A novel approach to enhancing healthcare Non-Technical skills: The

TINSELS programme

Abstract

Background and Context: Training in 'non-technical skills', social (communication and team work) and cognitive (analytical and personal behaviour) skills, in healthcare have been of great interest over the last decade. Whilst the majority of publications focus on 'whether' such education can be successful, they overlook the question of 'how' they enhance skills. We designed and piloted an original, theoretically robust and replicable teaching package that addresses non-technical skills in the context of medicines safety through simulation-based inter professional learning: the TINSELS (Training In Non-technical Skills to Enhance Levels of Medicines Safety) Programme.

Innovation: A modified Delphi process was completed to identify learning outcomes, and recruitment of multi-professional teams was through local publicity. The faculty developed a three-session simulation based intervention: session one was a simulated ward encounter with multiple medicine related activities; session two was an extended debrief and facilitated discussion; and session three a 'chamber of horrors' where inter professional teams identified potential sources of error. Each session was completed in the simulation suite with 6 – 9 participants, lasted approximately 90m minutes, and took place over 2 weeks. Full details of the course will be presented to facilitate dissemination.

Implications: Likert scale feedback was collected after the course (1 strongly disagree-5 strongly agree). Mean scores were all greater than 4, with qualitative feedback noting the fidelity of the authentic inter professional learner groups. A previously validated safety attitudes questionnaire found changes in attitudes towards handover of care and perceptions of safety levels in the workplace post intervention. An original, simulation based, multi-professional training programme has been developed with learning and assessment materials available for widespread replication.

Background:

Attitudes to errors in health care began to change towards the later end of the Twentieth Century with a series of high profile incidents reported in the media[1]. This laid the foundation on which an industry of 'patient safety' has been built. Medication safety has often been at the epicentre of such work, with upwards of 130,000 medicines errors a year consistently reported in England and Wales alone[2].

The majority of healthcare professionals are familiar with the concept of 'human factors' through a particular type of training practice derived from aviation that arose from the need to address error, teamwork and communication issues. This training programme is usually based on checklists (as a system), simulation (as a teaching method) and non-technical skills (as a curriculum) as discrete components of human factors improvement training. Whilst a number of programmes that use this approach have been reported, efficacy is limited[3].

From an educational perspective, it is inappropriate to simply transpose training from one discipline to another, as has often been the case when adopting human factors training in healthcare[4]. Indeed, it is interesting that at its core, human factors are not really concerned with 'humans' but the systems in which they work. Given the complexity of health systems, and given that that most human factors changes are retrofitted, it is unsurprising that effective improvements are limited[4].

However, an area of human factors that has achieved much interest from educators is that of non-technical skills: the social (communication and team work) and cognitive (analytical and personal behaviour) skills that play a vital role in the support of high quality, safe, and effective care[5].

Context:

Training in non-technical skills in a healthcare setting has been of great interest over the last decade, enabled largely through the deployment of increasingly sophisticated simulation training; but while the majority of publications focus on 'whether' such education can be successful, they ostensibly overlook the question of 'how' certain educational tools are effective and lack clearly defined learning outcomes, a conceptually underpinned pedagogy and replicable educational materials. Additionally, whilst many programs highlight the key role of team working to non-technical skills safety, the education offered is often paradoxically within homogenous teams of learners[3].

Work has been completed investigating the non-technical skill elements that regulate behaviour of recent medical graduates prescribing and this identified non-technical skills are central[6] and situational error experience based ways of learning, suggesting the role for a simulation based program. Recently, a more complete and generic theoretically grounded model of non-technical skills learning has been developed through consideration of key safety issues such as handover of care and prescribing – the SECTORS model[7] (Figure 1). SECTORS describes a situated cognition mode of skill acquisition that can and should be fostered through all forms of simulated learning, so as to reduce risk of harm to patients.

We undertook to design and pilot an original teaching package that addresses non-technical skills in the context of medicines safety through simulation-based inter professional learning. This programme was underpinned by the SECTORS model and sought to innovate by a high fidelity interprofessional approach to ensure a situated cognition model of learning facilitated by authentic error awareness, communication and teamworking experiences.

Innovation:

Setting the curriculum

Learning outcomes for the programme were identified via a two staged modified Delphi process[9] including both international experts in the field (all corresponding authors from published pieces on non-technical skills in the top 5 journals in the field for the last 2 years) and a multidisciplinary / lay mix of local stakeholders. Invitations were by email, with a link to an online survey. Reminders were sent to non-responders after two weeks.

The 40 participants who took part (from 84 invitations) were offered a complete list of recently published non-technical skills learning outcomes[5] to rank on a likert scale, as well as having the option to add free text. Participants were also offered a complete list of 58 specific tasks involved in the medicines management journey where errors can occur, devised from an analysis of the last three years of significant incident reporting and once again asked to rank. This allowed them to highlight key content areas related to medicines relevant to local challenges. Two members of the research team independently assessed the results and decided on the cut off for inclusion, with a third member of the team employed to reach consensus on disagreement (15% of items). This allowed presentation of a final list of ten core learning outcomes and twelve key contexts for error, which were approved and amended by the panel prior to the next phase (feedback on changes received from nine members of the panel).

Table 1: Learning Outcomes identified as relevant in medicines safety context through Delphi process

Learning Outcomes	
Communication	When giving information ensures receiver of information has understood
	Confirms understanding when receiving information
Team working	Exchanges relevant information with the team, demonstrating shared planning where appropriate
	Identifies when colleagues are struggling and acts appropriately, recognises stress and fatigue
	Focuses on the patient and their care when conflict among the team arises
Personal behaviours	Displays personal attributes of compassion, integrity and honesty
	Seeks and takes responsibility when appropriate
Analytical Skills	Gathers and analyses information to support situational awareness of risk of errors
	Changes trajectory when significant risk is encountered
	Anticipates potential future risks for the team and assesses those risks

A wider faculty development team of medics, nurses, pharmacists, evidence user experts and simulation educators were gathered for three meetings over a month. Using these learning outcomes and the contexts identified, the course structure was developed. The team were supplied the Delphi results and details of the SECTORS model. During the first session, the team considered specific methods of facilitating learning in each learning outcome area and underlying principles of simulation learning theory. In this context, it was agreed that fidelity of the simulation in terms of the choice of authentic multidisciplinary learner groups and a basic structure of three sessions,

involving two practical forms of simulation and one extended debrief / tutorial in between. In session two, the faculty worked up the content of the primary simulation session, including actor requirements, scripts and faculty materials. Extra materials for learners were also set out. In the final session, the group completed materials for the final 'chamber of horrors' session, reviewed the extra course materials and completed a learning outcome mapping exercise to ensure the appropriateness of the full course.

Whilst there was consideration of delivering sessions as an in-situ simulation, this would have limited the use of recording of sessions to facilitate debrief (due to patient confidentiality issues and available of in situ recording equipment) and so it was decided to situate the sessions in the simulation unit. However, the team noted that this would have in no way impacted the material and other departments wishing to replicate this intervention could indeed deliver TINSELS in an in situ fashion.

Each session was to be completed in the simulation suite with 6-9 participants from the different professions, lasting no more than 90 minutes. E-learning to deliver extra course materials were designed with consideration of Cognitive Load Theory and a pedagogically sound course structure, as previously described[8]. Course materials are available for use on request from the authors (Structure in Appendix 1)

Participants initially invited included all members of the team from two acute wards. They were contacted through identification and supplied email contacts from ward managers and medical leads. The department of education was also contacted to invite the relevant undergraduate learners who were training in these areas. Whilst interest was high, practical difficulties leaving ward duties became significant limiting for senior nursing and medical staff and after four weeks of attempting to find a viable set of dates, it was decided by the project steering group to proceed without inclusion of these two groups. Instead, a senior member of medical and nursing staff was asked to join as an invited faculty member for each simulation session. This lead the learner team for

each session as: Two Student nurses, Pharmacist, one or two junior doctor, medical student, and allied healthcare professionals (physiotherapist).

A novel non-technical skills knowledge based video quiz was also developed for the programme to assess learning and was administered pre and post course, as well as qualitative written feedback and likert scale feedback (available on request from authors).

There were 18 participants recruited and split into two groups. Mean likert scores were all greater than 4, with the highest rating for the statements 'My practice and management of medicines will change after this training' (Mean 4.6) and 'I now have a clear understanding of how team work can impact on medicines management' (Mean 4.8). The qualitative feedback was subjected to a thematic analysis by two authors independently, with agreement in three key themes becoming clear. Firstly, the fidelity of conversations between the learners from different professions gave them insight into error sources. Secondly, an attitude change was noted as they 'were not to blame for errors', whilst having a team based 'responsibility to prevent them'. Finally, enhancements in their awareness of sources of error from all groups, not just their own discipline, were fostered. The qualitative feedback has also been presented as a word cloud (Figure 2).

Table 2: Mean Likert Scale Results (Max 5, minimum 1)

I would recommend this course to others	My practice will not change after this training	I have an increased awareness of error management	I have a clear understanding of how my role can impact on patient safety	Training was thought provoking	My practice and management of medicines will change after this training	I now have a clear understanding of how team work can impact on medicines management
4.5	1.5	4.3	4.5	4.4	4.6	4.8

The safety and teamwork elements of the previously validated safety attitudes questionnaire[10] were administered to learners pre and post intervention. This showed a change in the mean total scores

(102 vs 97), although given the small sample sizes this did not reach statistical significance. Notable changes were seen in several specific areas, including items related to attitudes towards handover of care (mean score increase by 15% post intervention), suggesting enhanced attitudes towards team based communication and decreased perceptions of levels of current safety (mean score reduction of 20%), suggesting enhanced error awareness.

Implications:

The TINSELS project has sought to address the weaknesses in the current evidence base in healthcare non-technical skills education. This work uniquely describes the theoretical underpinning of the TINSELS course, the learning outcomes used to guide the teaching design, the structure of the course and the process used to contextualise to the local needs of our learners. Materials are available for local use to support replication and dissemination. Outcomes assessed include positive reaction of the learners and enhancements in attitudes using a previously validated tool.

By delivering a non-technical skills training programme that is practical, this course allows a situated cognition mode of learning to be achieved, whilst not risking any harm to patients. Additionally, by ensuring the high fidelity of the simulated learner teams, participants were able to explore issues of communications across teams and hierarchies in a meaningful way, as well as explore the roles of responsibility within medicine safety to facilitate a wider human factors view of medicines safety in healthcare.

Using the course design and delivery structure described, the TINSELS course can be both replicated and modified to address medicine safety issues in other institutions, as well as to address non-technical skills in other healthcare contexts. The course has been designed to meet local need, but this is also an implicit limitation which may limit the generalisability of the intervention. This manuscript has sought to support readers in applying these techniques to produce their own local intervention, but it is possible in doing so these new education interventions may not have the same impact. Future work can explore translation of this design structure to address other healthcare non-technical skills learning needs and other contexts. Further research is needed to evaluate how the use of such theory to underpin non-technical skills education ensures learning and thereby allow modification of this underlying framework, as well as whether such interventions are effective in changing behaviour within the workplace.

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Figure legend:

Fig 1: The SECTORS Model for training on non-technical skills

Figure 2 and 3. Simulation laboratory images of medicines round in session one.

Figure 4. Word Cloud following qualitative feedback analysis