, cleaning, disinfection and sterilisation in healthcare*. Policies and guidelines for infection control. CDC guidelines.

Health Protection Agency Communicable Disease Surveillance Centre for the Department of Health. (2005). MRSA surveillance system: Statistical data. Accessed date 05/06/2005.
http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsStatistics/PublicationsStatisticsArticle/fs/en?CONTENT_ID=4085951&chk=HBt2QD

Healthcare Associated Infection in Scotland - Report from the Ministerial Convention. (2001). A. Jarvie. Glasgow Caledonian University. Glasgow

Healthcare Infection Control Practices Advisory Committee. (2005). *Guidance on public reporting of Healthcare Associated Infections*. Recommendations of the Healthcare Infection Control Practices Advisory Committee. Accessed date 12/06/2005.
http://www.ihatoday.org/issues/quality/reportguidance.pdf

Heavisides, B., and Price, I. (2001). Input versus output-based performance measurement in the NHS - the current situation. *Facilities*. **19** (10). pp. 344 - 56.

Hill, J., and Wright, L. T. (2001). A qualitative research agenda for small to medium-sized enterprises. *Marketing Intelligence and Planning*. **19** (6). pp. 432-43.

Hinks, J., Egbu, C., Docherty, C., Hoy, D., Haggarty, P., and Liyanage, C. (2003). *Mapping Knowledge on Controlling and Avoiding HAIs*. Knowledge Transfer Grant Proposal.

Holsti, O. R. (1969). *Content Analysis for the Social Sciences and Humanities*. Reading: Mass.

Horton, R., and Parker, L. (2002). *Informed Infection Control Practice*. 2nd Edition. Edinburgh: Churchill Livingstone. ISBN 0443071020

House of Lords Select Committee on Science & Technology. (1998). *Resistance to antibiotics and other antimicrobial agents*. The Seventh Report of the House of Lords Select Committee on Science and Technology.

Hull, H. (2000). *Mentoring*. Encyclopedia of Educational Technology. Accessed date 14/05/2006. http://coe.sdsu.edu/eet/Articles/mentoring/start.htm

Human Resource and Organisational Development Consultancy (HRODC) (2003). Organisational structuring and organisational restructuring.

Hutchinson, J., and Huberman, M. (1993). *Knowledge Dissemination and use in Science and mathematics education - A literature review*. The National Science Foundation. *Report number NSF 93-75 (EHR/ RED)*.

Hyde, K. F. (2000). Recognising deductive processes in qualitative enquiry. *Qualitative Market Research - An International Journal*. **3** (2). pp. 82-89.

Infection Control Nurses Association. (1998). *Guidelines for Hand Hygiene*. Report Nr. ICNA/Deb. West Lothian.

Information Technology at CSU Monetary Bay. (2004). *Knowledge Transfer - definition*. Accessed date 16/11/2005. http://it.csumb.edu/departments/data/glossary.html

Institute of Health Services Management Policy Unit. (1993). *Future Healthcare Options: Final Report*. London.

Jacobsen, M. (1999). *Complementary Research Methods*. Accessed date 30/03/2004. http://www.ucalgary.ca/~dmjacobs/phd/methods/

Janetzko, D. (2001). Processing Raw Data both by the Qualitative and Quantitative Way. *Forum Qualitative Social Research*. **2** (1).

Johnson, R. B., and Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*. **33** (7). pp. 14–26.

Joint Commission – Facilities Management and Safety. (2005). Facilities Management and Safety and Infection Control. *International Newsletter*. **3** (2).

Joint Commission Resources – Performance Improvement. (2005). *Performance Improvement in Infection Control*. Improving Healthcare Quality and Safety. Accessed date 03/08/2005. http://www.jcrinc.com/publications.asp?durki=10236&site=153&return=8455

Jordan, G., Prevette, S., and Woodward, S. (2001). *The performance-based management handbook - analysing, reviewing and reporting performance data*. A six-volume compilation of techniques and tools for implementing the Government Performance and Results Act of 1993 (GPRA). Performance Based Management Special Interest Group (PBMSIG). Laboratory Administration Office, University of California.

Jorgenson. (1989). *Qualitative Data Analysis paper (QDA Paper)*. Accessed date 29/04/2004. http://www.quarlisresearch.comhttp://www.quarlisresearch.com

Junginger, J. (1996). Psychosis and violence: the case for a content analysis of psychotic experience. *PubMed - National Library of Medicine*. **22** (1). pp. 91-103.

Kagioglou, M., Cooper, R., and Aouad, G. (2001). Performance Management in Construction: A Conceptual Framework. Accessed date 14/05/2003. http://pp2.dct.salford.ac.uk/pdf/Performance%20Management%20in%20Contruction.pdf

Kahn, M. G., Steib, S. A., Fraser, V. J., and Dunagan, W. C. (1993). An expert system for culture-based infection control surveillance. *Proceedings/ The Annual Symposium On Computer Application [Sic] In Medical Care. Symposium on Computer Applications in Medical Care*. pp. 171-75.

Kaplan, R. S., and Norton, D. P. (1992). The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review*. **70** (1). pp. 71-79.

Kato, S. (2002). A Study of Research Method. *A Japanese Journal (translated version)*. **4** (1). pp. 101-111.

Katz, J. M., and Green, E. (1997). *Managing Quality: A guide to system-wide Performance Management in Healthcare*. 2nd Edition. Missouri: Mosby.

Kazandjian, V. (1995). From Red Adair to Smokey Bear: the renaissance of common sense in healthcare. *Clinical Performance and Quality Healthcare*. **3** (1). pp. 48-50.

Keen, J., and Packwood, T. (1995). Qualitative Research - Case study evaluation. *British Medical Journal*. **311** (August). pp. 444-446.

Kelle, U. (2001). Sociological Explanations between Micro and Macro and the Integration of Qualitative and Quantitative Methods. *Forum Qualitative Social Research*. **2** (1).

Kennedy, A. (1996). Support Services. *Facilities Management - theory and practice*. K. Alexander. London: E & FN Spon. pp. 134 - 145.

Kennerley, M., and Neely, A. D. (2000). Performance Measurement Frameworks – A Review. *Performance Measurement - Past, Present, Future*. Cambridge. July 2000.

Kibbler, C. C., Quick, A., and O'Neill, A. M. (1998). The effect of increased bed numbers on MRSA transmission in acute medical wards. *The Journal of Hospital Infection*. **Volume 39** (Issue 3). pp. 213-219.

Kincaid, D. G. (1994). Measuring Performance in Facilities Management. *Facilities*. **12** (6). pp. 17-20.

King, A. (2000). *The New Zealand health strategy*. Ministry of Health. Wellington. *ISBN 0-478-23941-6*.

Knowledge Management Specialist Library. (2005). *Knowledge Harvesting*. Accessed date 04/07/2006. http://www.library.nhs.uk/knowledgemanagement/ViewResource.aspx?resID=93815&catID=9379

Knowledge Management Strategic Advisory Committee. (2002). *Summary Report*. Ontario Hospital Association. Accessed date 06/03/2002. http://www.oha.com/OHA/6ppknow.nsf/79b131cbff9661a085256b5e005b4779/cb054d518f8241e785256bdd0070aafc/$FILE/KMsumrepmarch2002.pdf

Kotzé, M., and Nkado, R. (2003). An investigation of the use of facilities management in institutions of higher learning in South Africa. *CIDB 1st Postgraduate Conference*. Port Elizabeth, South Africa. pp. 241 - 54.

Koulopoulos, T., and Frappaolo, C. (1999). *Smart Things to Know about Knowledge Management*. Dover, NH: Capstone.

Krippendorff, K. (1980). *Content Analysis: an introduction to its methodology*. Newbury Park and London: Sage.

Kuehne, V. S., and Kaplan, M. S. (2001). *Evaluation and research on intergenerational-shared site facilities and programs: what we know and what we need to learn*. Generations United Background Paper: Project SHARE. Accessed date 12/05/2003. http://intergenerational.cas.psu.edu/Docs/ResearchSharedSites.pdf

Lane, D. M. (1993). *HyperStat Online Statistics textbook*. Statistically significant consulting, LLC. Accessed date 21/02/2005. http://davidmlane.com/hyperstat/index.html

Larson, E. (2003). Status of practice guidelines in the United States: CDC guidelines as an example. *Preventive Medicine*. **36** (5). pp. Pages 519-24. Science Direct

Lauer, C. S. (2006). *Performance Management - financial and performance goals are met*. Price Water House Coopers. Accessed date 20/05/2006. http://healthcare.pwc.com/st200301.html

Lee, A. B. (1999). *Scales of measurement*. Accessed date 30/11/2004. http://web.uccs.edu/lbecker/SPSS/scalemeas.htm

Legislative Analyst's Office - California. (2004). *In-Home Supportive Services*. Accessed date 25/10/2005. http://www.lao.ca.gov/analysis_2004/health_ss/hss_18_ihss_anl04.htm

Legislative Council Select Committee - Hong Kong. (2003). *Chapter 13 - Infection Control Measures*. Severe Acute Respiratory Syndrome outbreak. Government hospital authority, Central Hong Kong. pp. 213-232.

Lester, S. (1999). *An introduction to phenomenological research*. Accessed date 14/07/2005. http://www.devmts.demon.co.uk/resmethy.htm

Lichiello, P. (1999). *Guidebook for Performance Measurement - Turning Point National Program Office*. Seattle WA. p. 48.

Lincoln, Y. S., and Guba, E. G. (1985). *Naturalistic inquiry*. Sage: Beverly Hills.

Lingle, J. H., and Schiemann, W. A. (1996). From balanced scorecard to strategic gauges: is measurement worth it? (Strategic measurement management). *Management Review*. **85**. pp. 56-61.

Little, R. J. A., and Rubin, D. B. (1987). *Statistical analysis with missing data*. New York: John Wiley & Sons.

Liyanage C., Egbu C. (2004), *FM services have vital role – infection control,* Journal of Health Estate, October issue 2004, pp. 47-54.

Liyanage C., Egbu C. (2005), *Controlling HAI and the role of FM in achieving 'Quality' in Healthcare: A Three-Dimensional View,* Facilities, 23 (5/6), pp. 263-277.

Long, A. F., and Harrison, S. (1985). *Health Services Performance: Effectiveness and efficiency.* London: Croom Helm Ltd. ISBN 0709916728

Loosemore, M., and Hsin, Y. Y. (2001). Customer-focused benchmarking for facilities management. *Facilities*. **19** (13). pp. 467-76.

Lowry, R. (2001). *Mann-Whitney test*. Accessed date 03/12/2003.
http://faculty.vassar.edu/lowry/utest.html

MacDonald, A. A. (2002). *A report on MRSA bacteraemias, as an indicator of hospital acquired infection, in Ayr, Biggart, Ayrshire Central and Cross house Hospitals*. Trust Management Group meeting.

Mackenzie, S. (1995). Surveying the organisational culture in an NHS Trust. *Journal of Management in Medicine*. **9** (6). pp. 69-77.

MacMorrow, N. (2001). Knowledge management: an introduction. *Annual Review of Information Science and Technology*. pp. 381 - 422.

Maki, D. G. (1989). The use of antiseptics for hand washing by medical personnel. *Journal of Chemotherapy*. **1** (11). pp. 3-11.

Mallak, L. A., Lyth, D. M., Olson, S. D., Ulshafer, S. M., and Sardone, F. J. (2003). Culture, the built environment and healthcare organizational performance. *Facilities*. **13** (1). pp. 27-38.

Malone, F. L. (2001). *Teaching Strategic Planning*. Texax Southern University. Accounting resources.

Marshall, C., and Rossman, G. B. (1989). *Designing Qualitative Research*. Newbury Park California: Sage Publications.

Martinez, J. (2001). Assessing quality, outcome and performance management. *Workshop on Global Health Workforce Strategy,* 9-12 December 2000. Annecy, France.

Masterton, R. G., Mifsud, A. J., and Rao, G. G. (2003). Review of hospital isolation and infection control precautions. *Journal of Hospital Infection*. **54** (No. 03). pp. 171-73.

Maula, M. (2000). The senses and memory of a firm – implications of autopoiesis theory for knowledge management. *Journal of Knowledge Management*. **4** (2). pp.157-61.

May, D. (2000). Infection Control. *Continuing Professional Development*. **14** (28). pp. 51-60.

McAdam, R., and McCreedy, S. (1999). A critical review of knowledge management models. *The Learning Organisation*. **6** (3). pp. 91-100.

McCampbell, A. S., Clare, L. M., and Gitters, S. H. (1999). Knowledge management: the new challenge for the 21st century. *Journal of Knowledge Management*. **3** (3). pp. 172-79.

McGlynn, E. A. (1998). Developing a clinical performance measure. *American Journal of Preventive Medicine*. **14** (Supplement 3). pp. 14-21.

Medical Research Council. (1944). *The Control of Cross Infection in Hospitals*. War Memorandum No. 11 - Memorandum prepared for the Committee on preventive medicine of the medical research council by the sub-committee on Cross infection in Hospital Wards. His Majesty's stationary office - London.

Medical Research Council. (1945). *The sterilisation, use and care of syringes*. War Memorandum 15 - A Committee appointed by the medical research council. His Majesty's Stationery Office - London.

Medical Research Council. (1951). *The Control of Cross Infection in Hospitals*. War Memorandum No. 11 (Revised Edition): The cross infection in hospitals committee of the medical research council. His Majesty's stationary office - London.

Meers, P. D., Ayliffe, G. A. J., and Emmerson, A. M. (1981). Report on the national survey of infection in hospitals. *Journal of Hospital Infection*. **2** (Suppl). pp. 1-51.

Meers, P., Jackobsen, W., and McPherson, M. (1992). *Hospital Infection Control for Nurses*. London: Chapman and Hall.

Meers, P., McPherson, M., and Sedgwick, J. (1997). *Infection Control in Healthcare*. 2nd Edition. Cheltenham: Stanley Thornes (Publishers) Ltd.

Mehtar, S. (1992). *Hospital infection control: Setting up with minimal resources*. Oxford: Oxford University Press. ISBN 0192622668

Mercier, C. (1997). *Infection Control: Hospital & Community*. Cheltenham: Stanley Thrones (Publishers) Ltd.

Mertens, R. A. F. (1996). Methodologies and results of national surveillance. *Baillieres Clinical Infectious Diseases*. **3**. pp. 159 - 78.

Miles, H., and Huberman, M. (1994). *Qualitative Data Analysis: A Sourcebook*. Beverly Hills: Sage Publications.

Millennium Ecosystem Assessment. (2003). Introduction and Conceptual Framework. *Ecosystems and human well-being*. Washington: Island Press.

Ministry of Foreign Affairs - Denmark. (1999). *Evaluation Guidelines*. Evaluation Development. *ISBN: 87-7964-087-7*. Danida.

Ministry of Health. (1959). *Staphylococcal infections in hospitals*. Report of the Sub-Committee Central health services council - Standing medical advisory committee. Her Majesty's Stationery Office.

Mintzberg, H. (1994). *The rise and fall of strategic planning*. Basic Books.

Miriam-Webster's Collegiate Dictionary. (1994). 10th Edition. Springfield: MA: Miriam-Webster, Inc.

Mooraj, S., Oyon, D., and Hostettler, D. (1999). The balanced scorecard: a necessary good or an unnecessary evil? *European Management Journal*. **17** (5). pp. 481-191.

Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: applications to health research. *Qualitative health research*. **8** (3). pp. 362-76.

Morris, R. (1994). Computerized Content Analysis in Management Research: A Demonstration of Advantages & Limitations. *Journal of Management*. **20** (4). pp. 903-31.

Moscarola, J. (2002). Contribution of qualitative methods to research work and organisational psychology. *Communication to ISSWOV 2002*. Varsaw. June 2002.

Moustakas, C. (1994). Designing funded qualitative research. *Handbook of qualitative research*. N. K. Denzin and Y. S. Lincoln. Thousand Oaks: California: Sage publications.

Murphy, J. (2002). *Literature Review on Relationship between Cleaning and Hospital Acquired Infection*. Accessed date 15/04/2003. http://www.cupe.ca/downloads/cleaning_and_infection_control.pdf

Murray, C. J. L., and Frenk, J. (2000). A framework for assessing the performance of health systems. *Bulletin of the World Health Organization*. **78** (6).

Myers, M. D. (1997). Qualitative Research in Information Systems. *MIS Quarterly*. **21** (2). pp. 241-42.

Myers, Nielson, Avison, and Lau. (1999). Action Research. *Communication of the ACM*. **4** (1). pp. 94-97.

Nabudere, D. W. (2002). *The epistemological and methodological foundations for an all-inclusive research paradigm for 'field building' and inter-subjective accommodation*. Mbale: Afrika Study Centre.

Nani, A. J., Dixon, J. R., and Vollmann, T. E. (1990). Strategic control and performance measurement. *Journal of Cost Management*. **Summer Volume**. pp. 33-42.

National Council on Compensation Insurance. (2003). *Domestic service workers - work classifications*. Scopes Manual. *Report number 0918*.

National Electronic Library for Health. (2005). *Specialist Library - Knowledge Management*. Accessed date 25/02/2006. http://www.nelh.nhs.uk/knowledge_management/glossary/glossary.asp#m

National Excellence Collaborative. (2005). *Performance Management Collaborative*. Accessed date 12/09/2005. http://www.turningpointprogram.org/Pages/perfmgt.html

National Health and Medical Research Council (NHMRC) and Australian National Council on AIDS (ANCA). (1996). *Infection Control in the Healthcare Setting: Guidelines for the Prevention of Transmission of Infectious Diseases*. AGPS, Canberra.

National Health Ministry - Australia. (1999). *Third National Report on Health Sector Performance Indicators*. pages106. Accessed date 15/07/2004. http://www.health.gov.au/pq/sq/pdf/3rdpi.pdf

Neely, A. (1999). The performance measurement revolution: why now and what next? *International Journal of Operations & Production Management*. **19** (2). pp. 205-28.

Neely, A. N. (2000). A survey of gram-negative bacteria survival on hospital fabrics and plastics. *The Journal Of Burn Care & Rehabilitation*. **21** (6). pp. 523-27.

Neely, A., Gregory, M., and Platts, K. (1995). Performance measurement system design: a literature review and research agenda. *International Journal of Operations and Production Management*. **15** (4). pp. 85-116.

Neely, A., Mills, J., Platts, K., Gregory, M., and Richards, H. (1996). Performance Measurement system design: Should process based approaches be adopted. *International Journal of Production Economics*. (**46-47**). pp. 423-31.

Nelson, B. (2000). *Are Performance Appraisals Obsolete?* Performance Appraisals - Compensation and Benefits Review. Sage Publications, Inc.

New South Wales Health. (2004). *Healthcare Associated Infections*. New South Wales. Accessed date 14/05/2005. http://www.health.nsw.gov.au/health_pr/infectdefs.html

Newton, J. (2003). *Infection control in a hospital during a construction project*. Engineering Systems. Accessed date 14/05/2005. http://www.esmagazine.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,2500,102638,00.html

NHS Education - Scotland. (2003). *Information Resource: To support the introduction of assigned staff to champion infection prevention and control*. Healthcare Associated Infection: Education for prevention and control.

NHS Estates and Department of Health. (2004). *The Matron's Charter: An Action Plan for Cleaner Hospitals*. NHS. pages 31. October 2004.

NHS Estates. (1998). *Health Facilities Note (HFN) 17 - a business approach to facilities management*. HMSO Publications, London.

NHS Estates. (1999). *NHS Performance Assessment Framework*. Accessed date 07/07/2004. http://nww.doh.nhsweb.nhs.uk/pbnp/pb1999b

NHS Estates. (2001a). *National Standards of cleanliness for the NHS*. April 2001. Her Majesty's Stationery Office, Norwich. ISBN 011-322429 X

NHS Estates. (2001b). *Guide No1: Domestic services*. Healthcare Facilities Consortium. Facilities Management good practice guides. Department of Health.

NHS Estates. (2001c). *Infection Control in the Built Environment: Design and Planning*. Health Building Notes : **HBN 30**. *ISBN 0-11-322000-0*. Accessed date 14/08/2003. http://www.nhsestates.gov.uk/download/publications_guidance/infectn.pdf

NHS Estates. (2001d). *Housekeeping - a first guide to new, modern and dependable ward housekeeping services in the NHS*. Department of Health. Accessed date 02/10/2004.
http://www.nhsestates.gov.uk/download/ward_housekeeping/housekeeping.pdf

NHS Estates. (2002). *Facilities Management*. Accessed date 04/10/2004.
http://www.nhsestates.gov.uk/facilities_management/content/introduction.html

NHS Estates. (2003a). *Facilities for critical care*. Health building Notes (**HBN 57**). *ISBN 0113224591*. London. Accessed date 23/09/2004.
http://www.sykehusplan.org/data/3225881.pdf

NHS Estates. (2003b). *Standards of Cleanliness in the NHS*. A Framework in which to measure performance outcomes. Accessed date 12/01/2004.
http://patientexperience.nhsestates.gov.uk/clean_hospitals/ch_downloads/2003_draft_standards_060503.doc

NHS Estates. (2003c). *Privacy and Dignity - Consultation Document*.

NHS Estates. (2003d). *The future of Knowledge Management*. HEFMA Reference Book. Health Facilities Management Association.

NHS Estates. (2004a). *Revised guidance on contracting for cleaning*. Best Practice Guidance. Department of Health. *Report nr. 4217*. December 2004.

NHS Estates. (2004b). *Healthcare Facilities Cleaning Manual - Background*. Improving the Patient Experience - Clean Hospitals. Accessed date 14/08/2005.
http://patientexperience.nhsestates.gov.uk/clean_hospitals/ch_content/cleaning_manual/background.asp

NHS Estates. (2004c). *Infection control response to winning ways - working together to reduce healthcare associated infection*. Northern Lincolnshire and Goole Hospitals NHS Trust.

NHS Executive. (1999). *Public Private Partnerships in the National Health Service: The Private Finance Initiative*. Good Practice - Overview (PFI in the NHS). pages 15.

NHS Information Authority. (2000). *Knowledge Management in Hospitals*. Accessed date 14/05/2003. http://www.research-projects.unizh.ch/oek/unit30200/area331/p1764.htm

NHS National Electronic Library for Health. (2003). *KM principles and practices*. Accessed date 19/04/2004.
http://www.stuff.co.uk/knowledgemanagement/km1/principles.asp

NHS Quality Improvement Scotland. (2003). *Improving clinical care in Scotland: Healthcare Associated Infection (HAI); Infection Control*. Accessed date 04/09/2003.
http://www.clinicalstandards.org/pdf/natoveriew/haiic.pdf

Nickols, F. (2000). *Strategy - Definitions and Meaning*. Distance Consulting.

Nonaka, I., and Takeuchi, H. (1991). *The Knowledge creating company*. Oxford University Press.

Nonaka, I., and Takeuchi, H. (1995). *The Knowledge Creating Company*. Oxford: Oxford University Press.

Noskin, G. A., and Peterson, L. R. (2001). Engineering infection control through facility design. *Emerging Infectious Diseases*. **7** (2). pp. 354-57.

Nutt, B. (2000). Four competing futures for facility management. *Facilities*. **18** (3). pp. 124 - 132.

Okoroh, M. I., Gombera, P. P., and Alani, A. M. (2002). Managing Risks in the UK healthcare sector. *Risk Management - An International Journal*. pp. 43-58.

Okoroh, M. I., Gombera, P. P., John, E., and Wagstaff, M. (2001). Adding value to the healthcare sector - a facilities management partnering arrangement case study. *Facilities*. **19** (3-4). pp. 157- 164.

Okoroh, M. I., Ilozor, B. D., Gombera, P. P., and Alani, A. M. (2002). Healthcare Facilities Management Operations and Organizational Decisions. *CIB W070 Global Symposium*.

Old, M. (2003). SARS spread aided by contracting out hospital cleaning and laundry, says head of Taiwan's disease control agency. *Canadian Union of Public Employees (CUPE)*. Accessed date 12/03/2004. http://cupe.ca/www/News/5356

Ontario Hospital Association. (2006). *Prevention and Control of Transmission of Clostridium difficile within Healthcare Facilities*. Professional Developments and Events. Accessed date 22/06/2006. http://www.oha.com/Client/OHA/OHA_LP4W_LND_WebStation.nsf/page/Prevention+and+Control+of+Transmission+of+Clostridium+difficile+within+Healthcare+Facilities

Oppenheim, A. N. (1966). *Questionnaire Design and Attitude Measurement.* New York: Basic Books, Inc.

Organisation for Economic Co-operation and Development. (1999). *Benchmarking Knowledge-based Economies*. Science, Technology and Industry Scoreboard 1999. Paris.

Otero, R. B. (1998). *Prevention of disease transmission in a health-care setting*. Computer Innovations, Inc. Accessed date 15/10/2005. http://www.cinetwork.com/otero/podt.html

Otley, D. T. (1999). Performance Management: a Framework for Management Control Systems Research. *Management Accounting Research*. **10** (4). pp. 363-382.

Ottosson, S. (2003). Participation action research - a key to improved knowledge of management. *Technovation*. **23**. pp. 87-94.

Oxford University Press. (1994). *The Oxford Pocket Dictionary*. Oxford: Oxford University Press.

Palmquist, M. E., Carley, K. M., and Dale, T. A. (1997). *Two applications of automated text analysis: Analyzing literary and non-literary texts*. Text Analysis for the Social Sciences: Methods for Drawing Statistical Inferences from Texts and Tanscripts. NJ: Lawrence Erlbaum Associates: Hillsdale.

Park, A. (1998). *Facilities management, an explanation*. Second edition. Palgrave. Princeton: Princeton University Press.

Parliamentary office of Science and Technology. (2005). *Infection control in healthcare settings*. Postnote. *Report number 247*. London. Accessed date 02/02/2006. http://www.parliament.uk/parliamentary_offices/post/pubs2005.cfm

Pasteur, K., and Scott-Villiers, P. (2004). *If relationships matter, how can they be improved? Learning about relationships in development*. Institute of Development Studies. Lessons for Change in Policy and Organisations. *Report No. 9*. Brighton.

Patterson, C. H. (2001). Engineering Controls vs. Infection Control. *Nursing Management*. **June Issue**.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods*. Newbury Park, Calif: Sage Publications.

Payne, T. (2000). *Facilities Management – a strategy for success*. Chandos Publishing.

Payne, T. (2002). *Prescription for Change*. Healthcare Facilities Management Association (HEFMA). Accessed date 23/22/2004. http://www.hefma.org.uk/refbook/prescriptionchange64.htm

Payne, T., and Rees, D. (1999). NHS facilities management: a prescription for change. *Facilities*. **17** (Number 7/8). pp. 217-221.

Pederson, P. O. (2003). *Knowledge management FAQs*. Accessed date 23/4/2004. http://www.melcrum.com/know_articles/01.htm

Pellicciotto, A. (2003). *Getting the most from your KM initiative: The importance of change management*. SeeChange Consulting, Inc. Accessed date 04/10/2005. http://www.icasit.org/km/kmrt/sept03/555,1

Peursem, K. A. V., Pratt, M. J., and Lawrence, S. R. (1995). Health management performance - A review of measures and indicators. *Accounting, Auditing & Accountability Journal*. **8** (5). pp. 34-70.

Phillips, G. (2001). *An Infection Control Doctor's view*. *Healthcare Associated Infection in Scotland - Report from the Ministerial Convention*, Anne Jarvie, Glasgow Caledonian University. p.22.

Phillips, P. A. (1996). *Organisational strategy, strategic planning systems characteristics, and business performance in the UK Hotel Sector*. Cardiff Business School. Unpublished Ph.D. thesis.

Phillips, P. A. (1999). Performance measurement systems and hotels: a new conceptual framework. *Hospitality Management*. **18**. pp. 171-82.

Plowman, R., Graves, N., Griffin, M., Roberts, J., Swan, T., Cookson, B., and Taylor, L. (1999). *The socio-economic burden of hospital acquired infection.* Document type: Research report. Public Health Laboratory Service and Health Protection Agency.

Pollock, A. M., Shaoul, J., and Vickers, N. (2002). Private finance and "value for money" in NHS hospitals: a policy in search of a rationale? *British Medical Journal*. **324**. pp. 1205-1209.

Proctor, S., and Campbell, J. (1999). A developmental performance framework for primary care. *International Journal of Healthcare Quality Assurance*. **12** (7). pp. 279-86.

Procurement Executives' Association. (1999). *Guide to a Balanced Scorecard performance management methodology*. Procurement Executives' Association.

Property and Environment Forum Executive. (2005). *A national education and training framework for domestic assistants - Version 1*. NHS Scotland. Healthcare Associated Infection Education for Prevention and Control. Accessed date 15/03/2006. http://www.pef.scot.nhs.uk/guest/HaiInitiatives/NatEducationFramework.pdf

Property Environment Forum Executive. (2002). *Infection Control in the Built Environment*. Scottish Health Facilities Notes : **SHFN 30**. NHSScotland.

Public Sector Benchmarking Service. (2003). *Knowledge Management*. PSBS. Learning through sharing. Accessed

Public Health Foundation. (2004). *From Silos to Systems: Performance Management to improve the Public's Health*. Turning Point. Accessed date 15/03/2005. http://www.turningpointprogram.org/Pages/perfmgt.html

Public Health Laboratory Service. (2000). The burden of hospital-acquired infections. *The Pharmaceutical Journal*. **264** (No 7082). pages 206. Accessed date 03/04/2003. http://www.pharmj.com/Editorial/20000205/clinical/hospitalinfections.html

Queensland Health. (2001a). *Infection Control Guidelines*. Queensland Government. 371. Brisbane. Accessed date 01/11/2003. http://www.health.qld.gov.au/infectioncontrol/documents/pdf/Legislation.pdf

Queensland Health. (2001b). *Planning and Design Guidelines - Section 1*. Queensland Government - Capital works. Brisbane. pages 74. Accessed date 15/07/2005. http://www.health.qld.gov.au/cwamb/cwguide/section1.pdf

Queensland Health. (2001c). *Planning and Design Guidelines - Section 2*. Queensland Government - Capital works. Brisbane. pages 74. Accessed date 15/07/2005. http://www.health.qld.gov.au/cwamb/cwguide/section2.pdf

Queensland Health. (2002). *Building and Refurbishment: Infection Control Guidelines*. Queensland Government - Capital Works Guidelines. Brisbane. pages 130. Accessed date 15/04/2003. http://www.health.qld.gov.au/cwamb/cwguide/InfectionGuide.pdf

Quintas, P., Lefrere, P., and Jones, G. (1997). Knowledge management: A strategic approach. *Journal of Long Range Planning*. **30** (3). pp. 385 - 91.

Ransley, D. L. (1994). Do's and Don'ts of R&D Benchmarking. *Research-Technology Management Accounting Research*. **37**. pp. 50-56.

Rees, D. (1998). Management structures of facilities management in the National Health Service in England: a review of trends 1995-1997. *Facilities*. **16** (9). pp. 254 - 261. Accessed date 12/03/03. http://leporello.emeraldinsight.com/vl=2835379/cl=17/nw=1/rpsv/cgi-bin/linker?ini=emerald&reqidx=/cw/mcb/02632772/v16n9/s3/p254

Reference Library: Encyclopaedia. (1996). Florence Nightingale. Accessed date 14/06/2004. https://www.campusprogram.com/reference/en/wikipedia/f/fl/florence_nightingale.html

Reingold, A. L. (1998). National Strategy to Address Healthcare Associated Infections Operational Template - Outbreak Management. *Emerging Infectious Diseases*. **4** (1).

Remenyi, D., Williams, B., Money, A., and Swartz, E. (1998). *Doing Research in Business and Management*. London: Sage.

Reuvid, J., and Hinks, J. (2002). *Managing Business Support Services: strategies for outsourcing and Facilities Management*. 2nd Edition. London: Kogan Page Ltd.

Richards, H. M., and Schwartz, L. J. (2002). Ethics of qualitative research: are there special issues for health services research? *Family Practice*. **19**. pp. 135-139.

Richardson, W. M. (2001). *Reconceiving healthcare to improve quality*. University of California. Santa Barbara.

Riley, D., Freihaut, J., Bahnfleth, W. P., and Karapatyan, Z. (2003). *Indoor Air Quality Management and Infection Control in Healthcare Facility Construction*. Innovative techniques in IAQ. Report Nr. IAQ T3S1. Accessed date 12/08/2005. http://www.engr.psu.edu/ae/iec/publications/papers/indoor_air_quality.pdf

Robathan, P. (1996). Building Performance. *Facilities Management -Theory and Practice*. K. Alexander. London: E & FN Spon. pp. 98 - 109.

Robertson, K. (2000). Work transformation: integrating people, space and technology. *Facilities*. **18** (10). pp. 376 - 382.

Robertson, S. (2006). *Knowledge Management*. Health Management Specialist Library. National Library for Health (NLH). Accessed date 16/05/2006. http://www.library.nhs.uk/healthmanagement/ViewResource.aspx?resID=29645&catID=4031

Robson, C. (1993). *Real World Research*. Oxford: Blackwell Publishers.

Rogers, P. A. (1999). Optimising Healthcare Facilities Management: Outsourcing Opportunities. *BIIA – Healthcare*. pp. Accessed date 21/06/2003. http://www.rdtpacific.co.nz/news/papers/optimisinghealth.pdf

Rouse, P., and Putterill, M. (2003). An integral framework for performance measurement. *Management Decision*. **41** (8). pp. 791-805.

Rowley, J. (2004). Researching people and organisations. *Library Management*. **15** (4/5). pp. 208-14.

Royal College of Nursing. (2005). *Good practice in infection prevention and control*. Guidance for nursing staff. London.

Ryu, S., Ho, S. H., and Han, I. (2003). Knowledge sharing behaviour of physicians in hospitals. *Expert Systems with Applications*. **25**. pp. 113- 122. Accessed date 20/07/2004. http://afis.kaist.ac.kr/download/inter_jnl030.pdf

Saltmarshe, D., Ireland, M., and McGregor, J. A. (2003). The performance framework : A systems approach to understanding performance management. *Public administration and development*. **23**. pp. 445–56.

Samuelsson, P., and Nilsson, L. E. (2002). Self-Assessment practices in large organisations: Experiences from using the EFQM Excellence Model. *International Journal of Quality & Reliability Management*. **19** (2). pp. 10-23.

Santos, J. R. A. (1999). Cronbach's Alpha: A Tool for Assessing the Reliability of Scales. *Journal of extension*. **37** (2).

Scher, P. (2003). *Uneasy Bedfellows*. Discussed by the Property and Environment Forum Executive during a Task Force meeting.

Scottish Centre for Infection and Environmental Health - SCIEH. (2002a). *Model of Infection and Communicable Disease Control in Scotland (Kennedy Report)*. Kennedy Business Development - Northamptonshire.

Scottish Centre for Infection and Environmental Health - SCIEH. (2002b). *Response to the consultation exercise on the Model of Infection and Communicable Disease Control in Scotland (Kennedy Report)*. Kennedy Business Development - Northamptonshire.

Scottish Executive Health Department. (2000). *Our National Health; A plan for action, a plan for change*. Working together for a healthy, caring Scotland. NHS in Scotland. *B16345-12-2k.* 99. Accessed date 16/08/2003. www.scotland.gov.uk

Scottish Executive Health Department. (2001a). *Managing the risk of Healthcare Associated Infection in NHSScotland (**The Carey Group Report**)*. NHS in Scotland Working Group. 119. Accessed date April 2003. http://www.show.scot.nhs.uk/sehd/mels/HDL2001_53Carey.pdf

Scottish Executive Health Department. (2001b). *The Decontamination of Surgical instruments and other medical devices (**The Glennie Report**)*. Report of a Scottish Executive Health Department Working Group. *NHS HDL: (2001)10*. Accessed date 01/02/204. http://www.show.scot.nhs.uk/sehd/publications/hdl30101annex.pdf

Scottish Executive Health Department. (2001c). *An HAI Reference Group Report (**The Old Group Report**)*. Clinical Standards Board for Scotland (CSBS).

Scottish Executive Health Department. (2002a). *Preventing Infections Acquired while receiving healthcare*. Scottish Executive Health Department (SEHD). The Scottish Executive's Action Plan to reduce the risk to patients, staff and visitors. 51. Accessed date 12/06/2003. http://www.scotland.gov.uk/library5/health/preventinfect.pdf

Scottish Executive Health Department. (2002b). *The Watt Group Report*. A review of the outbreak of salmonella at the Victoria Infirmary, Glasgow, between December 2001 and January 2002. *NHS HDL(2002)82*. Accessed date 12/04/2003. http://www.scotland.gov.uk/library5/health/twgr-00.asp

Scottish Executive Health Department. (2003a). *Standards for hospital cleaning*. News Online. Accessed date 23/02/2004. http://www.scotland.gov.uk/pages/news/2003/08/p_SEDH476.aspx

Scottish Executive Health Department. (2003b). *Chief Medical Officer's Task Force on Healthcare Associated Infection*. Consultation Document: A code of practice for the

local management of hygiene and healthcare associated infection (HAI). Report Nr. ERS05009.

Scottish Executive Health Department. (2004). *The NHSScotland national cleaning services specification*. Scottish Executive Publications. Accessed date 18/01/2005. http://www.scotland.gov.uk/Publications/2004/05/19319/36645

Scottish Executive Health Department. (2005). *The Scottish Ministerial Healthcare Associated Infection Task Force*. HAI Task Force Secretariat. The Chief Medical Officer for Scotland. Accessed date 10/07/2005. http://www.scotland.gov.uk/Topics/Health/NHS-Scotland/17914/21447

Scottish Executive News. (2005). *Action on hospital cleaning*. Accessed date 14/05/2006. http://www.scotland.gov.uk/News/Releases/2005/11/14090532

Scottish Office – NHS in Scotland Management Executive. (2000). *Improving Healthcare: A Guide*. The National Health Service in Scotland framework for action. Report Nr. K1400127.111.

Shah, B. (2003). Capturing tacit knowledge - do you know more than you think? *PLC (Practical Law Company)*. **Volume XIV** (October article)..

Shapiro, G., & Markoff, J. (1997). *Text Analysis for the Social Sciences: Methods for Drawing Statistical Inferences from Texts and Transcripts*. Mahwah: NJ: Lawrence Erlbaum Associates.

Shekhawat, P. S., Singh, R. N., Shekhawat, R., and Joshi, K. R. (1992). A bacteriological study of the environment of pediatric ward and neonatal nursery. *Indian Pediatrics*. **29** (3). pp. 327-31.

Shiomori, T., Miyamoto, H., and Makishima, K. (2001). Significance of airborne transmission of methicillin-resistant Staphylococcus aureus in an otolaryngology-head and neck surgery unit. *Archives of Otolaryngology--Head & Neck Surgery*. **127** (6). pp. 644-648.

Sonalina. (2004). *The Opportunities and Challenges of Knowledge Management in the BPO industry*. Introduction to a White Paper - KM in BPO. Accessed date 15/04/2006. http://www.chillibreeze.com/articles/KMinBPOOpportunitiesandChallenges.asp#a

Specialist Library Knowledge Management. (2003). *What is Knowledge Management?* Accessed date 23/02/2004. http://www.nelh.nhs.uk/knowledge_management/km1/what_is_km.asp

Srebnik, D., Hendryx, M., Stevenson, J., Caverly, S., Dyck, D., and Cauce, A. (1997). Development of outcome indicators for monitoring the quality of public mental healthcare. *Psychiatric Services*. **48** (7). pp. 903-909.

Standing Committee on Infection Control. (1999). *Guidelines for the Classification and Design of Isolation Rooms in Healthcare Facilities*. Department of Human Services. Melbourne. Accessed date 21/06/2004. http://www.dhs.vic.gov.au/phd/9906058a/9906058.pdf

Stehr, N. (2001). The Grammar of Productive Knowledge. *Knowledge Management in the Innovation Process*. de la J. Mothe and D. Foray. Boston: Kluwer Academic Press. pp. 193-203.

Stemler, S. (2001). An overview of content analysis. Practical Assessment. *Research & Evaluation*. **7** (17).

Sumlin, R. (1997). *Common Performance Management Challenges*. Development Dimensions International. Whitepaper. Accessed date 12/06/2003.
http://www.ddiworld.com/pdf/WPPERFMG.pdf

Taguchi, F., Saito-Taki, T., S. Okuda, S., Aoki, M., Matsuzaki, T., Tomioka, M., Kikuno, R., and Lee, S. M. (1992). Proposal for the Nosocomial Infection Control of Methicillin-Resistant Staphylococcus Aureus (MRSA). *Nippon Saikingaku Zasshi. Japanese Journal of Bacteriology*. **47** (6). pp. 767-775.

Tannahill, M. (2003). Healthcare Associated Infection Task Force. *Conference held for 'Healthcare Associated Infection'*. Hilton Hydro, Dunblane. November 6th and 7th, 2003.

The American Heritage Dictionary of the English Language. (2004). Fourth Edition. Houghton Mifflin Company. Houghton. Accessed date 23/03/2005.
https://www.answers.com

The glossary of research methods. (2000). Accessed date 28/02/2004.
http://www.bath.ac.uk/e-learning/gold/glossary.html

The National Health Plan. (2003). *Achieving the National Health Plan*. Audit Commission. Assessment of current performance, likely future progress and capacity to improve. London.

The Quality Interagency Coordination Task Force - QuIC. (1999). *What is Quality*. Accessed date 02/05/2005. http://www.consumer.gov/qualityhealth/index.html

The Scottish Executive Health Department. (1998). *Scottish Infection Manual*. Accessed date 12/03/2003. http://www.scotland.gov.uk/library2/doc15/sim-00.asp

Then, D. S.-S. (1999). An integrated resource management view of facilities management. *Facilities*. **17** (12). pp. 462 - 469.

Theurer, J. (1998). Seven pitfalls to avoid when establishing performance measures. *Public Management*. **8** (7). pp. 21–24.

Thurm, V., and Gericke, B. (1994). Identification of infant food as a vehicle in a nosocomial outbreak of Citrobacter freundii: epidemiological sub typing by allozyme, whole-cell protein and antibiotic resistance. *The Journal of Applied Bacteriology*. **76** (6). pp. 553-558.

Tregoe, B., and Zimmerman, J. (1980). *Top Management Strategy*. Simon and Schuster.

Truch, A., Higgs, M., Bartram, D., and Brown, A. (2002). *Knowledge sharing and personality*. Henley Knowledge Management Forum. Accessed date 24/06/2004.
http://www.henleymc.ac.uk/henleyres03.nsf/files/KM_ProjectSummary_Personality.pdf/$FILE/KM_ProjectSummary_Personality.pdf

Turnock, B. J. (2004). *Public Health: What It Is and How It Works*. 3rd Edition. Boston MA: Jones & Bartlett.

Turnock, B., and Handler, A. (1997). From measuring to improving public health practice. *Annual Review - Public Health.* **18**. pp. 261-82.

Turpin, R., Darcy, L., Koss, R., McMahill, C., Meyne, K., and Morton, D. (1996). A model to assess the usefulness of performance indicators. *International journal of quality Healthcare*. **8** (4). pp. 321-29.

Tydell, P. (2005). *Patient Safety: Integration is Key*. Best Practices. Phoenix: Virgo Publishing.

U.S. Agency for International Development. (2002). *Glossary*. Automated Directive System. Results-oriented assistance: A USAID Sourcebook. Accessed date 14/05/2003. http://www.usaid.gov/pubs/sourcebook/usgov/source.html

U.S. Department of Health and Human Services. (2003). *Guidelines for environmental infection control in healthcare facilities*. Centre for Disease Control and Prevention (CDC). Atlanta. Accessed date 02/05/2005. http://www.cdc.gov/ncidod/hip/enviro/Enviro_guide_03.pdf

U.S. General Accounting Office. (1996). *Content Analysis: A Methodology for Structuring and Analyzing Written Material. Report Nr. GAO/PEMD-10.3.1.* Washington.

Ulster Community and Hospitals Trust. (1990). *Policies, Procedures, Guidelines, Standards, Protocols and Care Pathways - Definitions*. NHS - Northern Ireland. Policy Committee. Ulster.

UNISON. (2004). *Cleaner's Voices - Interviews with hospital cleaning staff*. Inprint Print. London.

UNISON. (2005). *More NHS cleaners to fight MRSA*. Accessed date 14/12/2005. http://www.politics.co.uk/issueoftheday/unison-more-nhs-cleaners-fight-mrsa-$368571$367131.htm

UNISON. (2006). *Contracting out damages infection control in hospitals*. Accessed date 13/05/2006. http://www.unison.org.uk/asppresspack/pressrelease_view.asp?id=579

Unit Leadership Program. (1998). *Accountability and Responsibility. Version 3/98*. Accessed date 04/06/2005. http://learning.uscg.mil/uldp/ULPResources/AccountabilityandResponsibilityULP.pdf

University of Michigan Health System. (2001). *Infection Control*. Patient safety toolkit. Accessed date 05/06/2003. http://www.med.umich.edu/patientsafetytoolkit/infection/chapter.pdf

van den Hoof, B., and de Ridder, J. A. (2004). Knowledge sharing in context - the influence of organisational commitment, communication climate and CMC use on knowledge sharing. *Journal of Knowledge Management*. **8** (6). pp. 117-130.

van der Bij, J., and Vissers, J. (1999). Monitoring healthcare processes: a framework for performance indicators. *International Journal of Healthcare Quality and Quantity*. **12** (5). pp. 214-21.

van Maanen, J. (1979). *Qualitative Methodology*. Beverly Hills: SAGE.

van-Aken, J. E. (2004). Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules. *Journal of Management Studies*. **41** (2).

Voss, A., Schülin, T., and Verweij, P. E. (2003). Culture and infection control. *The Lancet*. **361** (9369). p. 1657.

Walker, M. (2005). The Performance Management Framework for Hyndburn Borough Council. *A brief guide for staff*. Hyndburn.

Ward, D. (2003). Improving patient hand hygiene. *Nursing Standard*. **Vol 17** (Issue 35). pp. 39-42.

Waring, J. J. (2000). *Towards an integrated organisational framework of hospital performance*. A. C. f. H. S. O. Research. Report Nr. RP0018*,* Birmingham. *ISBN 1 85449 535 6*.

Waterhouse, M., and Crook, G. (2002). Management and Business Skills in the Built Environment. *Facilities*. **20** (3). pp. 164-165.

Watkins, G. (2005). *Performance Management*. National Training Directory. Accessed date 09/08/2005. http://www.rainbowsa.co.za/sdd/index.php/Performance_Management#What_is_Performance_Management.3F1

Weber, R. P. (1990). *Basic Content Analysis*. 2nd Edition. California: Newbury Park.

Welch, J. L. (1985). Research Marketing Problems and Opportunities with Focus Groups. *Industrial Marketing Management*. **14**. pp. 247.

Welsh Assembly Government. (2005). *Healthcare Associated Infections - A strategy for hospitals in Wales : Feedback and guidance on action plans*. Welsh Health Circular. Report Nr. WHC (2005) 54. Cardiff.

West, K. (1995). Forum: trauma and infection: considerations for patient and healthcare professional. *Asepsis*. **17** (2). pp. 10-13.

Wiig, K. M. (1999). What future knowledge management users may expect. *Journal of Knowledge Management*. **03** (2). pp. 155-66.

Wikipedia. (2005). *Content analysis*. Accessed date 14/01/2006. http://en.wikipedia.org/wiki/Content_analysis

Wikipedia. (2006a). *Audits*. Accessed date 24/05/2006. http://en.wikipedia.org/wiki/Audits

Wikipedia. (2006b). *Cronbach's Alpha*. The free encyclopaedia. Accessed date 18/05/2006. http://en.wikipedia.org/wiki/Cronbach's_alpha

Williams, B. (1994). *Facilities Economics*. Kent: Building Economics Bureau Ltd.

Williams, B. (2001). *Facilities Economics in the European Union*. Kent: Building Economics Bureau Ltd.

Wolcott, H. F. (1990). *Writing up qualitative research*. Newbury Park: CA: Sage.

Wolfe, S. (2003). *Infection Control During Construction in Healthcare Environments*. Occupational Health and Safety. Clayton Group Services, Inc. Seattle Regional Office.

Wong, W. L. P., and Radcliffe, D. F. (2000). The tacit nature of design knowledge. *Technology Analysis & Strategic Management*. **12** (4). pp. 493-512.

World Health Organisation. (1997). Hospital Hygiene and Infection Control. *Safe Management of Wastes from Healthcare Activities*. pp. 148-58. Accessed date 10/06/2004.
http://www.who.int/water_sanitation_health/Documents/Healthcare_waste/Manual/148to158.pdf

World Health Organisation. (2004a). *Infection Control*. Department of Essential Health Technologies (EHT). Geneva.

World Health Organisation. (2004b). *Practical guidelines for infection control in healthcare facilities*. Regional Office for Western Pacific. SEARO Regional publication No. 41. Manila. *ISBN 92 9022 238 7.*

World Health Organization. (2002). *Prevention of Hospital Acquired Infection: A Practical Guide*. Report nr. WHO/CDS/CSR/EPH/2002.12. pages 64. Accessed 01/09/2003.
http://www.who.int/csr/resources/publications/drugresist/whocdscsreph200212.pdf

Yin, R. (1994). *Case Study Research*. Beverly Hills, California: Sage Publications.

York University Research Partnership. (2000). *Introduction - Conceptual Framework*. Toronto: Research working group.

Zack, M. H. (1999). Managing Codified Knowledge. *Sloan Management Review*. **40** (4). pp. 45-58.

Zhang, T., and Kuo, J. (2001). Audio Content Analysis for Online Audiovisual Data Segmentation and Classification. *IEEE Transactions on speech and audio processing*. **9** (4).

APPENDIX 1

SOME INFECTIONS COMMONLY ASSOCIATED WITH FM SERVICES

(Source: adapted from, Horton and Parker, 2002; Bartely, 2000; Ayliffe et al, 1988; NHS Estates, 2001; Property and Environment Forum Executive, 2002; Otero, 1998)

Type of infection	Mode of transmission	Associated factors of acquiring the infection
Aspergiollosis	Airborne transmission	Increased risk during construction and renovation. Carpets, tiles, building materials, dust can be reservoirs.
Campylobacter infection	food borne transmission	Mostly acquired through contaminated food and milk
Cholera	food borne transmission	Infection is usually acquired from contaminated water or food
Common cold	Airborne/droplet/direct contact	Overcrowding or proximity to the source of infection can be major factors.
Diarrhoea	Contact/vehicle transmission	Spread is by contact or may be food associated. Personal hygiene and environmental hygiene can be major factors.
Diphtheria	Airborne transmission	Usually spread by aerosol
Dysentery	Direct or indirect contact/ food borne transmission	Normal reservoir is humans but is acquired from contaminated food and milk
Food poisoning	food borne transmission	Mostly associated with food, especially pulses, rice and vegetables. Improper food storage is a major factor.
Hepatitis A	Contact/ food borne transmission	Commonly related with food and water. People's hygiene is also a major factor.
Influenza	Droplet transmission	Personal hygiene and proximity to the patient can be major factors
Legionnaires' disease	Airborne and water borne transmission	Infection is acquired by inhalation of contaminated water from showers, air-conditioning, cooling towers, etc.
MRSA	Direct/indirect contact	Personal hygiene and environmental hygiene are major factors
Pseudomonas infection	Direct/indirect contact	Personal hygiene and environmental hygiene are major factors
Ringworm	Direct/indirect contact	Personal hygiene and hygiene at communal areas are major factors
Salmonellosis	Endogenous or vehicle transmission	Contaminated food, personal hygiene and sanitation systems can be major factors
Urinary Tract Infections	Endogenous/indirect contact	Personal hygiene and environmental hygiene are major factors
Urinary Tract Infections	Direct/ indirect contact	Personal hygiene and environmental hygiene are major factors
VRE	Indirect transmission	More resistant to disinfectants; survives well in hospital environment – environmental hygiene can be a major factor
Waterborne viruses	Waterborne transmission	Potable water, scopes can be major factors

APPENDIX 2a

CASE STUDY QUESTIONS

Target groups and Sample:
- Domestic managers
- Infection control team members
- Domestic services staff
- Ward nurses (Matron/Ward manager)

Underline philosophy of the study:

The idea of the survey is to identify how domestic services are being carried out in controlling Healthcare Associated Infections (HAI). The study focuses on four major strands, i.e. strategies adopted, involvement and integration of parties, adoption of knowledge management practices and practices of measuring and managing performance in the control of HAI. The results will also be used for the main study and the desired outcomes will be:

- strategies adopted in the domestic services in the control of HAI
- parties involved in the control of HAI in domestic services and their integration
- practical difficulties in adhering to the control of HAI
- modes of managing performance in the control of HAI in domestic services
- knowledge sharing practices exist in the control infection and it's accessibility

"The results to be obtained through the interviews will only be used for the purpose of this research study and will not be used for any other purpose. All responses remain completely confidential."

Date   : …………………………………………………………….……..
Name   : ……………………………………………………………………...
Position   : ……………………………………………………………….…..
Hospital/Trust : ………………………………………………………………...

Section One:

This section attempts to acquire general information about the participant and the type of domestic service they are involved in.

1. Can you please describe your job role in general and then how it relates to the control of HAI practices?
2. Can you describe the type of domestic service you have in your hospital and how it operates?

Section Two:

This section attempts to identify the issues related to the control of HAI in domestic services.

3. In your point of view, how important is the control of HAI in domestic services?
4. In your hospital, do you adopt any strategies for the control of HAI in domestic services, if yes, what are those?
5. In your view do you see any practical difficulties in complying with the strategies adopted for the control of HAI in domestic services?
6. How do you describe the extent to which you are involved in the control of HAI in domestic services?
7. How do you describe the level of influence you have over decision-making and taking corrective actions in terms of control of HAI in domestic services?
8. Can you describe the integration (coordination, communication and collaboration) along the structure of the healthcare organisation in order to instigate infection control practices?

Section Three:

This section attempts to identify aspects of sharing knowledge in the control of HAI in domestic services

9. Do you have any methods to manage knowledge in your service?
10. In your view what enables the staff in managing knowledge, e.g. job roles and responsibilities, workload, outsourcing/in-house, culture, structure, authority, etc.?
11. In your view what are the challenges the staff confront in sharing knowledge, e.g. job roles and responsibilities, workload, outsourcing/in-house, culture, structure, authority, etc.?

Section Four:

This section attempts to identify the performance management approaches in-use for FM control of HAI in domestic services.

12. Do you adopt any performance management approaches for the control of HAI in domestic services, if yes can you please provide the details of the performance management approaches in-use?
    - focuses which means the ultimate goal of performance management such as evaluating patient satisfaction/achievement of NHS goals/employee satisfaction
    - performance measures (in general and specifically performance measures for facilities services staff)
    - who measures
    - what tools you use to measure performance
    - frequency of performance measurement (weekly/monthly/quarterly/yearly)
    - how do you benchmark the measurement results
    - control measures if the standards are not met
    - feedback mechanisms (for the facilities services staff and facilities managers)
    - strengths of the PM approach
13. In your view, how well do you think that the domestic services staff are aware of performance management approaches in-use for the control of HAI?
14. Are there any reward schemes for domestic services staff if the performance standards are met – e.g. merit increases, promotions, certificates of appreciation, letters of commendation, etc?
15. Can you describe the challenges for managing performance in the control of HAI in domestic services?

Please state any other contact detail/s for this study, if any:

Name   :
Job role   :
Organisation and address   :
Tel   :
E-mail (if any)   :

Thank you very much for your cooperation.
Champika Liyanage

Section Two:

This section attempts to identify the issues related to the control of HAI in domestic services.

16. In your point of view, how important is the control of HAI in domestic services?
17. In your hospital, do you adopt any strategies for the control of HAI in domestic services, if yes, what are those?
18. In your view do you see any practical difficulties in complying with the strategies adopted for the control of HAI in domestic services?
19. How do you describe the extent to which you are involved in the control of HAI in domestic services?
20. How do you describe the level of influence you have over decision-making and taking corrective actions in terms of control of HAI in domestic services?
21. Can you describe the integration (coordination, communication and collaboration) along the structure of the healthcare organisation in order to instigate infection control practices?

Section Three:

This section attempts to identify aspects of sharing knowledge in the control of HAI in domestic services

22. Do you have any methods to manage knowledge in your service?
23. In your view what enables the staff in managing knowledge, e.g. job roles and responsibilities, workload, outsourcing/in-house, culture, structure, authority, etc.?
24. In your view what are the challenges the staff confront in sharing knowledge, e.g. job roles and responsibilities, workload, outsourcing/in-house, culture, structure, authority, etc.?

Section Four:

This section attempts to identify the performance management approaches in-use for FM control of HAI in domestic services.

25. Do you adopt any performance management approaches for the control of HAI in domestic services, if yes can you please provide the details of the performance management approaches in-use?
    - focuses which means the ultimate goal of performance management such as evaluating patient satisfaction/achievement of NHS goals/employee satisfaction
    - performance measures (in general and specifically performance measures for facilities services staff)
    - who measures
    - what tools you use to measure performance
    - frequency of performance measurement (weekly/monthly/quarterly/yearly)
    - how do you benchmark the measurement results

- control measures if the standards are not met
- feedback mechanisms (for the facilities services staff and facilities managers)
- strengths of the PM approach

26. In your view, how well do you think that the domestic services staff are aware of performance management approaches in-use for the control of HAI?
27. Are there any reward schemes for domestic services staff if the performance standards are met – e.g. merit increases, promotions, certificates of appreciation, letters of commendation, etc?
28. Can you describe the challenges for managing performance in the control of HAI in domestic services?

Please state any other contact detail/s for this study, if any:

Name	:
Job role	:
Organisation and address	:
Tel	:
E-mail (if any)	:

Thank you very much for your cooperation.
Champika Liyanage

APPENDIX 2b

CASE STUDY QUESTIONS VS. THE TYPE OF JOB ROLE (SUMMARY)

Section	Question (summary)	Job role	Number of interviewees
Section 1	**Summary of the job role and infection control duties**	Domestic Managers, ICT members, domestics, nurses/matrons	**26**
Section 2	**Strategies adopted**	Domestic Managers (including domestic supervisors), ICT members	**16**
	Practical difficulties	Domestic Managers, ICT members, domestics, nurses/matrons	**26**
	Involvement	Domestic Managers, ICT members, domestics, nurses/matrons	**26**
	Integration	Domestic Managers, ICT members, domestics, nurses/matrons	**26**
Section 3	**Knowledge Management**	Domestic Managers, ICT members, domestics, nurses/matrons	**26**
Section 4	**Performance Management approaches**	Domestic Managers (excluding domestic supervisors)	**7**
	Issues of performance	Domestic Managers, ICT members, domestics, nurses/matrons	**26**

APPENDIX 3

CATEGORIES AND CODES USED FOR CONTENT ANALYSIS – AN EXAMPLE

Section	Category	Main Code	Code	Sub Categories developed using the matrix and interview transcriptions
STRATEGIES	**Accountability**	STR	ACC	
	Organisational structure		ORG	
	Importance of Control of HAI		IMP	Impact
				Priority
				Awareness - mgt
				Change of work practices
	Guidance documents (Standards/Specs/Policies and Guidelines)		GUI	Availability
				Type
				Clarity
				Consistency
				Specificity
				Easy reference
				Evidence-base
				Up-to-date guidance
				Regular reviews
				Accessibility
				Practical difficulties
	Ensuring successful strategy implementation		ENS	Leadership commitment
				Resource deployment
				Monitoring arrangements
				Practical difficulties
INVOLVEMENT AND INTEGRATION	**Involvement**	I&I	INV	Planning
				Monitoring
				Taking Corrective Actions
				Changing Practices
				Carrying out practices
	Integration		INT	Clear lines of communication
				Meetings with infection control teams
				Issues of meetings are being actioned
				Practical Difficulties
				Support from the infection control teams
				Advice is always taken into consideration
				Consultation

Section	Category	Main Code	Code	Sub Categories developed using the matrix and interview transcriptions
KNOWLEDGE MANAGEMENT (KM)	KM practices	KM	PRC	Training and education IT Seminars and conferences Learning from books External consultants Sharing knowledge expert groups Meetings Mentoring
	Enabling factors		ENB	
	Inhibiting factors		BAR	
PERFORMANCE MANAGEMENT (PM)	PM approaches	PM	APP	Internal audits External audits Patient surveys Frequencies strengths Weaknesses Improvements
	Issues of PM		ISS	Resource limitations Time constraints Lack of IT Lack of performance indicators contracting-out services Inappropriate design practical difficulties Lack of training and education

APPENDIX 4a

QUESTIONNAIRE USED IN THE SURVEY

| | **Ref No.** | | | |

SCHOOL OF BUILT AND NATURAL ENVIRONMENT
GLASGOW CALEDONIAN UNIVERSITY

QUESTIONNAIRE

Research Title: Performance Management in Domestic Service in the Control of Healthcare Associated Infections (HAI)

Return Address: Champika Liyanage
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Overview of the Research Project

This survey is based on an on-going research project which is funded by Glasgow Caledonian University. The research project aims to develop a conceptual framework for managing the performance of Facilities Management in the control of Healthcare Associated Infections (HAI). This study also considers the need for the managing knowledge for improving the integration between the clinical and facilities management teams. The study **focuses** on domestic services.

Conceptual definitions used for the study

5. **Domestic Services (DS):** For this study, domestic services **only** relate to cleaning and house keeping services.

6. **Facilities Management (FM):** The management of facility resources and services in support of the operations of an organisation (i.e. hospitals). The facilities managers/domestic managers in this study include General Managers (facilities), Hotel services/Domestic managers and Assistant Domestic services/Hotel Services Managers.

7. **Control of HAI:** Control of HAI refers to policies and procedures used to minimise the risk of spreading HAI, especially in hospitals and healthcare facilities. The specialised teams involved in the control of HAI are known as **Infection Control Teams (ICTs)**.

8. **Knowledge Management (KM):** A systematic process for acquiring, creating, integrating, sharing, and using knowledge to make the right business decisions and achieve organisational goals.

9. **Performance Management (PM):** Performance management is a systematic process of planning, monitoring and measuring inputs, activities and outputs of an organisation which will eventually help to assess whether the organisation has met its goals. Different techniques can be used to measure and manage performance.

Questionnaire survey instructions

1. There is no right or wrong answers to the questions in this survey. Select the most appropriate answer for each question based on your view/experience.

2. There may be questions which appear irrelevant or impertinent. However, I would like you to attempt to answer all questions as each question is asked to achieve a stated objective. If there are questions which you are unwilling or unable to answer, then please continue to answer the remainder of the questions.

3. Please post the completed questionnaire to the researcher at the address above; to reach her **on or before 14th November 2004**.

PART ONE - General information

1. **Your Present Job role**: _____

2. **Location** of your present hospital (**please circle the appropriate answer**):

   1. England   **1.** Scotland   **3.** Any other (please specify)

3. **Years of experience** in your **present hospital** in the control of HAI (**please circle the most appropriate answer**):

   1. Less than 1 year   **2.** 2 – 5 years   **3.** 6 – 10 years

   4. 11 – 15 years   **5.** More than 15 years

4. **Total years of experience** in The control of HAI – taking account of experiences which you may have had before your present job and hospital (**please circle the most appropriate answer**):

   1. Less than 1 year   **2.** 2 – 5 years   **3.** 6 – 10 years

   4. 11 – 15 years   **5.** More than 15 years

PART TWO - Type of domestic services and the present context

5. Please tick (✓) **only one box** that best describes the **type of FM service** (i.e. the domestic service) you have in your organisation.

1.	Majority of services are delivered and managed **in-house**	☐
2.	**A balanced approach** between in-house services and out-sourced functions	☐
3.	An **entirely out-sourced** FM package (one major contractor)	☐
4.	A **Private Finance Initiative (PFI) model** where the complete FM package is out-sourced (management contract with an external domestic managers acting on behalf of the Trust)	☐

6. Please **circle the most appropriate scale** against each statement to describe the **level of authority/influence you have** on the control of HAI in domestic services. Please answer all the questions.

   Meaning of scale: **1** (Very High Level), **2** (High Level), **3** (Low level), **4** (Very Low Level), **5** (Not Applicable)

LEVEL OF AUTHORITY/INFLUENCE	Very High	High	Low	Very Low	NA
Level of authority **in planning** (e.g. preparation of work schedules) practices in the control of HAI in domestic services	1	2	3	4	5
Level of authority **in monitoring** practices in the control of HAI in domestic services	1	2	3	4	5
Level of authority **in taking corrective actions** in practices in the control of HAI in domestic services	1	2	3	4	5
Level of authority **in changing** practices in the control of HAI in domestic services (e.g. introduction of a new cleaning equipment)	1	2	3	4	5

7. Given the current situation in your hospital, please **circle the most appropriate scale** that best describes your **overall level of satisfaction** with regard to the **level of authority/influence you have** in the control of HAI in domestic services.

   1 Very High Level   **2** High Level   **3** Low Level

   4 Very Low Level   **5** Not Applicable

8. How would you describe the **level of integration (i.e. communication and coordination)** between clinical (e.g. Infection control team members, nursing staff, etc.) and domestic teams in your hospital in carrying out practices related to the control of HAI? **Please circle the appropriate scale.**

   1 Very High Level   **2** High Level   **3** Low Level

   4 Very Low Level   **5** Not Applicable

9. How do you describe the **level of integration (i.e. communication and coordination)** that may exist between infection control and domestic teams in your hospital? **Please circle the most appropriate scale.**

Meaning of scale: **1** (very high level), **2** (high level), **3** (low level), **4** (very low level), **5** (Not applicable)

STATEMENT	Very High	High	Low	Very Low	NA
Level of integration in terms of clear lines of communication (in the organisational structure) that facilitates communication and coordination between Infection Control and Domestic teams	1	2	3	4	5
Level of integration in terms of meetings between the domestic services and Infection Control teams to discuss issues related to the control of HAI in domestic services	1	2	3	4	5
Level of integration in terms of the support given by the Infection Control teams in enlightening/advising the domestics about the control of infection issues	1	2	3	4	5
Level of integration in terms of taking Infection control teams' advices into consideration by the domestic services team	1	2	3	4	5
Level of integration in terms of taking Domestic managers as the members of the Infection Control Committee	1	2	3	4	5

10. According to the current situation in your hospital, how would you **rate the overall level of performance** of control of HAI in domestic services? **Please circle the most appropriate scale.**

      1 Very High Level (more than 90%)

      2   High Level (80 - 89%)

      3 Low Level   (65 – 79%)

      4   Very Low Level (Below 64%)

      5   Not Applicable

PART THREE - Knowledge Management in the control of HAI in Domestic Services

11. Some of the **key factors that promote/inhibit effective Knowledge Management,** in your hospital, in the control of HAI in domestic services, are given below. In your perception, **please circle the most appropriate scale** to show **your level of agreement** with the following statements on the factors that promote/inhibit effective knowledge management.
    Meaning of scale:
    1 (Strongly agree), **2** (Agree), **3** (Disagree), **4** (Strongly Disagree), **5** (Not Applicable/Do not know)

STATEMENT – ON KNOWLEDGE MANAGEMENT	LEVEL OF AGREEMENT				
Initiatives taken by the NHS for the control of HAI (e.g. cleanliness champions programme, Matron's Charter), as a result of the political endorsement, are factors that promote effective knowledge management	1	2	3	4	5
The **increased prioritisation of domestic services,** as a result of the increased concern given on Healthcare Associated Infections (HAI), is an opportunity for knowledge management	1	2	3	4	5
Staff awareness on the control of HAI is an opportunity for sharing and dissemination of knowledge	1	2	3	4	5
Web-based knowledge (i.e. knowledge networks/knowledge and information portals) is an opportunity for effective management of knowledge)e.g. the National Electronic Library of Health developed by the NHS)	1	2	3	4	5
Regular meetings between the domestic teams and clinical teams (e.g. infection control teams) teams are factors that promote effective knowledge management (e.g. involvement of domestic managers in the ICC of the respective NHS Trust)	1	2	3	4	5
Having the domestic service as an in-house service can encourage close liaison between clinical (especially ICT) and domestic teams and thereby can enhance effective management of knowledge	1	2	3	4	5
Contracting-out domestic services is an opportunity to bring specialised knowledge into hospitals and thereby can enhance effective management of knowledge	1	2	3	4	5
A **hierarchical organisational structure** negatively impact upon effective management of knowledge	1	2	3	4	5
Poor level of integration between clinical (especially ICT) and domestic teams negatively impact upon effective management of knowledge	1	2	3	4	5
Human resource issues (e.g. high workload, lack of motivation, lack of empowerment, employee retention) negatively impact upon effective management of knowledge	1	2	3	4	5
Lack of IT facilities negatively impact upon effective management of knowledge	1	2	3	4	5
High cost of training and education programmes negatively impact upon effective management of knowledge	1	2	3	4	5
Lack of understanding of control of HAI goals negatively impact upon effective management of knowledge	1	2	3	4	5

Absence of a learning culture negatively impact upon effective management of knowledge	1	2	3	4	5

PART FOUR – Performance Management in the control of HAI

12. The following table describes common Performance Management approaches in-use in organisations. If you are currently using any of the techniques listed in the table below, in your hospitals, **please circle the most appropriate scale** as follows (Please answer all the questions):

- **Column A:** Please state the **frequency of use** of the Performance Management approaches.
  Abbreviations of Frequency of use:
  Weekly (**W**), fortnightly (**F**), Monthly (**M**), Quarterly (**Q**), Bi-Annually (**B**), Annually (**A**), Once in Two years (**OT**), Once in Three Years (**T**), any other (please specify)

- **Column B:** Please indicate the **level of effectiveness** of the Performance Management approaches in the control of HAI in domestic services. Mark scale 5 in Column B, if you are not using the technique/s (i.e. Not applicable).
  Meaning of scale:
  1 (Very Effective), **2** (Effective), **3** (Fairly Effective), **4** (Not Effective), **5** (Not Applicable)

PERFORMANCE MANAGEMENT APPROACHES	Column A (Frequency of use)	Column B (Level of effectiveness)				
External Audits by Audit Scotland		1	2	3	4	5
Audits by the Infection Control Committee - checklists and snapshot for reviewing cleanliness of hospitals		1	2	3	4	5
Self audits by the domestic service for reviewing its services		1	2	3	4	5
Audits for reviewing standards ISO 9001:2000 - measures the quality of the domestic service		1	2	3	4	5
Environmental audits for reviewing cleanliness of the hospitals		1	2	3	4	5
Performance appraisal technique for domestics		1	2	3	4	5
Performance appraisal technique for managers		1	2	3	4	5
Performance Development Plans (e.g. CPD – Continuing Professionals Development Plans)		1	2	3	4	5
Patient Satisfaction Survey techniques		1	2	3	4	5
Programme Evaluation Techniques – to review the performance of programmes (e.g. Effectiveness of Training and Education Programmes for staff)		1	2	3	4	5
The Performance Assessment Framework (PAF) developed by the National Health Service		1	2	3	4	5
Balance Scorecard (BSC) Technique - focuses on customer perspective, internal-business processes, learning and growth and financial perspective		1	2	3	4	5
The Business Excellence (EFQM) Model - review sustainable excellence in all aspects of performance		1	2	3	4	5
Benchmarking techniques – comparison of the hospital or		1	2	3	4	5

part of your services with others (internal/external).						
Any other (please specify):		**1**	**2**	**3**	**4**	**5**

13. Where do you think **improvements** are needed in the Performance Management techniques you are currently using in your organisation for the control of HAI in domestic services? **Please circle the most appropriate scale.**

   <u>Meaning of scale:</u> **1** (Improvement is very much needed),   **2** (Needed),   **3** (Fairly needed),
   4 (Not needed),   **5** (Not applicable – it is already in use and work well)

AREAS FOR IMPROVEMENT	LEVEL OF NEED OF IMPROVEMENTS				
Balanced set of measures to cover areas beyond operational performance	**1**	**2**	**3**	**4**	**5**
Performance Management techniques to be developed using an **IT (Information Technology) tool** to ease work and to reduce paper work	**1**	**2**	**3**	**4**	**5**
The **organisational goals and objectives** to be aligned with the performance management technique	**1**	**2**	**3**	**4**	**5**
Regular review of performance measures	**1**	**2**	**3**	**4**	**5**
A **benchmarking technique** to compare performance results against other FM departments/hospitals	**1**	**2**	**3**	**4**	**5**
Individual **rewards and recognition** to be closely linked to performance	**1**	**2**	**3**	**4**	**5**
Training and education needs to be better supported by the performance management techniques	**1**	**2**	**3**	**4**	**5**
More **accountability** for domestic teams for achieving performance targets	**1**	**2**	**3**	**4**	**5**
Team performance to be included in the performance management technique (e.g. team work, integration of teams, etc.)	**1**	**2**	**3**	**4**	**5**
The **utilisation of resources** (e.g. cost of cleaning equipment) to be included as a performance measure to identify the cost of resources.	**1**	**2**	**3**	**4**	**5**
A **penalty system** to be included for poor performance	**1**	**2**	**3**	**4**	**5**
Any other (please specify):	**1**	**2**	**3**	**4**	**5**

14. The following is a list of **issues which could affect the performance levels** of control of HAI in domestic services. Given the current situation in your hospital, please **rate** the following issues according to the <u>extent to which they are critical in inhibiting the performance levels</u> of control of HAI in domestic services. **Please circle the most appropriate scale.**
<u>Meaning of scale:</u>   **1** (Very Critical),   **2** (Critical),   **3** (Fairly Critical),   **4** (Not Critical), **5** (Not applicable)

ISSUES THAT ARE CRITICAL IN INHIBITING THE PERFORMANCE OF CONTROL OF HAI IN DOMESTIC SERVICES	LEVEL OF NEED OF IMPROVEMENTS				
Budgetary limitations	1	2	3	4	5
Unnecessary bureaucracy created through high involvement of infection control teams in FM services	1	2	3	4	5
Low level of involvement of infection control teams in FM services	1	2	3	4	5
High level of absenteeism (due to sickness/illness) and **high turnover** of domestics	1	2	3	4	5
Lack of clear performance measures for the control of HAI in domestic services	1	2	3	4	5
Lack of appropriate control of HAI standards for domestic services	1	2	3	4	5
Lack of training and education for staff on the control of HAI in domestic services	1	2	3	4	5
Lack of comprehensive guidance documents on the control of HAI in domestic services	1	2	3	4	5
Lack of Involvement of domestic managers in the process of developing guidelines and standards for the control of HAI in domestic services	1	2	3	4	5
More Contracting out (including PFI schemes – Private Finance Initiative) domestic services	1	2	3	4	5
Inappropriate design (functionality and spatial arrangements) of the hospital building	1	2	3	4	5

15. Please kindly provide further comments, if any, relating to this questionnaire or the area of the study in the space below.

    ……

    ……

    ……

Thank you for taking your time to complete this questionnaire.

If you need a summary of the final survey report, please tick (✓) the box and note your name and address below. Your responses will be treated in confidence.

Name and Address: ………………………………………………………………………

…………………………………………………………………………………………………

……………………………………………………………………………………………….

Please post the completed questionnaire to reach the researcher on or before 14th November 2004.

Post to: Champika Liyanage
          M542, School of Built and Natural Environment
          Glasgow Caledonian University, Cowcaddens Road
          Glasgow, G4 0BA

------- Questionnaire prepared by Champika Liyanage -------

APPENDIX 4b

MISSING VALUE ANALYSIS (MVA) OF THE QUESTIONNAIRE SURVEY DATA

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
KM1	409	3.09	1.302	3	.7	0	0
KM2	409	2.30	1.316	3	.7	0	0
KM3	409	1.60	.599	3	.7	0	4
KM4	409	3.57	1.391	3	.7	0	0
KM5	409	2.08	1.047	3	.7	0	0
KM6	410	1.95	1.015	2	.5	0	44
KM7	409	3.69	.938	3	.7	13	0
KM8	409	3.23	1.309	3	.7	0	0
KM9	409	2.01	.989	3	.7	0	27
KM10	409	2.76	1.592	3	.7	0	0
KM11	409	3.87	1.362	3	.7	0	0
KM12	409	3.47	.905	3	.7	13	0
KM13	409	2.81	1.625	3	.7	0	0
KM14	409	3.45	1.228	3	.7	34	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Summary of Estimated Means

	KM1	KM2	KM3	KM4	KM5	KM6	KM7	KM8	KM9	KM10	KM11	KM12	KM13	KM14
All Values	3.09	2.30	1.60	3.57	2.08	1.95	3.69	3.23	2.01	2.76	3.87	3.47	2.81	3.45
EM	3.09	2.30	1.60	3.57	2.08	1.95	3.69	3.23	2.01	2.76	3.87	3.47	2.81	3.45

Summary of Estimated Standard Deviations

	KM1	KM2	KM3	KM4	KM5	KM6	KM7	KM8	KM9	KM10	KM11	KM12	KM13	KM14
All Values	1.302	1.316	.599	1.391	1.047	1.015	.938	1.309	.989	1.592	1.362	.905	1.625	1.228
EM	1.302	1.316	.599	1.391	1.047	1.015	.938	1.309	.989	1.592	1.362	.905	1.625	1.228

EM Estimated Statistics

EM Means[a]

KM1	KM2	KM3	KM4	KM5	KM6	KM7	KM8	KM9	KM10	KM11	KM12	KM13	KM14
3.09	2.30	1.60	3.57	2.08	1.95	3.69	3.23	2.01	2.76	3.87	3.47	2.81	3.45

a. Little's MCAR test: Chi-Square = 1.071, DF = 1, Sig. = .301

EM Covariances[a]

	KM1	KM2	KM3	KM4	KM5	KM6	KM7	KM8	KM9	KM10	KM11	KM12	KM13	KM14
KM1	1.695													
KM2	.455	1.731												
KM3	.017	.019	.358											
KM4	.058	.573	-.014	1.936										
KM5	.218	1.002	-.028	.599	1.096									
KM6	.098	-.328	-.030	-.103	-.224	1.029								
KM7	-.156	.133	-.006	.158	.089	-.457	.880							
KM8	.312	.346	-.120	.641	.292	-.125	.045	1.713						
KM9	-.050	-.441	-.061	-.222	-.224	.027	-.012	.062	.978					
KM10	.441	1.418	-.061	.490	.949	-.392	.228	.408	-.162	2.534				
KM11	.090	.381	-.002	1.140	.359	.111	.008	.381	-.166	.096	1.855			
KM12	.021	.172	.004	.166	.220	.010	.026	.164	.215	.213	.185	.819		
KM13	.446	1.390	-.099	.431	.944	-.409	.195	.293	-.295	2.196	.032	.015	2.642	
KM14	.273	.296	.069	.293	.438	.001	.032	.162	-.047	.362	-.048	.263	.410	1.508

a. Little's MCAR test: Chi-Square = 1.071, DF = 1, Sig. = .301

EM Correlations[a]

	KM1	KM2	KM3	KM4	KM5	KM6	KM7	KM8	KM9	KM10	KM11	KM12	KM13	KM14
KM1	1													
KM2	.266	1												
KM3	.021	.024	1											
KM4	.032	.313	-.017	1										
KM5	.160	.727	-.044	.411	1									
KM6	.074	-.245	-.050	-.073	-.211	1								
KM7	-.128	.108	-.011	.121	.091	-.480	1							
KM8	.183	.201	-.153	.352	.213	-.094	.036	1						
KM9	-.039	-.339	-.103	-.162	-.216	.027	-.013	.048	1					
KM10	.213	.677	-.064	.221	.569	-.243	.153	.196	-.103	1				
KM11	.051	.212	-.002	.601	.252	.080	.006	.214	-.123	.044	1			
KM12	.018	.144	.008	.131	.233	.011	.031	.139	.240	.148	.150	1		
KM13	.211	.650	-.102	.190	.555	-.248	.128	.138	-.184	.849	.014	.010	1	
KM14	.171	.183	.094	.172	.341	.001	.028	.101	-.039	.185	-.029	.237	.206	1

a. Little's MCAR test: Chi-Square = 1.071, DF = 1, Sig. = .301

APPENDIX 5

**STRUCTURED QUESTIONNAIRE FOR REFINING AND VALIDATING THE
PERFORMANCE MANAGEMENT FRAMEWORK**

<u>Purpose of the interviews:</u>

The interview seeks to refine the Performance Management Framework (PMF)
developed for the control of HAI in domestic services.

<u>Types of questions:</u>

The questions will be in both "closed" and "open" formats to ensure effective
coverage of the issues concerned.

<u>Sample:</u>

The sample will be mainly chosen from the following professionals:

- Academics (10)
- Facilities managers/Domestic managers (10)
- Infection control members (10)

The total number of interviews to be conducted will be approximately thirty (30).

<u>Background Information</u>

1. Present Job role/title:

   ………………………………………………………………………

2. Area of expertise (e.g. performance management, facilities management, etc.)

   …………………………………………………………………………

   …………………………………………………………………………

Evaluation of the Performance Management Framework (PMF)

Note: For questions 3, 4, 5 and 6, please indicate a relevant number (according to the Likert scale given - 1, 2, 3, 4 or 5) in the box provided.

<u>Meaning of scale:</u> **1** (Very high level of coverage), **2** (High level), **3** (Low level), **4** (Very Low level), **5** (Not at all covered)

3. In your view, how will you rate the level of coverage (level of completeness) in terms of the **<u>contents of the performance management framework</u>**.

4. In your view, how will you rate the level of coverage (level of completeness) in terms of the **<u>logic (e.g. flow of the activities – the sequence of activities and how it mirrors what should be done) used in the performance management framework</u>** -

5. In your view, how will you rate the level of coverage (level of completeness) of the issues discussed under **<u>performance goals</u>** in the developed framework?

6. In your view, how will you rate the level of coverage (level of completeness) of the issues discussed under **<u>performance indicators</u>** in the developed framework?

7. In your view, how will you rate the **<u>level of understanding</u>** of the performance management framework?

    <u>Meaning of scale:</u> **1** (very easy to understand), **2** (easy to understand), **3** (difficult to understand), **4** (very difficult to understand), **5** (Cannot understand at all)

8. Please feel free to provide any **further comments/suggestions** regarding the PMF (consider any areas that you think may need to be **improved/included/deleted** in the PMF):

    …………………………………………………………………………………

    …………………………………………………………………………………

    …………………………………………………………………………………

    …………………………………………………………………………………

9. Would you recommend the framework for use on the domestic services in the control of HAI?

    Yes ☐   **No** ☐

Investigation of further issues in the control of HAI in domestic services

10. From the findings of this study so far, there is a perceived lack of integration between the domestic services and infection control teams in many hospitals in the control of HAI. What is your view on this within the context of your own hospital?

11. From the findings of this study so far, there is a perceived lack of delegation of authority and responsibility to infection control teams in most of the hospitals where the domestic service is contracted-out (i.e. outsourced or PFI). What is your view on this within the context of your own hospital?

12. Please feel free to provide any other comments/observations regarding the issues of control of HAI in domestic services?

Thank you for your time.

Champika Liyanage

APPENDIX 6a

KEY DOCUMENTS SPECIFICALLY RELATED TO THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS (HAI) IN DOMESTIC SERVICES

Institution	Year	Title	Place of publication	Web link/reference
UNISON	2005	**Cleaners' voices : interviews with hospital cleaning staff**	London : UNISON	http://www.unison.org.uk/acrobat/14565.pdf
UNISON	2005	**Hospital contract cleaning and infection control**	London : UNISON	http://www.unison.org.uk/acrobat/14564.pdf
Department of Health	2004	**Towards cleaner hospitals and lower rates of infection : a summary of action**	London : DH	http://www.dh.gov.uk/assetRoot/04/08/58/61/04085861.pdf
Department of Health	2004	**MRSA surveillance system : results**	London : DoH	http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsStatistics/PublicationsStatisticsArticle/fs/en?CONTENT_ID=4085951&chk=HBt2QD
Department of Health. NHS Estates	2004	**The NHS healthcare cleaning manual**	London : DoH	http://patientexperience.nhsestates.gov.uk/clean_hospitals/ch_content/cleaning_manual/introduction.asp
Department of Health. NHS Estates	2004	**A Matron's Charter : an action plan for cleaner hospitals**	London : NHS Estates	http://www.dh.gov.uk/assetRoot/04/09/15/07/04091507.pdf
Department of Health	2003	**The Government response to 'Fighting infection', the 4th report of the House of Lords Select Committee on Science and Technology 2002-2003**	London : Stationery Office	http://www.info.doh.gov.uk/doh/point.nsf/0/abea635c83bf3b1f80256ddd0044969e/$FILE/infectioncontrol.pdf
Department of Health	2003	**Winning ways : working together to reduce healthcare associated infection in England : report from the Chief Medical Officer**	London : DoH	http://www.dh.gov.uk/assetRoot/04/06/46/89/04064689.pdf
Department of Health. NHS Estates	2003	**Standards of cleanliness in the NHS : a framework in which to measure performance outcomes**	[Leeds] : NHS Estates	http://patientexperience.nhsestates.gov.uk/clean_hospitals/ch_downloads/cleanliness_standards_2003.doc
National Audit Office	2004	**Improving patient care by reducing the risk of hospital acquired infection : a progress report**	London : Stationery Office	http://www.nao.org.uk/publications/nao_reports/03-04/0304876.pdf
Parliament. House of Lords. Select Committee on Science and Technology	2003	**Fighting infection : 4th report session 2002-03**	London : Stationery Office	http://www.parliament.the-stationery-office.co.uk/pa/ld200203/ldselect/ldsctech/138/13801.htm

Institution	Year	Title	Place of publication	Web link/reference
Parliament. House of Lords. Select Committee on Science and Technology	2003	**Fighting infection : oral evidence and written evidence from 18 February 2003 : 4th report session 2002-03**	London : Stationery Office	**18 February 2003: 4th report session 2002-03** (138-I)
National Audit Office <u>and</u> Thames Valley University. Richard Wells Research Centre	2003	**A comparison of international practices in the management and control of hospital-acquired infections**	London : NAO	http://www.nao.org.uk/publications/nao_reports/03-04/0304876_int_comparison.pdf
National Audit Office Wales <u>and</u> Great Britain. National Assembly for Wales	2003	**The management and delivery of hospital cleaning services in Wales**	Cardiff : NAOW	http://www.agw.wales.gov.uk/publications/2003/agw2003_5.pdf
Department of Health	2002	**The NHS Plan patient environment self-assessment form 2002**	London : DoH	
Department of Health. NHS Estates	2002	**Infection control in the built environment : design and planning**	London : Stationery Office	http://www.nhsestates.gov.uk/download/publications_guidance/ES_IC.pdf
Patients' Association	2002	**Infection control and medical device decontamination : a survey of strategic health authorities**	London : Patients' Association	
Department of Health. NHS Estates	2001	**The NHS plan : clean hospitals**	London : Stationery Office	http://patientexperience.nhsestates.gov.uk/clean_hospitals/ch_downloads/clean_hospitals_report.pdf
National Audit Office	2001	**The challenge of hospital acquired infection**	London : Stationery Office	
London School of Hygiene and Tropical Medicine. Department of Public Health Policy	2001	**Hospital acquired infections**	London : DPHP	http://palin.lshtm.ac.uk/php/publications/briefing5.pdf
National Audit Office	2000	**The management and control of hospital acquired infection in acute NHS Trusts in England**	London : Stationery Office	http://www.nao.gov.uk/publications/nao_reports/9900230.pdf
Department of Health. NHS Estates	2000	**Standards for environmental cleanliness in hospitals**	London : Stationery Office	http://www.nhsestates.gov.uk/download/publications_guidance/es_clean.pdf
Auditor General for Scotland	2000	**Clean Bill of Health?**	Audit Scotland	
Auditor General for Scotland	2003	**Hospital Cleaning**	Audit Scotland	
NHS Quality Improvement Scotland	2003	**Improving clinical care in Scotland: Healthcare Associated Infection (HAI); Infection Control**		www.clinicalstandards.org/pdf/natoveriew/haiic.pdf file://C:%5CProgram%20Files%5CEndNote%5CEN7CWYW.dot
Scottish Executive Health Department	2002	**The Scottish Executive's Action plan to tackle HAI**		http://www.scotland.gov.uk/library5/health/preventinfect.pdf

APPENDIX 6b

KEY RECOMMENDATIONS GIVEN BY THE KEY DOCUMENTS RELATING TO CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS (HAI)

The Comptroller and Auditor General's report (2000) published on 'The management and control of hospital acquired infection in acute NHS Trust in England' is seem to be a seminal document in the history of infection control in the UK. This report has gone a long way to uncover the reasons why efforts made towards infection control have failed. It provides recommendations to produce better results in hospitals in terms of control of HAI, such as:

- Consider the need for a revision of the 1995 guidance on infection control

- Consider the available evidence on cost effectiveness in infection control and develop standards where appropriate

- Review policies on the provision of training and education on infection control procedures to ensure that all staff are targeted by induction training and that key staff are kept up-to-date on good infection control practice

- Review arrangements for monitoring infection control programmes to determine whether there is a need for some revision of hospital practices

- Ensure that infection control practices are fully implemented

- Ensure that the staff comply with the newly published infection control standards

- Review audit arrangements to ensure that issues associated with the control of HAI are covered adequately

The aforementioned recommendations mostly focus on development and review of policies and standards (including policies on training and education) and also on the review of monitoring and audit arrangements. The NHS Quality Improvement Scotland (2003) report on 'Improving clinical care in Scotland: Infection Control', which was developed with the aim of promoting public confidence in the NHS Scotland, also provides similar recommendations to improve the processes associated with the control of HAI. However, it goes further on to discuss the importance of accountability and infrastructure as well. The recommendations given by the NHS Quality Improvement Scotland (2003) are:

- Accountability – fully demonstrate clear lines of accountability in relation to infection control

- Infrastructure – Every Trust should have ICT members that include infection control nurses, infection control doctors and consultant microbiologists. These teams should be properly trained and infection control advice should be available 24 hours a day.

- Infection control policies and procedures – Every Trust should produce infection control policies and procedures, and it has to be developed with key stakeholders such as other health professionals and ICT members

- Training, education and Induction - Every Trust should have a formal infection control training and education programmes

▪ Monitoring, review and audit – Routine monitoring and review of the infection control arrangements should be in place.

The Queensland Health (2001a) report on 'Infection control guidelines' was published to establish minimum standards of practice in relation to the control of HAI. This was achieved by introducing key areas of improvement in the control of HAI in the report. These key areas, which are stated below, are akin to the areas identified in the above recommendations provided by the NHS Quality Improvement Scotland (2003):

▪ Policies and procedures

▪ Education and training

▪ Research and development

▪ Performance requirements

▪ Duties and responsibilities

▪ Resources

The Legislative Council Selective Committee, Hong Kong (2003) recommendations also take a similar view to what has been described above. They also mention the importance of measuring performance of control of HAI programmes. As per the report, the full recommendations to improve practices of control of HAI are:

▪ There is a need to develop guidelines on infection control

▪ There is a need for training on guidelines on infection control

▪ Compliance with guidelines on infection control is essential

▪ Responsibilities of infection control officers should be properly defined

▪ Measuring performance of infection control programmes is vital

A report published by the Government of Ontario – Canada (2003) on 'Infection control' also highlights the importance of areas such as standards and monitoring, facility design as well as training and education in the control of HAI. This is also stated in the Ontario Hospital Association's (2006) recent report on Prevention and Control of Transmission of Clostridium difficile within Healthcare Facilities. The report furthermore explains the need for the development of infection control networks (among the parties involved in the control of HAI in FM services) in effective control of HAI. The main recommendations of the report are:

▪ Develop infection control networks

▪ Develop standards, accreditation and monitoring to ensure compliance with both existing infection control standards and new comprehensive provincial infection control standards.

▪ Facility design – ensure appropriate facility design within hospitals to ensure effective infection control practice

▪ Develop appropriate training and education programmes

'A clean bill of health' report published by the Auditor General for Scotland (2003) also states that it is essential for the FM teams to work with ICT members in the control of HAI. In addition the report also states that the NHS Trusts should agree on performance indicators and targets for measuring performance in the effective control of HAI. Summary The key recommendations from the report are as follows:

- Trusts should agree performance indicators and targets for staffing indicators such as sickness absence, turnover and vacancies

- Trusts should ensure that operational policies specify responsibility for cleaning clinical equipment and that all staff are made aware of their responsibilities.

- Facilities managers should work with ICT members

- Staff training

- Trusts should ensure that they have comprehensive policies and procedures, which are developed in collaboration with providers and users

The University of Michigan Health System (2001) report on 'Infection Control' presents and outlines some of the basic considerations to be made in developing an effective institutional programme in terms of control of HAI. Their main considerations are based on education and training and the role of ICT members:

- Education and Training – staff should be familiar with the elements of their organisation's infection prevention and control programme. This requires institutional level orientation in addition to departmental, work-area and job specific education interventions. Staff members should undergo orientation to become familiar with their expected individual responsibilities, as they relate to infection prevention and work place activities.

- The role of the ICT – The ICT is responsible for carrying out all aspects of the infection prevention and control programme. A highly effective method of expanding front-line staff involvement in the programme is the designation of infection control liaisons. These infection control liaisons can facilitate consistent communication between the teams (clinical and non-clinical). Liaisons can facilitate the functions such as Informing staff members of changes in infection control practice, notifying staff members of unusual infection trends, assisting the coordination of the scheduling of infection control programmes

The Department of Health (2001a) journal publication on 'EPIC guidelines' provides broad statements (principles) of good practices that all practitioners can use and which can be incorporated into local protocols. As the guidelines suggest, the following are very important in the successful control of HAI:

- Audit and feedback to staff

- Set up indicators to demonstrate improvement in infection control

- Provide training for all healthcare staff in infection control

Most of the aforementioned documents highlight the important of role of ICT members, training and education, policies and guidelines, standards, performance measures, audit and feedback, and resource constraints. 'Infection control and practical guidelines for infection control in healthcare facilities', published by the World Health Organisation (2004a, 2004b), also highlight similar areas for effective control of HAI. The guidelines are aimed at helping countries to strengthen their infection control practices in healthcare facilities. The guidelines address all aspects of control of HAI programme. According to the guidelines, the following areas are the 'key considerations' for effective control of HAI:

- Management
    - Assignment of responsibilities
    - Choice of appropriate technologies
    - Costing, budgeting and financing
    - Monitoring & supervision
    - Performance assessment
- Information, Education and Communication
    - Adoption of best practices standards
    - Training
- Equipment and supply
    - Establishment of a list of essential infection control equipment and supplies
    - Forecasting of needs
    - Procurement
    - Maintenance

The Auditor General for Wales (2003) report on 'the management and delivery of hospital cleaning services in Wales' provide a comprehensive list of recommendations to set out a new policy agenda to rebuild, renew and improve the NHS. The recommendations are similar to the recommendations in the aforementioned guidelines/reports. Below are the summary of the recommendations of the report:

- Determine the interface between environmental cleanliness and infection control
- Develop national standards of environmental cleanliness for the NHS
- Develop audit criteria and methodologies for environmental cleanliness for the NHS
- Consider accountabilities/responsibilities involved and develop a framework for achieving the agreed national standards of environmental cleanliness for the NHS
- Develop key performance indicators for the National Standards of Environmental cleanliness for the NHS
- Identify key issues and make recommendations on any anticipated demand for resources
- Work with the ICT members to ensure that monitoring of cleaning in hospitals is consistent throughout the NHS
- Evaluate the pilot schemes in operation to overcome problems with recruitment, retention and sickness and promulgate schemes that are having a positive impact

- Involve ICT members in the development of cleaning standards and specifications
- Update hospital cleaning specifications to suit infection control requirements
- Improve internal communications with the clinical staff
- Ensure cleaning is stressed as a vitally important part of patient care
- Report the results of cleanliness monitoring on a monthly basis

The recommendations provided by the College of Nurses of Ontario (2004) on 'Infection prevention and control – Canada', however, take a different view. According to the College of Nurses of Ontario, for successful control of HAI, the focus should be on:

- Application of Evidence-Based Measures – apply evidence-based measures to prevent and control transmission of micro-organisms that are likely to cause infection.
- Application of professional judgement – exercise professional judgement relevant to each client's situation and infection prevention and control practices
- Communication – use appropriate and timely communication strategies with the healthcare teams to discuss infection prevention and control issues.

The aforementioned recommendations highlight the importance of application of professional judgement in the control of HAI. The Department of Health's (2004c) report entitled 'Towards cleaner hospitals and lower rates of infection' also identifies this as an important area. The Department of Health's (2004) report is written to give power to matrons and nurses at ward level in order to provide practical advice for the other staff to ensure high standards of cleanliness. Their recommendations, therefore, include:

- Giving power to matrons and nurses at ward levels
- Independent inspection to measure progress
- Learning from the very best – through matrons and nurses

As stated above, learning from the very best to develop knowledge and skills is a vital recommendation offered by the Department of Health (2004c). This was further strengthened by two other reports published by the Department of Health in the same year (Department of Health 2004a, 2004b). The reports are entitled 'NHS sets up the fight against hospital infections' and 'infection control training for over one million NHS staff'. The reports are published as part of the proposed new knowledge and skills framework introduced in the hospitals for the staff to recognise how they can play a part in maintaining high standards in terms of control of HAI in the NHS. The key recommendations of the reports are:

- Staff should be helped to develop in such a way that they can apply the knowledge and skills appropriate to their job
- Staff should be helped to identify and develop knowledge and skills that will support their career progression and encourage lifelong learning
- Staff should have annual development reviews provided by their line manager and they should be able to agree personal development plans

As aforementioned the Department of Health considers 'knowledge of staff and other practitioners' as one of the key considerations in the successful control of HAI. The report published by Ann Noble Architects (2003) on 'reduction of hospital acquired infections by design' avers this to a further extent. According to Ann Noble Architects the application of knowledge and skills is vital in the successful control of HAI. The focus of their report from the start is on the practical application of available knowledge, in terms of both infection control practices and building design. The key issues highlighted in the report are:

- Giving infection control the right priority

- What is expected vs. resource allocations – In many NHS Trusts there may be a growing mismatch between what is expected of ICT members in the control of HAI and the staffing and other resources allocated to them

- Training

- The need of an Expert client – does the NHS client have the necessary knowledge and experience needed for the sophisticated and commercial procurement methods

- The input of doctors and nurses is invaluable, but fewer are joining project teams

- Protecting experience – there is a wealth of experience and knowledge among the most senior infection control practitioners that is in danger of being lost when they retire.

- Integrating the design and ICT members - There is inconsistency of knowledge and experience among ICT members who are asked to participate in projects.

- Role of FM – there is a need for improved communication between building designers and FM teams.

- NHS knowledge dissemination – the needs of the NHS has to be more rigorously documented. Better cross-referencing, and the design of an authoritative method of posting comments/feedback/accrued knowledge should be considered.

- Other current problems also include insufficient and poorly trained staff, poor supervision, and poor contract specification.

Apart from the importance of application of knowledge and skills, Ann Noble Architects also commented on the significance of the role of different parties (FM, ICT members and other clinical teams) and their level of integration.

APPENDIX 7a

CONTENT ANALYSIS – SOME OF THE FINDINGS OF THE *IN-HOUSE CASE* AND *PFI CASE*

Table I: Characteristics of standards used in the control of HAI

Description	In-house case				PFI case					Total 16
	FMGR (CS1) Total 3	FMGR - SUP (CS1) Total 2	ICT (CS1) Total 3	Total for In-house case	FMGR (CS2) Total 2	FMGR - OUT (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	ICT (CS2) Total 2	Total for PFI case	
Easy to understand	3	2	3	**8**	2	1	2	2	**7**	**15**
Involvement of parties in developing the standards	3	-	3	**6**	1	1	-	2	**4**	**10**
Consistency with national and hospital standards	2	2	3	**7**	1	-	-	2	**3**	**10**
Option of reviewing the standards	2	1	2	**5**	1	-	1	2	**4**	**9**
Flexibility of the standards	-	-	-	**0**	-	2	-	-	**2**	**2**

Table II: Characteristics of service specifications used in the control of HAI

Description	In-house case				PFI case					Total (16)
	FMGR (CS1) Total 3	FMGR - SUP (CS1) Total 2	ICT (CS1) Total 3	Total for In-house case	FMGR (CS2) Total 2	FMGR - OUT (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	ICT (CS2) Total 2	Total for PFI case	
Set clear objectives	3	2	3	**8**	2	2	2	2	**8**	**16**
Set clear outcome statements	2	1	2	**5**	2	2	2	2	**8**	**13**
Provide clarity for domestic staff	2	2	2	**6**	2	2	2	1	**7**	**13**
Involvement of domestic teams/ infection control teams in developing the specifications	3	1	2	**6**	2	1	-	2	**5**	**11**
Consistency with hospital/ national infection control requirements	2	-	2	**4**	2	1	-	2	**5**	**9**
Provide specific information rather than being too general	-	2	1	**3**	-	-	2	-	**2**	**5**
Regular review of specifications	1	-	2	**3**	-	2	1	2	**5**	**8**

Table III: Characteristics of policies and guidelines

Description	In-house case				PFI case					Total (16)
	FMGR (CS1) Total 3	FMGR - SUP (CS1) Total 2	ICT (CS1) Total 3	Total for In-house case	FMGR (CS2) Total 2	FMGR - OUT (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	ICT (CS2) Total 2	Total for PFI case	
Availability	3	2	3	**8**	2	2	2	2	**8**	**16**
Types	3	2	3	**8**	2	2	2	2	**8**	**16**
Up-to-dateness	3	2	1	**6**	2	1	2	2	**6**	**12**
Clarity in terms of responsibilities	1	1	1	**3**	2	1	2	2	**3**	**6**
Clarity in terms of training needs	3	1	2	**6**	2	1	-	2	**6**	**12**
Clarity in terms of working methods	1	1	2	**4**	2	2	2	1	**4**	**8**
Clarity in terms of the attainment levels to be achieved	3	1	3	**7**	1	1	-	1	**7**	**14**
Clarity in terms of lines of communication	1	-	1	**2**	1	1	-	2	**2**	**4**
Involvement in developing policies	1	-	1	**2**	1	1	-	2	**2**	**4**

Table IV: Determining the importance given to the control of HAI

Description	In-house case				PFI case				Total (12)
	FMGR (CS1) Total 2	FMGR - SUP (CS1) Total 1	ICT (CS1) Total 3	Total for In-house case	FMGR (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	ICT (CS2) Total 2	Total for PFI case	
Impact of domestic services on HAI rates	1	1	-	**2**	2	2	-	**4**	**6**
Priority given for control of HAI in domestic services	-	1	1	**2**	-	-	2	**2**	**4**
Awareness of domestic teams in the control of HAI	-	-	3	**3**	-	1	-	**1**	**4**
Change of work practices in domestic services due to the high priority given for control of HAI in recent years	2	-	-	**2**	1	-	1	**2**	**4**

Table V: Resource deployment – important factors to be considered

Description	In-house case				PFI case					Total (15)
	FMGR (CS1) Total 3	FMGR - SUP (CS1) Total 2	ICT (CS1) Total 2	Total for In-house case	FMGR (CS2) Total 2	FMGR - OUT (CS2) Total 2	FMGR - SUP,OUT (CS2) Total 2	ICT (CS2) Total 2	Total for PFI case	
<u>Resource availability</u>										
Staff availability	3	2	2	**7**	2	2	2	2	**8**	**15**
Budget availability	3	1	1	**5**	1	2	-	-	**3**	**8**
Availability of equipment and materials	1	2	1	**4**	-	1	1	-	**2**	**6**
Staff salaries/ wages	-	2	-	**2**	1	1	2	-	**4**	**6**
Types of equipment and materials	-	-	3	**3**	-	-	-	2	**2**	**5**
Staff skills and expertise	-	1	1	**2**	-	-	-	2	**2**	**4**

Table VI: Different stages of involvement of key players in the control of HAI in domestic services

Description	In-house case						PFI case							Total (26)
	FMGR (CS1)	FMGR - SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	Total for In-house case	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)	Total for PFI case	
	Total 3	Total 2	Total 3	Total 3	Total 2		Total 2	Total 2	Total 2	Total 3	Total 2	Total 2		
Involvement														
In planning	3	-	-	3	-	**6**	2	2	-	-	2	-	**6**	**12**
In monitoring and supervision	1	2	-	2	2	**7**	2	1	2	-	2	2	**9**	**16**
In taking corrective actions	2	-	-	3	-	**5**	1	2	-	-	-	-	**3**	**8**
In changing practices	1	-	-	3	-	**4**	2	1	-	-	2	-	**5**	**9**
In carrying out practices	-	2	3	-	1	**6**	-	-	2	3	-	2	**7**	**13**

Table VII: Different interpretations to 'integration'

Description	In-house case						PFI case							Total (26)
	FMGR (CS1)	FMGR - SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	Total for In-house case	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)	Total for PFI case	
	Total 3	Total 2	Total 3	Total 3	Total 2		Total 2	Total 2	Total 2	Total 3	Total 2	Total 2		
Integration														
Working together as a team	-	2	2	-	2	**6**	-	1	2	2	-	2	**7**	**13**
Taking clinical team's advices into consideration	2	-	-	2	1	**5**	-	-	-	-	2	2	**4**	**9**
Meetings between the teams	3	-	-	1	-	**4**	1	1	-	-	2	-	**4**	**8**
Clear lines of communication in the structure	1	-	-	1	-	**2**	2	1	-	-	2	-	**5**	**7**
Support by the clinical teams	1	1	2	-	-	**4**	-	-	-	-	-	-	**0**	**4**
Domestic managers are members of infection control committees	-	-	-	-	-	**0**	-	1	-	-	-	-	**1**	**1**

Table VIII: Practices of KM

Description	In-house case						PFI case							Total (26)
	FMGR (CS1)	FMGR - SUP (CS1)	STAF (CS1)	ICT (CS1)	NURS (CS1)	Total for In-house case	FMGR (CS2)	FMGR - OUT (CS2)	FMGR - SUP,OUT (CS2)	STAF (CS2)	ICT (CS2)	NURS (CS2)	Total for PFI case	
	Total 3	Total 2	Total 3	Total 3	Total 2		Total 2	Total 2	Total 2	Total 3	Total 2	Total 2		
Training and Education programmes	3	2	3	3	2	13	2	2	2	3	2	2	13	26
Learning from books/ manuals	3	2	3	3	2	13	2	2	2	3	2	2	13	26
Sharing ideas and learning from each other	3	2	2	3	2	12	1	1	2	3	2	2	11	23
Mentoring	2	2	1	1	2	8	2	1	1	2	-	1	7	15
Meetings	3	1	-	3	-	7	2	2	-	-	2	-	6	13
Seminars and Conferences	3	1	-	2	-	6	1	-	-	-	1	-	2	8
Information Technology	2	2	-	1	-	5	1	2	-	-	-	-	3	8
Expert groups	2	-	-	1	-	3	-	-	-	-	-	-	0	3
Hiring External consultants	2	-	-	-	-	2	-	-	-	-	-	-	0	2

APPENDIX 7b

National Standards of Cleanliness for the NHS (2001)

Patients expect wards to be clean and furnishings to be tidy. They have a right to expect a welcoming environment, particularly at a time when they might be in pain and feel threatened by unfamiliar surroundings.

Healthcare buildings are the 'shop window' of the NHS. Rightly or wrongly, people will judge the quality of the service by the way it presents itself at first glance. A hospital that appears dirty, untidy and uncared for may lead patients to believe that the care it offers is also poor. Staff, too, may feel demoralised and may not give of their best.

Ward sisters and charge nurses now have more authority to influence standards when service specifications are set, to make sure that sufficient resources are spent to provide high-quality cleaning services, standards are properly monitored and improvements are made if necessary.

PAF- In 1998 the Government published 'A First Class Service'. This set out a package of proposals to support the delivery of consistent high-quality care to patients, and to drive performance framework which would support the drive for higher quality standards by ensuring that performance assessment is focused on the delivery of cost-effective, appropriate and timely health services to meet local needs.

The NHS Performance Assessment Framework, published in April 1999, introduced a new, broader-based approach to assessing performance in the NHS. The Cleanliness Standards included in this guide are part of the performance requirements of the PAF. They apply to all NHS hospitals regardless of whether the cleaning service is performed in-house or contacted out.

Some of the findings:

- Over 70% of wards are very good or acceptable level
- 20% of hospitals showed a clear need for improvement, with the remainder in need of some minor improvement
- responsibilities for cleaning clinical equipment (hoists, drip stands, commodes, etc) are not clearly specified in some hospitals
- level of cleanliness of some cleaning clinical equipment was found to be unacceptable in 10% of wards: this requires co-ordination between domestic services and nursing staff and the development of operational policies with explicit responsibilities.

The appearance of wards and public areas varies, and this is not always related to level of cleanliness. Poor maintenance of buildings and fabric, the need for redecoration and dirty windows all contribute to a public perception

that standards of cleanliness are poor. In some cases, poor maintenance and decoration can make it more difficult for areas to be cleaned effectively. There is a need for better co-ordination of domestic services and estates management to identify and manage areas of risk.

Ward staff interviewed as part of the review were generally aware of areas of concern about levels of cleanliness and felt these were mostly related to insufficient staff hours or cleaning frequencies.

Number of factors that many relate to level of cleanliness:

- the staff time available for cleaning, supervision and monitoring
- staff training
- management arrangements – does management provide knowledge and leadership, ensure accountability, manage and minimise risk?
- The application of comprehensive policies and procedures, developed in collaboration by providers and users

Inputs to cleaning, supervision and monitoring

Rates of staff turnover and sickness absence continue to be a problem in many hospitals. Almost half reported difficulties attracting and retaining staff, due to the availability of other job opportunities offering higher rates of pay. Basic hourly rates of pay in hospitals ranged from $4.10 to £4.86, with an average of £4.25. There was little difference between rates paid by in-house providers or external contractors. Rates at all hospitals are below the basic hourly rate of £5.02 offered by local authorities, one of the main competitors for staff.

Management of cleaning services:

Both the CSBS standards and 'A clean bill of health' identify the importance of good management arrangement, clear service specifications, and adequate monitoring to achieve clean hospitals.

Contracts with external providers are not always specific enough to ensure acceptable levels of cleanliness and may allow for repeated non-compliance with targets for levels of cleanliness.

Specifications for cleaning services are mostly based on recognised national guidance for minimum cleaning frequencies, with adjustment for local needs. In our previous report we identified the importance of reviewing the specification on a regular basis to ensure that it is kept up to date with national best practice guidance and local needs, based on a risk assessment.

Whilst almost 80% of Trusts have a formal policy for monitoring levels of cleanliness, we found that actual monitoring arrangements are insufficient in just over 40% of hospitals. A number of hospitals with appropriate monitoring

<u>policies and procedures are not always able to put these into practice because of staff shortages and workload pressures</u>.

The number of factors that make it more difficult for hospitals to achieve high standards:

- staff vacancies and absence
- high staff turnover
- lack of co-ordination between cleaning and other services
- poorly defined or managed contracts
- inadequate monitoring arrangements

Clean Bill of health (2000)

Effective cleaning of hospital wards is essential for the health and safety of both patients and staff, and makes an important contribution to the quality of care patients experience. However, there is a growing perception that standards of cleanliness in hospitals have been declining. Domestic services play a key part in minimizing the risk of hospital acquired infections, which have serious consequences for patients and lead to significant costs to the NHS.

Our report shows, however, that there is wide variation in the costs of cleaning. Some of this variation is explained by factors such as the size of the hospital. But there is also wide variation due to differences in the role of domestics, and in the level of the cleaning service provided. Understanding and reducing these differences will help hospitals to improve the quality of cleaning and lower costs.

<u>Assuring quality</u> – managing domestic services is a complex activity choices need to be made about where domestics should be based and what their role should be. There can be real advantages in basing domestics on individual wards, so that they can work as part of the ward team and develop more flexible roles.

Services are best specified by a combination of clear minimum frequencies for specific cleaning tasks, and descriptions of the results that are required.

Equally important, our evidence suggests that many hospitals may have trouble achieving the cleaning frequencies or output standards that they have specified because of high levels of absence due to sickness and high turnover. Data collected at one hospital demonstrated that nearly one third of planned cleaning hours were lost due to vacancies, sickness absence and leave. Only 2% of this shortfall was made up by overtime. This level of under-cleaning raises serious concerns about quality, and risks failing to achieve minimum levels of infection control.

APPENDIX 8

ROLES AND RESPONSIBILITIES OF KEY PLAYERS INVOLVED IN THE CONTROL OF HEALTHCARE ASSOCIATED INFECTIONS (HAI)

1. Chief Executive: The chief executive has only an advisory role in terms of domestic services. He has the authority to implement relevant policies, standards or guidelines in terms of control of HAI practices and other practices.

2. General Manager (Facilities): The general manager oversees the domestic services and is accountable for the chief executive. He is a member of the infection control committee (ICC). He has the authority to change the control of HAI practices with the approval of the chief executive and the ICC.

3. Hotel Services Manager: The hotel services manager is the one who is directly involved in domestic services among top level domestic managers. He is involved in preparing work schedules for the domestics with the assistant domestic managers and is the main person who handles the domestic services budget. He is responsible for allocating funds for infection control training programmes for staff and purchasing new equipment or material if needed. He is also responsible to provide reports regarding hospital cleanliness in case of any complaints by the patients or by the clinical teams or in case of infection control outbreaks. She is responsible for recruiting domestics.

4. Assistant Domestic manager: The assistant domestic manager provides a hands-on service for the control of HAI practices in domestic services. He has to ensure that control of HAI policies, guidelines and standards are well instigated. In terms of control of HAI practices he has to work closely with the ICT members. He has to identify and report any training needs for domestic supervisors and domestics in terms of control of HAI, to the hotel services manager. He also has to identify and report any modifications to the work schedules of the domestics if any considering the standards to be achieved in terms of control of HAI.

5. Domestic supervisor: A domestic supervisor *per se*, supervises the domestics and besides, he or she has to cover domestics' duties during staff shortages. During the interviews all the domestic supervisors (interviewed 6 as two groups) revealed that at least 80% of the work cover is domestic duties while only 20% contains supervision. The domestic supervisors should closely associate with the matrons and ward managers to identify any deficiencies of control of HAI practices.

6. Domestics: Domestics is responsible for carrying out domestic services in wards. The ward area here includes the patient beds, floors and walls of the ward, sanitary areas and the ward

equipment. They should abide by the hand hygiene rules, which are prompted in order to protect the patients and the staff from spread of HAI.

7. <u>The ICT</u>: Mainly have an advisory role in the control of HAI in domestic services. They can suggest new plans or changes of work practices according to the control of HAI policies or procedures in the clinical services. They are also allowed to instruct or guide domestic supervisors and domestics in terms of control of HAI practices. They are also responsible for holding training programmes on the control of HAI for the members of the domestic teams. This hence requires close liaison between ICT and the domestic team.

8. <u>Ward nurses</u>: The ward nurses are categorised into two categories, i.e. matrons/ward managers and the nurses. Matron/the ward manager have the responsibility to sign off the work schedules of the domestics while other nurses have some responsibilities in cleaning. Cleaning of the upper side of the bed is up to the nurses and they are also responsible to clean the commodes in between patient use. They have to also take immediate actions in case of blood or body fluid spillages. Due to the fact that nursing staff have some cleaning responsibilities it is of paramount importance for the nurses and the domestics to maintain a close relationship with each other. All the ward nurses also can give their feedback on domestics to the domestic supervisor to improve the quality of the domestic service.

Responsibilities in the NHS in relation to control of HAI :

Key
→ Accountability

Department of Health – responsible for:

- Setting overall policy issues in relation to public health matters.

NHS Executive – responsible for:

- Managing performance of NHS;

- Issuing policy and implementation guidance;

- Each of its 8 regional offices are responsible for surveillance and control of communicable disease and infection in the resident population, including hospitals.

Health Authority responsible for:

- Ensuring quality of service provided to local population by ensuring adequate infection control arrangements in English hospitals in collaboration with local authorities' environmental health officers;

- Protecting the public health by controlling communicable disease and infection.

NHS Trust responsible for:

- Ensuring that there are effective arrangements for infection control within the Trust.

Hospital Infection Control Committee – responsible for:

- Endorsing all infection control policies, procedures and guidelines;

- Providing advice and support on the implementation of policies;

- Collaborating with the Infection Control Team to develop the annual infection control programme and monitoring its progress .

The Hospital Infection Control Committee may comprise:

| The Infection Control Team | Chief Executive or representative | Occupational Health Physician and Occupational Health Nurse | Infectious Disease Physician | Senior Clinical representative | Consultant in Communicable Disease Control | Other identified representatives |

Infection Control Team (includes infection control doctor(s) and nurse(s) responsible for:

- Ensuring advice on infection control is available on a 24 hour basis;

- Producing the annual infection control programme in full consultation with the ICC, health professionals and senior managers. This programme will include surveillance of infection and an audit of the implementation and compliance with selected policies;

- Providing education and training on the prevention and control of hospital acquired infection to all grades of hospital staff.

Consultant in Communicable Disease Control responsible for:

- Surveillance, prevention and control of communicable diseases and infections in district, including management of outbreaks;

- Advising Health Authorities and Primary Care Groups about service agreements for infection control;

- Collaborating with ICT on management of outbreaks both within hospitals and in the community;

- Providing epidemiological advice.

(Source: Comptroller and Auditor General, 2000)

APPENDIX 9

PERFORMANCE MANAGEMENT PENALTY SYSTEM – *PFI CASE*

There are 3 categories in the penalty system. Category 3 which is the most important one, category 2 and category 1. On a category 3, if you fail, you immediately take a financial and a penalty of 50% of the rate. Category 3 is 3 points. So the penalty is 1.5 points. So, if you rectify the problem within an hour you are only charged for £15. If you miss the hour it's £30. If you fail the next day then you are get penalised by 150% which means £45. If the failure is continuing everyday it adds up 50% of the penalty until you get it right. As far as domestic service is concerned we don't get into such situations. We always try to meet the standards on time. In catering services sometimes we are penalised due to food temperatures, etc. But domestic service is a very efficient service as far as we are concerned.

If the 'client' finds and issue they tell us about it and then we start to resolve it within the specified time limit.
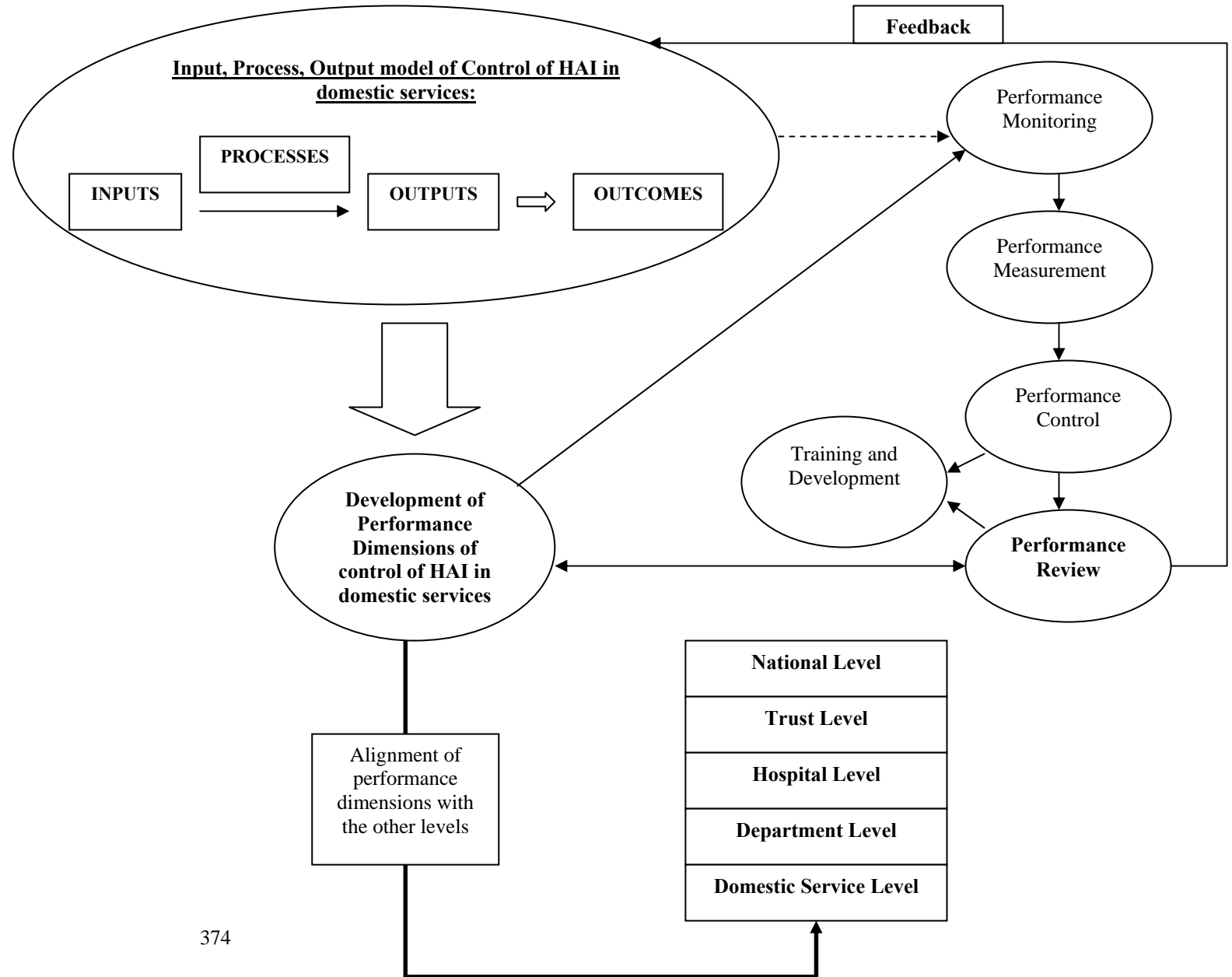
For the 3 categories, the penalty rate is charged through 'performance failure point unit value' (PFP). So, category 3 is 3 points which means roughly about £30, category 2 is 2 points and is about £20 and finally category 1 is 1 point and is about 10. They rack up by points and they are multiplied by the PFP value to get the financial value of the penalty.

There are monitoring periods for all the outputs. Some of the outputs we have to monitor on a daily basis, some monthly, some bi-annually and some annually. So during these monitoring periods you can only fail, on an individual output, twice. So, if we get a dirty floor on ward six and in ward seven that's two failures. If there are other failures in the same ward, we can't penalised any more than that particular output.

The audit tool we have is called Performance Management system (PMS). It's a very long one but contains all the areas to be monitored/audited and all the penalty systems. All the monitoring periods, all the results, all the rectifications, etc. go into the spreadsheet. And then we get a summary sheet which has the areas in categories. It is in-depth but there are still things that need to improve. I would like to see it's going more electronically than manual. At the moment it's lot of manual going in the system. The computer decides the failure but we have to input all the data. It comes in a paper format and one person logs all the tasks which is coming through the 'client'. Then automatically the computer decides the rectification times. That task will then be given to one of the staff members in order to deal with the problem. Then she or he gives the feedback to the helpdesk (the person who log the tasks) saying they completed the task. Then the helpdesk closes the task. At the end of the month we go through the summary sheets to see whether all the rectification tasks are completed and see whether all the tasks are completed on the time scale. We then transfer these results to the PMS which then calculates the financial penalty automatically. The transfer of results is done manually. The manual input in the middle is the quite tedious task. There is a lot of staff involved in this. Mainly two people are involved but there are people who work in the background to get the information together.

APPENDIX 10a

THE DRAFT PMF

Input, Process, Output model of Control of HAI in domestic services:

INPUTS

PROCESSES

OUTPUTS

OUTCOMES

Feedback

Performance Monitoring

Performance Measurement

Performance Control

Training and Development

Performance Review

Development of Performance Dimensions of control of HAI in domestic services

Alignment of performance dimensions with the other levels

National Level

Trust Level

Hospital Level

Department Level

Domestic Service Level

374

APPENDIX 10b

DRAFT PERFORMANCE GOALS AND INDICATORS DEVELOPED FOR THE PMF

Goal 1: Ensure effective utilisation of strategies for the control of HAI in domestic services

Performance indicators	Areas to be considered
Importance given to the control of HAI in domestic services	Understanding the impact of domestic services on HAI rates
	Priority given to the control of HAI in domestic services
	Awareness of control of HAI in domestic services among the staff
	Change of practices of domestic services due to issues of control of HAI
Organisation	appropriateness of the organisational structure for the control of HAI
	clarity of authority
	clarity of roles and responsibilities
	clarity in terms of parties involved
Specification of services	Procedures for establishing specifications
	Consistency with requirements with other levels (e.g. national level)
	Clarity of specification
	Appropriateness of specifications used
	Procedures for revising the specifications
	Status of adhering to specifications
	Status of communicating specifications to staff
Policies	Procedures for establishing policies
	Consistency with requirements with other levels (e.g. national level)
	Clarity of policies
	Appropriateness of policies used
	Procedures for revising the policies
	Status of adhering to policies
	Status of communicating policies to staff
Standards	Procedures for establishing standards
	Consistency with requirements with other levels (e.g. national level)
	Clarity of standards
	Appropriateness of standards used
	Procedures for revising the standards
	Status of adhering to standards
	Status of communicating standards to staff

Goal 2: Ensure effective utilisation of resources in the control of HAI in domestic services

Performance indicators	Areas to be considered
Finance	Productivity (Cleaning budget and cost)
	Existence of plans for dealing with financial constraints
Staff	Existence of recruitment and retention plans for staff
	Procedures for developing recruitment and retention plans for staff
	Clarity of recruitment and retention plans for staff
	Status of adhering to recruitment and retention plans for staff
	Status of revising recruitment and retention plans for staff
	Existence of training and development plans for staff
	Procedures for developing training and development plans for staff
	Clarity of training and development plans for staff
	Status of adhering to training and development plans for staff
	Status of revising training and development plans for staff
	feedback processes
	Existence of staff motivation schemes
	Procedures for setting salary/wage levels for staff
	Existence of plans for dealing with staff shortages
Material and Equipment	Existence of plans for deployment of material and equipment
	Procedures for developing plans for deployment of material and equipment
	Clarity of plans for deployment of material and equipment
	Status of adhering to plans for deployment of material and equipment
	Procedures for revising plans for deployment of material and equipment
	Existence of plans for dealing with material and equipment constraints

Goal 3: Ensure Effective improvement of control of HAI practices in domestic services

Performance indicators	Areas to be considered
Knowledge Sharing	status of sharing knowledge among the teams
	status of utilising computers
	status of collecting information
	status of communicating knowledge
	status of utilising knowledge
Integration	Existence of plans for team meetings
	Existence of clear links between participants
	Status of consulting other participants when in need to carry out practices
	Taking advices of other participants into consideration to carry out practices
	Status of taking domestic teams as part of the infection control committees
Cleaning arrangements according to the control of HAI requirements	Existence of plans for division of work
	Procedures for developing plans for division of work
	Clarity of plans for division of work
	Status of adhering to plans for division of work
	Status of revising plans for division of work
Monitoring and supervision arrangements	Existence of monitoring and supervision plans in terms of responsibility, frequency, methods and feedback

Goal 4: Ensure effective benchmarking of control of HAI practices in domestic services

Performance indicators	Areas to be considered
Effectively benchmarking practices over time	General Information needed for benchmarking purposes – area of the hospital, age of the hospital, area cleaned, type of domestic service, number of staff hours
Effectively benchmarking practices with other hospitals	

APPENDIX 11

ACHIEVEMENTS, JOURNAL AND CONFERENCE PUBLICATIONS AND PRESENTATIONS

Achievements during the course of the PhD

1. **Best Student award** in October 2004 from the National Health Service in Scotland, during the conference held by the NHS in Scotland and Property and Environment Forum (in Scotland) on 'Property and Facilities'.

2. **Best paper award** in November 2005 during the Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment (PRoBE), organised by the School of Built and Natural Environment, Glasgow Caledonian University

Journal Papers published

1. Liyanage C., Egbu C. (2004), *FM services have vital role – infection control,* Journal of Health Estate, October issue 2004, pp. 47-54.

2. Liyanage C., Egbu C. (2005), *Controlling HAI and the role of FM in achieving 'Quality' in Healthcare: A Three-Dimensional View,* Facilities, 23 (5/6), pp. 263-277.

Journal papers accepted for publication

1. Liyanage C., Egbu C., *The integration of key players in the control of Healthcare Associated Infections in different types of domestic services,* Journal of Facilities Management, accepted for publication.

Conference Papers published

1. Liyanage C., Egbu C. and Tookey J. (2005). *Development of a conceptual framework for the control of Healthcare Associated Infection in Facilities Management services,* Paper submitted for 6th International Postgraduate Research Conference in The Built and Human Environment of University of Salford holding at University of Delft, 6th and 7th April 2006, pp. 09 – 21.

2. Liyanage C., Egbu C. and Tookey J(2005), A *content analysis approach to compare different types of service providers in the control of healthcare associated infections in domestic services,* Paper submitted for Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment held at Glasgow Caledonian University, Glasgow, 16th – 17th November 2005. pp. 139-150.

3. Liyanage C., Egbu C. and Tookey J. (2005). *Researching into Facilities Management in the Healthcare Sector – A choice of research strategy.* Paper submitted for 5th International Postgraduate Research Conference in The Built and Human Environment holding at University of Salford, 14th and 15th April 2005, pp. 494 – 504.

4. Liyanage C. L., Egbu C. O. and Tookey J. (2005), *Investigating the current state of infection control practices in domestic services in the National Health Service in Scotland – A case study approach.*, 21<u>st</u> Annual Conference Association of Researchers in Construction Management (ARCOM), September 7th – 9th 2005. pp. 321-331

5. Liyanage C.L, Egbu C.O, Kashiwagi D. (2004), *An identification of the Clinical and FM inputs in the control of HAI*, CIB W070 Symposium – Hong Kong, December 7th and 8th 2004, pp. 283-294.

6. Liyanage C. L. and Egbu C. O. (2004), *The role of the Built Environment in the control of HAI: A Non-Clinical perspective*, COBRA 2004: The International Construction Conference - Responding to Change, Ellis R. and Bell M, September 7th and 8th 2004. p.108

7. Liyanage C. L. and Egbu C. O. (2004), *Development of a PM Framework for FM in the control of infections – An Outline of Methodology*, 20th Annual Conference Association of Researchers in Construction Management (ARCOM), September 1st – 3rd 2004. pp. 321-331

8. Liyanage C. L, Egbu C, (2004), *KM initiatives in the control of infections associated with healthcare facilities*, 4th International Postgraduate Research Conference, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester, pp. 518 – 529, ISBN 0902896636

9. Liyanage C., Hinks J., Egbu C. (2003). *Integrating FM to the core functions of healthcare – Towards improving Quality in Infection Control*, Proceedings of The First Scottish Conference for Postgraduate Researchers of the Built and Natural Environment held at Glasgow Caledonian University, Glasgow, 18th – 19th November 2003. pp. 213 – 224.

10. Egbu C. O, Liyanage C. L, Hoy D, Doherty C, O'Brien G and Curran E. (2004), *Mapping the Knowledge available to control and avoid HAI: A FM perspective*, COBRA 2004: The International Construction Conference - Responding to Change, Ellis R. and Bell M, September 7th and 8th 2004. p.173

11. Egbu C.O, Liyanage C.L, Kashiwagi D. (2004), *Non-integration of FM to the core processes of healthcare – problems and solutions*, CIB W070 Symposium – Hong Kong, December 7th and 8th 2004, pp. 295-306.

12. Egbu C., Kurul E., Hari S., Vines M., Olomolaiye A., Hinks J. and Liyanage C. (2003). *Knowledge Management and Intellectual Capital in the Construction Industry: An Agenda for Research*, CIB W102 on Information and Knowledge Management in Building. The Centre for the Built Environment, Lighthouse, Glasgow, 22-24 June 2003.

13. Olomolaiye A, Liyanage C.L, Egbu C.O, Kashiwagi D. (2004), *KM for improved performance in FM*, COBRA 2004: The International Construction Conference - Responding to Change, Ellis R. and Bell M, September 7th and 8th 2004. p.105

14. Gallagher C, Mumovic D, Liyanage C. L. (2004), *A three-stage approach for assessment of outdoor air quality : a facilities management approach*, 4th International Postgraduate Research Conference, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester, pp. 400 – 409, ISBN 0902896636

15. Kurul E, Hari S, Egbu C, Vines M, Liyanage C, Olomolaiye A, (2004), *Appropriateness of research methods for knowledge management research in the UK construction industry*, 1st International Salford Centre for Research and Innovation (SCRI) Research Symposium, March 30th – 31st 2004, Aouad G, Amaratunga D, Kagioglou M, Ruddock L, Sexton M, Salford University, Manchester, pp. 110 – 119, ISBN 090296644

16. Vines M, Hari S, Olomolaiye A, Liyanage C, Lee C, Kurul E, Egbu C. (2004), *Lessons learned from knowledge management research: UK construction industry perspective,* 4th International Postgraduate Research Conference, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester, pp. 570 - 580, ISBN 0902896636

17. Hamilton S., Liyanage C., Mumovic D. (2003). *Eliminating 'sick' from buildings – application of CFD in optimising FM,* Proceedings of The First Scottish Conference for Postgraduate Researchers of the Built and Natural Environment held at Glasgow Caledonian University, Glasgow, 18th – 19th November 2003. pp. 551 – 562.

18. Branka Dimitrijevic, Colin H. Davidson, Mike Culhane, Guylaine Beaupré, Jaime Acevedo-Alvarez, Anthony Conder, Bengt Eresund, Charles Egbu , Esra Kurul, Cynthia ChinTian Lee, Anthony Olomolaiye , Subashini Hari , Champika Liyanage and Micah Vines, (2004), *Technology Watch for SME in the Construction Industry*, CIB 2004 Congress, Toronto Canada

Conference papers accepted for publication

1. Liyanage C. and Egbu C., (2006), *The role of Knowledge Management in the control of Healthcare Associated Infections in Facilities Management services,* COBRA 2006: The Construction Research Conference of the RICS, accepted for publication

Presentations

1. Liyanage C. (2005), A *content analysis approach to compare different types of service providers in the control of healthcare associated infections in domestic services,* Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment - Glasgow Caledonian University, 16th – 17th November 2005.

2. Liyanage C. (2005). *Researching into Facilities Management in the Healthcare Sector – A choice of research strategy*. 5th International Postgraduate Research Conference in The Built and Human Environment holding at University of Salford, 14th and 15th April 2005.

3. Liyanage C.L. (2004), *An identification of the Clinical and FM inputs in the control of HAI,* <u>CIB W070 Symposium – Hong Kong</u>, December 7th and 8th 2004.

4. Liyanage C.L. (2004), *Non-integration of FM to the core processes of healthcare – problems and solutions,* <u>CIB W070 Symposium – Hong Kong</u>, December 7th and 8th 2004.

5. Liyanage C. L, (2004), *Knowledge management initiatives in the control of infections associated with healthcare facilities*, <u>4th International Postgraduate Research Conference</u>, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester

6. Liyanage C. L, (2004), *Lessons learned from knowledge management research: UK construction industry perspective*, <u>4th International Postgraduate Research Conference</u>, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester

7. Liyanage C. L, (2004), *A three-stage approach for assessment of outdoor air quality : a facilities management approach*, <u>4th International Postgraduate Research Conference</u>, April 1st – 2nd 2004, Ruddock L, Amaratunga D, Aouad G, Kagioglou M, Sexton M, Salford University, Manchester

8. Liyanage C. L. (2004), *Development of a Performance Management Framework for Facilities Management in the control of infections – An Outline of Methodology*, <u>20th Annual Conference Association of Researchers in Construction Management (ARCOM)</u>, September 1st – 3rd 2004.

9. Liyanage C. L. (2004), *The role of the Built Environment in the control of Healthcare Associated Infections: A Non-Clinical perspective*, <u>COBRA 2004: The International Construction Conference - Responding to Change</u>, Ellis R. and Bell M, September 7th and 8th 2004.

10. Liyanage C. L. (2004), *Mapping the Knowledge available to control and avoid Healthcare Associated Infections: A Facilities Management perspective*, <u>COBRA 2004: The International Construction Conference - Responding to Change</u>, Ellis R. and Bell M, September 7th and 8th 2004.

11. Liyanage C. (2003). *Integrating Facilities Management to the core functions of healthcare – Towards improving Quality in Infection Control.* First Scottish Conference for Postgraduate Researchers of the Built and Natural Environment held at Glasgow Caledonian University, Glasgow, 18th – 19th November 2003.