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ORIGINAL ARTICLE

How is hydration assessed and managed in acute stroke? A qualitative study of healthcare staff's knowledge, attitudes and experiences

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Abstract

Aims and objectives: To explore healthcare staff's experiences of how dehydration is identified and managed in hospitalised patients after acute stroke, and facilitators and challenges to optimising hydration.

Background: Optimal hydration post-stroke reduces the risk of neurological deterioration and other complications. Patients are at risk of dehydration in acute stroke, particularly those with dysphagia.

Design: A descriptive qualitative study reported following the COREQ guidelines.

Methods: Semi-structured interviews, utilising patient vignettes, were conducted in 2018 (Apr–Oct) with a purposive sample of 30 multidisciplinary staff members from two UK stroke units. Interviews were digitally recorded and transcribed verbatim. Content analysis identified common themes which were mapped to the Theoretical Domains Framework and the Behaviour Change Wheel.

Results: The themes were mapped to twelve of the fourteen domains in the Theoretical Domains Framework. Participants believed that inadequate hydration management had potentially serious consequences, and described complex knowledge, skills and cognitive elements to effective hydration care. Participants felt that maintaining hydration was a multidisciplinary responsibility requiring good communication. Although the performance of initial dysphagia screening was reinforced by external audit, other areas of post-stroke hydration management were not; notably, there was no established method of assessing hydration. Barriers to maintaining good

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hydration included lack of staff, out-of-hours working patterns, low priority given to hydration, patients' comorbidities and complex post-stroke disabilities such as dysphagia, aphasia, inattention and hemiparesis.

Conclusion: Findings highlighted the importance of assessing and maintaining hydration but identified barriers to, and variation in, clinical practice. To provide optimal care, barriers to the prevention and treatment of dehydration after stroke must be further understood and addressed.

Relevance to clinical practice: Multidisciplinary teamwork is important in hydration care after stroke, but clarity is required about the specific contributions of each team member. Without this, hydration care becomes 'everybody's and nobody's job'.

KEYWORDS

acute nursing, acute stroke, assessment, dehydration, hydration, interprofessional working

1 | INTRODUCTION

Worldwide, there are approximately 80.1 million stroke survivors, with an estimated 13.7 million new cases of stroke every year and with stroke being the second largest global cause of disability (Johnson et al., 2019). Dehydration is common at the time of stroke (Rodriguez et al., 2009) and is also a frequent sequela of stroke, often due to swallowing dysfunction (Crary et al., 2013). It can also be exacerbated by post-stroke disabilities such as limb weakness, cognitive and communication difficulties. Up to two-thirds of acute stroke patients become dehydrated during their hospital stay (Rowat et al., 2012). Low-intake dehydration (hypertonic, hyperosmotic, water-loss or intracellular dehydration, hereafter referred to simply as dehydration) occurs commonly in acute stroke and leads to the elevation of directly measured serum osmolality, though this is not routinely measured in practice. Dehydration is of clinical significance due to its association with poorer outcomes. It is independently associated with longer length of stay and greater health care costs (National Institute for Health and Clinical Excellence, 2013; Pash et al., 2014). Patients with dehydration at any point during their hospital stay are significantly more likely to die or be dependent at hospital discharge (Bhalla et al., 2000; Jauch et al., 2013). Maintaining adequate hydration in acute stroke can reduce the ischaemic penumbra and maintain cerebral perfusion, thereby preventing neurological deterioration (Warren et al., 1994; Weinberg et al., 1995). Additional benefits include the reduction of dehydration-related complications such as infections, constipation, delirium and venous thromboembolism (Stotts & Hopf, 2003; Kelly et al., 2004; Visvanathan et al., 2015). Conversely, however, too much fluid can cause cerebral or pulmonary oedema, cardiac failure or hyponatraemia (Hilton et al., 2008). Therefore, better hydration management in acute stroke is an essential element of quality improvement to reduce stroke mortality and morbidity.

What does this paper contribute to the wider global clinical community?

- Identification and management of dehydration after stroke requires complex multidisciplinary teamwork
- The skills and expertise of bedside healthcare professionals, particularly nurses, should be recognised, developed, and utilised to maximise their contributions to hydration care decisions
- Evidence-based protocols need to be developed in order to inform and enable safe and effective care

2 | BACKGROUND

The impacts of dehydration and over-hydration in acute stroke on recovery and mortality make it very important to identify patients who are, or are at risk of becoming, dehydrated, to monitor and review hydration status, and to administer appropriate amounts of oral or parenteral fluids. The importance of adequate hydration is highlighted in the National Clinical Guideline for Stroke (Intercollegiate Stroke Working Party (ISWP), 2016), which recommends that patients with acute stroke should have their hydration status assessed, monitored and managed, so that normal hydration can be maintained. If adequate oral intake is not possible, parenteral (intravenous (IV)) fluids may be given, but if not carefully managed, this can lead to increased morbidity and mortality due to administration of incorrect volumes and type of fluids (National Confidential Enquiry into Perioperative Deaths (NCEPOD), 1999; Cain & Ackland, 2011; Visvanathan et al., 2015). Intravenous cannulation sites are also susceptible to phlebitis, infiltration, pain, swelling and infection, causing significant discomfort to patients (Webster et al., 2019). Subcutaneous fluid infusion

may also give rise to problems such as localised oedema (Bowen et al., 2014). Nasogastric intubation and feeding are also used, but are often associated with discomfort, pneumonia and abdominal pain (Gomes et al., 2015).

Clinical management decisions about hydration assessment and treatment in acute stroke can be complex and are often multifactorial, compounded by a lack of clear underpinning research evidence. A recent Cochrane review of the signs and symptoms of impending and current water-loss dehydration in older people found little evidence that any one sign, symptom or test, including many that clinicians customarily rely on, has any diagnostic utility for dehydration (Hooper et al., 2015). Another Cochrane review found no evidence to guide the choice of type, volume, mode or duration of parenteral fluid delivery for people with acute stroke (Visvanathan et al., 2015).

There is little research to guide the prevention and management of dehydration in acute stroke (Bahouth et al., 2018; Visvanathan et al., 2015), and there are no studies in the literature which examine the understanding, experience and attitudes of the Multi-Disciplinary Stroke Team (MDST) in this area. To explore these, it is first necessary to understand the influences of behaviour in the context in which they occur. The Theoretical Domains Framework (TDF) provides a mechanism to identify and understand influences on healthcare professionals' behaviour (Michie et al., 2005). Application of the TDF enables the exploration of a variety of constructs to inform the development of implementation objectives, providing a robust theoretical basis to underpin intervention implementation and evaluation activities, and the progression from theory-based investigation to intervention development (Atkins et al., 2017).

The aim of this study was to explore the knowledge and experiences of health care staff relating to the identification and management of dehydration in acute stroke, including strategies that are used to ensure that people with acute stroke are adequately hydrated, and barriers to achieving and maintaining adequate hydration after stroke.

3 | METHODS

3.1 | Design

This study utilised a qualitative descriptive design which is ideal to provide a broad insight into particular phenomena (Doyle et al., 2020). Semi-structured interviews, including discussion of two patient vignettes, were conducted. The sample of participants was drawn from two Acute Stroke Units (ASUs) at two NHS Trusts in England. Each NHS Trust supports a population of approximately 1.5 million people and provides emergency, inpatient and ambulatory services to a mixed urban and rural area. Each ASU admits approximately 800 patients with acute stroke per year.

The interview guide was developed collaboratively by the research team and informed by the literature, pilot tested and refined, following a staged process (Kallio et al., 2016). Questions were

intended as a guide with interviewers utilising follow-up and probing questions, where appropriate, to explore responses in greater depth. Vignettes and questions were constructed to elicit participants' perceptions of the hydration needs of stroke patients, the barriers to identifying hydration level and maintaining hydration, the roles and responsibilities within hydration care and potential changes that could be made to improve hydration care.

This manuscript has been prepared in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong et al., 2007) (Supplementary File 1).

3.2 | Data collection

All registered and unregistered healthcare staff working on the ASUs were eligible for inclusion and no specific exclusion criteria were applied. Staff were invited by individual emails, and via a general invitation at MDST meetings, to take part in face-to-face interviews. Any members of staff who were interested in taking part were asked to contact the research nurse by email or to provide their contact details at the MDST meeting. Potential participants were given a minimum of 24 h to decide if they wished to participate in the study. A maximum variation sample of staff was selected to ensure diverse representation of many disciplines and grades. Priority was placed on recruiting participants from across the MDST to explore a breadth of experiences and perceptions, as opposed to making a priori judgments regarding the number of data items required to achieve saturation. An information sheet was given to all participants, and written informed consent was obtained prior to interviews taking place.

The first part of each interview consisted of the participants being presented with two vignettes. The vignettes were developed by members of the research team (JG, SJ, CM, A-MT) and were based upon scenarios that commonly occur following a stroke. The interview guide (Appendix 1) was piloted by all interviewers before recruitment of participants; no changes were required. Vignettes were used to stimulate discussion and minimise the risk of disclosure of information about specific patients. The first vignette described a hypothetical situation whereby a patient was admitted at a weekend via the Emergency Department, they were confirmed as having had a stroke, and had passed a nurse dysphagia screen. The second vignette described a similar scenario in which the patient had failed a nurse dysphagia screen, although they had no other significant physical deficits from the stroke. For each vignette, participants were asked to describe how they would assess the patient's hydration status and to describe their plan for the patient's care over the next 48 h. Following discussion of the two vignettes, participants were asked semi-structured questions to explore their knowledge and understanding of the clinical presentation and management of hydration after stroke.

Interviews were conducted between April and October 2018 by research nurses (AM-T, AM, ER) in a private office location at each ASU. Interviews lasted from 7 to 28 min.

Role/profession	Number of participants
Nurse	10
Other staff group (Advanced Practitioner, Dietician, Doctor, Healthcare Assistant, Housekeeper, Occupational Therapist, Physiotherapist, Speech and Language Therapist)	20

TABLE 1 Occupational backgrounds, and number of participants. Professions represented by < 5 participants have been grouped to protect anonymity

All interviews were digitally audio-recorded and transcribed verbatim. To ensure anonymity of participants within the published findings, interview participants were assigned a numerical code, and this was subsequently used to identify them.

3.3 | Analysis

At least one member of the research team listened to the audio recordings of the interviews, to verify transcription accuracy. Each transcript was read in full, and data were initially explored using open coding, with an inductive approach informed by Braun and Clarke's (2006) six stage thematic analysis procedure. One researcher (BC) conducted initial coding of transcripts, and to enhance the reliability of analysis, five transcripts (16%) were independently double coded by an additional researcher (one of JG, SJ, CM). To ensure trustworthiness and reflexivity, the research team then held regular meetings to review initial codes and generate consensus regarding emergent themes. Themes were then mapped to the TDF to identify influences on staff behaviour in relation to the identification and management of dehydration in acute stroke (Cane et al., 2012; Michie et al., 2005). To identify the domains likely to be effective in changing behaviour, the domains were subsequently mapped to the Behaviour Change Wheel (BCW) core components of Capability, Opportunity and Motivation (Cane et al., 2012). NVivo software (version 11) was used to facilitate analysis.

3.4 | Reflexivity

The research team included health services researchers with expertise in stroke research (all), clinical nursing (JG, AM, ER, A-MT) and medicine (BC). The research nurses were known to participants but were not someone with whom they currently worked clinically. Members of the research team (BC, JG, SJ, CM) who analysed the data were not directly involved in undertaking interviews or in the clinical management of hydration but were familiar with the hydration literature. Following the initial coding, the research team used a collaborative iterative approach to the analysis in which confirmative and contradictory results were discussed until consensus was reached. Credibility was enhanced through presentation and discussion of the study themes as they emerged with local clinical and academic colleagues. Whilst dependability of the data may vary based on staff changes following the research undertaken, no major service changes took place during

the study period. Data collection took place with participants from two stroke units, and transferability of the findings, particularly outside of the UK, may be limited.

3.5 | Ethical approval

Ethics approval for the study was granted by the Science, Technology, Engineering and Medicine Ethics Committee at the University of Central Lancashire (STEM 826). In addition, permission to undertake the study was granted by the Research and Development departments at both NHS Trusts. Written informed consent was obtained from all participants.

The study conforms to the ethical standards set out in the Declaration of Helsinki (World Medical Association, 2013).

4 | RESULTS

4.1 | Participant characteristics

A total of 30 participants took part in semi-structured interviews. The occupational backgrounds of participants are shown in Table 1.

4.2 | Overview of themes

The findings mapped to 12 of the 14 domains in the TDF. Themes are presented below in accordance with the three higher level domains of the BCW, and the 12 lower-level TDF Themes. No data were collected that informed the domains of 'Intention' and 'Behavioural regulation', though of course this does not necessarily mean that these concepts are not relevant and further explorations may be more successful in these areas. Participant responses largely converged on six domains (Knowledge; Skills; Beliefs about capabilities; Beliefs about consequences; Environmental context and resources and Social Influences), suggesting saturation was achieved to some extent, with additional limited data for the remaining six domains.

4.2.1 | Capability

Most participants considered they had sufficient knowledge and skills regarding hydration care to facilitate effective practice. When combined with their stroke-specific experience, namely a

deep understanding of the particular challenges facing those affected by stroke and their effect on hydration status, staff felt confident in their abilities. General clinical experience, not only stroke-specific, further enabled good practice with staff using combinations of approaches to assess and treat patients. In addition, staff felt that interpersonal skills empowered them to engage with other members of the MDST, and families and carers, to inform their clinical decision-making. However, a lack of clear assessments and parameters for the identification of the need for intervention—a universal 'lack of knowledge'—added complexity to clinical decision making, therefore, increasing the need for MDST collaboration, or interpersonal skills, in detection and subsequent care planning.

Knowledge

Staff were aware of the complexity surrounding the provision of hydration care for those affected by stroke, demonstrating knowledge of a wide range of stroke-specific physical, cognitive and psychological factors that could hinder optimal hydration care.

Hemianopia was suggested as one factor affecting the ability of those affected by stroke to achieve oral hydration independently.

Sometimes it [the stroke] affects their vision, so they can't see where the cups are, it affects their co-ordination, so even if they can see the cup, they can't grab it

(Participant 8, Nurse).

Respondents described further challenges presented by post-stroke communication problems such as aphasia, dysarthria and apraxia. The inability of some patients to communicate thirst was perceived as negatively impacting the provision of timely hydration care.

...Sometimes they can't communicate with you, they wouldn't be able to tell you if they were thirsty

(Participant 7, Housekeeper).

The psychological effects of stroke including depression, anxiety and loss of confidence and motivation, were also highlighted as a barrier to patients engaging with their care, and ultimately, their recovery.

Patients who come in with acute stroke, they are at risk of developing a low mood or depression and ... some of them wouldn't even be bothered to ask for a drink because they are really withdrawn

(Participant 1, Trainee Advanced Practitioner (Nurse)).

Skills

Clinical assessment and management skills were seen as essential to the identification and management of patient hydration status.

Participants described utilising a combination of numerous approaches: visual assessment of the patient; cognitive or behavioural changes; consulting previous history and family members; biochemical analysis and accurate record keeping of intake and output.

There are some physical signs, the patient has become quite drowsy, lethargic. You can see that they are very dry in their mouth or you know, they are not engaging as much, to me these are some signs of dehydration

(Participant 22, Physiotherapist).

It was suggested that skills in physical assessment alone were not sufficient for a holistic assessment, with clinical decision-making skills being utilised to assess, and critically appraise, previous history to inform care.

Should be looking at the previous blood investigations of the patient. I should be looking at the fluid balance of the patient, has it been filled out properly, is the patient passing urine enough and when we are doing assessment clinically is this patient looking dehydrated or do they look well hydrated

(Participant 1, Trainee Advanced Practitioner (Nurse)).

Skills in the completion, and interpretation, of documentation were highlighted as a facilitator to effective hydration care. Accurate recording was thought to improve interprofessional communication and to inform changes to care plans.

Now that we've got everybody on a fluid balance (chart) it's easy to see if they are drinking or if they're not drinking and to change it if they're not or to highlight it if they need additional fluids that they're not taking enough orally

(Participant 8, Nurse).

In addition to the clinical skills, the interpersonal skills required to work effectively as an MDST were discussed. Respondents described taking action, and raising concerns with relevant members of the MDST, to inform diagnosis.

So for me if they said they weren't as alert, if they were more confused, if they were not as lucid in what they were saying to me, if I notice some definite change then I would be feeding that back to the nurse going "I don't know why, but they appear more confused" or say their speech was less clear, aspects like that I would be feeding back to the MDST saying "I don't know why. Can you review that patient?"

(Participant 30, Speech and Language Therapist).

The use of interpersonal and communication skills was not limited to MDST working. Dialogue with families and carers could elicit relevant details to inform patient-centred care.

Could maybe ask family members to see whether they've been eating and drinking prior to admission, what sorts of things they would have in a normal day in terms of eating and drinking

(Participant 4, Advanced Practitioner (Dietician)).

Memory, attention and decision-processes

A multifactorial approach to decision-making was recognised as being important, given the lack of agreed definitions and numerous ways of assessing hydration, often based on a range of physiological parameters. Decision-making processes routinely involved the interpretation of clinical tests and observations, and participants emphasised the need for repeated assessments to inform early detection and action.

It should come down to care planning and managing the individual in front of you, because they can fluctuate, and it needs to be regularly reassessed. It's not just filling in a care plan and never looking at it again

(Participant 16, Nurse).

One participant noted that decision-making skills might be utilised more often in the care of those patients identified as being at higher risk of dehydration for example, those nil by mouth, suggesting that less overt signs of dehydration might be missed in those patients deemed to be at lower risk:

We do tend to look at mouth care and patient assessment better in patients that are nil by mouth.

(Participant 16, Nurse).

4.2.2 | Opportunity

Environmental factors were perceived as both supporting and hindering effective hydration care. Participants noted that local drivers for system improvement, for example around reducing acute kidney injury or increasing fluid balance chart completion, contributed to improved practice and organisational culture. It should, however, be noted that the catalyst for such interventions often arose from a recognition of issues within services. Although, on the surface, the environment appeared to be one where hydration care was prioritised and was 'everybody's responsibility', the social and cultural norms meant that in practice this was rarely the case. Staff with the most patient contact—nurses and healthcare assistants—were most often seen to hold the responsibility for hydration care, but this presented further barriers. A recurring theme arose in the social and cultural interactions between members of the MDST, with participants describing their fears of being dismissed by colleagues, either because

of their role and therefore limited contact with/knowledge of individual patients (therapists), or because of a lack of proof to support their concerns (nurses and healthcare assistants). Such negative feedback caused staff to conform to social norms and avoid demonstrating independence of thought and action. Time and staffing, or a lack thereof, also restricted staff's abilities to provide effective care, especially at weekends, and were exacerbated by common complications experienced by those affected by stroke, such as dysphagia and cognition difficulties, which increased the amount of time required to support patients.

Environmental context and resources

Although all participants agreed that hydration care was important, the environmental context often created barriers to its delivery. This was mainly in terms of time and staffing, with lack of weekend support sometimes leading to delays in the development and implementation of an appropriate management plan.

I think time and the number of staff on the ward can have a big impact, so for instance if patients are on thickened fluids...maybe they can only swallow a certain amount at any one time, it means having to go back regularly to make sure they are getting adequate fluid, so if you are low on the ground of staff, I don't think that's easy

(Participant 21, Dietitian).

The limited availability of staff to carry out fundamental aspects of care was compounded by the different working patterns of some professions. For example, speech and language therapists, who are often required to make critical decisions regarding a patient's ability to achieve oral hydration, were not available at weekends.

A lot of the time the problems occur over the weekend because we [speech and language therapists] don't work weekends. So, if somebody is put nil by mouth, they are often having nothing orally over the whole weekend

(Participant 29, Speech and Language Therapist).

Similar challenges were faced when staff required the support of doctors to prescribe parenteral fluids.

For patients who are admitted at the weekend there are issues getting hold of the doctors in order to get them to prescribe IV fluids should they need them, and issues with staffing levels to ensure that patients are getting the hydration that they need

(Participant 25, Nurse).

Shortfalls in staff and time led to reduced capacity to regularly monitor patients, resulting in delays in assessment, and less timely initiation and maintenance of IV fluids.

If they fail the nurse dysphagia (screen) and they should have IV fluids prescribed they are not always done immediately... With IV fluids the next bag should always be ready, but it isn't always ready. Sometimes patients pull their (intravenous) cannulas out and you have to wait to give them a cannula if they agree to it. Quite often there is a big time delay

(Participant 20, Nurse).

The accurate completion of documentation, and timely communication of concerns, also suffered as a result of the lack of resources.

We add up the fluid balance charts at set times during the shift. And somebody is held responsible on that shift for checking those fluid balances and notifying whoever is in charge that this person isn't drinking. You can't always get round to it

(Participant 24, Nurse).

Many reported a lack of organisational guidance on the optimum level and timing of hydration care assessments, which contributed to confusion and a lack of action.

It varies with the clinician or the person who is looking after the patient... one person might think the person is dehydrated, the other person would think there is no dehydration because there is no set standard, apart from looking at the bloods

(Participant 6, Doctor).

Participants highlighted organisational quality improvement initiatives on fluid balance charts and dysphagia screening, which were viewed as positively contributing to care environment.

I think the documentation should be a lot better, maybe more electronic documentation methods. There are other Trusts that document everything electronically, you know when a patient is dehydrated or not drinking. That will flash up saying this person has only had this much to drink. It sort of points you in the right direction to make them drink a bit more. Make a plan for what you can do, like IV fluids

(Participant 5, Speech and Language Therapist).

Social influences

The majority of respondents ascribed to the social norm that hydration care is the responsibility of everyone in the MDST, and the importance of working together to identify and manage dehydration was clear.

Everybody's (responsibility) from the housekeepers to the senior members of staff

(Participant 8, Nurse).

However, in practice, an alternative norm emerged with the group conforming to behaviours that contradicted the 'everybody's job' narrative. Responsibility often fell to those with the most patient contact, most often the nurses. One explanation for this contradictory assignment of responsibility to nurses was the more sporadic contact that other members of the MDST have with patients, therefore, limiting their ability to assess, diagnose and manage hydration status.

It's probably everybody's responsibility but more so the ward staff who are with the patient and caring for that patient, you know for the whole shift... well speech therapists and dieticians and most professions are in and out (of the ward) but people on the ground [nurses and healthcare assistants] are there more often to flag things up

(Participant 5, Speech and Language Therapist).

Because of their increased contact time, nurses were perceived to be the "gatekeepers of knowledge", and widely perceived to have a deeper understanding of the history and comorbidities of patients.

The Trust (hospital) answer is (that it's) everybody's responsibility. However, I am not at handovers, I don't do the nursing side, so I don't know what they are monitoring. Who's on what, medical conditions, enough to know that people need monitoring for x, y, z. It has to be nurses really. So, for example, if someone had a condition where they had to limit their intake, I wouldn't know what conditions they have, and I wouldn't know if I am giving somebody too much

(Participant 2, Occupational Therapist).

Another factor posited as contributing to this reliance on nurses was the lack of accurate documentation. Without formal processes in place, interprofessional relationships were the mechanism by which concerns were raised.

I just feel there is a culture of relying on the nurses to notice, rather than to have anything documented, so unless a nurse says to us (doctors), or a dietician says to us, they are only eating... Then we probably, unfortunately, we wouldn't notice... There's always a bit of a relationship between myself [doctor] and the nurses. So, they'll keep an eye. If they are concerned, they will raise concerns to me

(Participant 15, Doctor).

When there were concerns about a patient's hydration status, difficulties were described in the escalation process with participants suggesting that it was challenging to influence other team members due to a 'burden of proof' and the need to justify their concerns about a patient.

I think you need to back it up with results, like your blood results, if you're escalating it to a doctor
(Participant 16, Nurse).

The effort required simply to be "heard" by those with the "power" to make clinical decisions, was in itself challenging and a source of conflict and alienation within the MDST.

Getting people to listen when you escalate it, it's not always that easy... Those that have the power to do the prescribing and the cannulating (doctors) they aren't spending much time with the patients
(Participant 22, Physiotherapist).

4.2.3 | Motivation

Staff felt that hydration care after stroke was rooted in their professional roles, with different team members having different roles to play in assessment, treatment planning, prescription, implementation and review. However, there were concerns about the capabilities of some team members, notably unqualified staff and volunteers, in contributing effectively and safely to hydration care. There was also pessimism about the effectiveness of hydration care as delivered, partly because of staffing levels and lack of prioritisation and planning for this area of care. Participants believed that the consequences of poor hydration care were potentially serious, and cited examples of some hospital-wide and national initiatives and guidelines aimed at reinforcing good hydration care. This concern was also reflected by the use of emotion in discussing problems relating to specific patients with other members of the MDST in order to elicit further actions.

Social professional role and identity

Although the accepted social norm was that hydration care is a team responsibility, it was identified that specific aspects of hydration care were constrained by professional boundaries. Treatment planning and prescribing were primarily the role of specific team members, notably doctors and dietitians.

I will have to wait for the doctor to see this patient first and check his bloods and according to the plan for the doctor I will have to adjust my plan, my nursing plan for him. It is difficult to tell you what to do because I will have to follow the main plan from the doctor
(Participant 9, Nurse).

However, nurses were also seen to play a critical role in implementing these decisions in order to maintain adequate hydration.

Being the nurse, I need to be the main person making sure the patient is having enough hydration
(Participant 9, Nurse).

Beliefs about capabilities

Although many respondents displayed self-confidence and detailed knowledge of stroke-specific factors contributing to dehydration, their perceptions regarding the competence of their peers were less positive. Many felt that further education was required to increase the capability and professional confidence of the whole MDST, and to ensure optimum hydration care provision. Participants described the barriers faced by untrained staff leading to a lack of supported oral intake for patients:

You have untrained (unregistered) staff who are not really very clear of what to look for and what to assess for a certain patient, then they would probably just disregard the importance of giving drinks to the patients... you put a glass of water in front of them and the staff are actually expecting that this patient will be able to drink on their own but 4 or 5 hours after, you do your rounds, the same glass of water is there sitting in front of them, so it's the prompting and education to the staff, making sure that they prompt the patient so they will be able to meet the dehydration target

(Participant 11, Nurse).

Similar concerns emerged not only about staff in unregistered roles, but also those transferring from other specialisms, who were perceived to have limited stroke-specific knowledge—which many believed to be an essential component of effective hydration care provision after stroke.

So maybe more training would help. Particularly with new starters to the ward or people who have changed to this area. Because they will obviously come with massive experience from their (previous clinical) area but not always with stroke.

(Participant 20, Nurse).

The challenges of monitoring and recording fluid balance, and lack of training and confidence in the preparation of modified consistency beverages, were also identified as having negative impacts on patients' fluid intake:

I think it's really quite difficult to monitor fluid balance and fluid intake, but I think having the knowledge and the skills and the training for appropriate staff to make sure that they can fill in the fluid balance charts correctly, I think that's one of the biggest issues
(Participant 4, Advanced Practitioner (Dietician)).

I think a lot of people dislike the thicker consistencies and also some staff aren't really sure how to make the drinks up sometimes, in particular the volunteers. Sometimes if they don't make them up correctly, they

make them too thick, and the patient dislikes it and that can affect how much someone takes in
(Participant 29, Speech and Language Therapist).

The inclusion of patient stories in training was suggested as a potential mechanism to achieve impact through education:

Training awareness, patient stories I think are always the best way to make sure that people sit up and take notice
(Participant 16, Nurse).

Optimism

Although some positive aspects of practice were described, some participants lacked optimism regarding the delivery of hydration care. Pessimistic views were expressed around the capacity of the MDST to deliver hydration care without sufficient staff to meet the needs of patients requiring support and assistance.

We don't have the staff to constantly prompt [patients to drink]
(Participant 2, Occupational Therapist).

Amongst some respondents, there was a perception that hydration care happened almost 'by accident', and it was identified that staff sometimes lacked confidence in the provision of hydration care due to a lack of system level planning and prioritisation.

No. I don't think we have a proper plan on the ward for a dehydrated patient. I think it's something that usually pick up as a coincidence
(Participant 24, Nurse).

Beliefs about consequences

Staff recognised that their caring behaviours had the potential for both positive and negative outcomes. Achieving adequate hydration was perceived as important, not only to avoid patient discomfort, but also to prevent life-threatening complications. Several participants discussed acute kidney injury (AKI), and the importance of prevention.

I think kidney function is critical, preventing acute kidney injury. Maintaining blood pressure. Hypoperfusion can be very dangerous in the aftermath of a stroke
(Participant 3, Trainee Advanced Practitioner (Nurse)).

Others highlighted the potential for dehydrated patients to suffer additional avoidable infections, which could negatively impact their recovery.

Everybody needs to be hydrated because it [dehydration] causes problems. Causes infections
(Participant 12, Advanced Practitioner (Nurse)).

Others focused on the fundamental bodily functions which may be affected by sub-optimal hydration care.

The other complications that come...constipation
(Participant 15, Doctor).

It was also recognised that the balance between dehydration and over-hydration was important and that both could lead to adverse consequences. In the following example, although the belief is not based on a sound scientific basis, it is clear that this member of staff might restrict fluids based on their beliefs about the adverse consequences of taking steps to prevent or treat dehydration. Though fluid restriction would not be advised in the case described below, there are of course circumstances where it is necessary for example, renal impairment:

I have read about a patient who has ICH (intracranial haemorrhage), we shouldn't be really giving them too many fluids because it might further cause swelling to the area of the brain, which is a bit controversial as well, given that what if this patient is getting dehydrated, so it's a very tricky one
(Participant 1, Trainee Advanced Practitioner (Nurse)).

However, although all respondents in this study recognised the importance of hydration care, it was not always perceived as a high priority in acute stroke treatment when compared with other immediate clinical concerns:

In the first three days (after stroke) they are very impaired physically and cognitively. Again, it might not be on the list of priorities
(Participant 26, Occupational Therapist).

Reinforcement

National initiatives such as the UK Stroke-Sentinel National Audit Programme (SSNAP), were important in influencing and incentivising the provision of early dysphagia screening in-line with national targets.

I think there's been a push to assess dysphagia screens early...but it varies on who you work with, other (non-stroke) nurses are geared to wanting to provide food and drink to the patient and it's just a different take on the way that we do it
(Participant 1, Nurse).

Similarly, local organisational quality improvement programmes were perceived to have improved the documenting of fluid balance, though notably some felt issues remained in practice.

I do think there's been a massive drive on fluid balance charts. Making sure that they are done adequately, I still think there's an issue, but I think as a Trust they do put in a lot of training because we've had massive issues in the past

(Participant 16, Nurse).

Goals

Evidence-based guidelines provided a consistent framework to guide goal-setting in practice to achieve desired patient outcomes:

Everything in stroke is around the 72-hour window, isn't it? The targets, because you're trying to achieve those in order to get the best recovery and the best outcome for the patient

(Participant 15, SALT).

Emotion

In the absence of systematic assessment using objective measures, staff utilised emotion to give weight to concerns, and to prompt action, when escalating for further review by other team members.

If I was concerned, I would escalate it to a doctor.

(Participant 22, Physiotherapist).

Staff, particularly nurses, attempted to deal with significant cases through the expression of their worries to others with the 'power' to act.

I wouldn't say there is a systematic approach. I think what is often the case is the nurses will say, we are worried, they are not eating and drinking. So, then we action it, if the nurses raise a concern.

(Participant 15, Doctor).

5 | DISCUSSION

In this study, we explored the perspectives of multidisciplinary stroke team members about the identification and management of hydration and dehydration after stroke. Hydration care was agreed to be an important element of stroke practice because both under- and over-hydration had the potential for serious clinical consequences. While there were some commonalities of experience, there was variation in how care was delivered. Stroke-specific knowledge and skills were seen as essential to delivering effective hydration care, with non-registered staff in particular (HCAs and housekeepers) being perceived to lack training in this area. All members of the multidisciplinary team were expected to be involved in the assessment,

diagnosis and management of dehydration, but it was recognised that the bulk of this work often fell to more junior nurses and health-care assistants by virtue of their having the most patient contact time. Communication of concerns about a patient's hydration status was hindered by the 'burden of proof' falling on some staff members, shortages of staff time, staff's working patterns such as lack of weekend cover and inaccurate documentation.

Team members' responsibilities appeared to interact and compound each other: poor practice in one area (e.g. completion of fluid balance charts by nurses) might be noticed by the medical team who then opted not to rely on the charts, which in turn provided little incentive for the nurses to complete the charts in future if they perceived that the medical team would not look at, or act on, the findings. It was also noteworthy that, while junior nurses, health care assistants and housekeeping staff had close and frequent contact with patients which made them very well placed to identify and address hydration issues, hierarchical working practices limited their agency to act on concerns and maximise their contribution to team-working in this area. For example, ordering of blood tests, intravenous cannulation and prescription of intravenous fluids are generally tasks which are restricted to medical staff. Respondents described utilising emotion, in the form of 'concern' or 'worry', to influence decision makers, demonstrating the emotional labour involved in these interdisciplinary interactions. Practicing in this manner has the potential to negatively impact the well-being of staff, increasing workplace stress and burnout (Karimi et al., 2013). These challenges could be further compounded by the lack of consistent terminology and processes to communicate about potential dehydration and to inform hydration care. This aligns with previous studies in the delivery of acute stroke care, which have found that improvements in care processes and outcomes can be achieved by focusing on teamwork and tailoring practice to implement evidence into routine care (Middleton et al., 2012).

In many countries, inpatient stroke care is underpinned by evidence-based National Clinical Guidelines (ISWP, 2016; Powers et al., 2019; Stroke Foundation, 2021). However, there is little research to guide the prevention and management of dehydration in acute stroke (Bahouth et al., 2018; Visvanathan et al., 2015), and this is reflected in variations in the terminology used to describe dehydration, and approaches to its diagnosis, demonstrated in this and other studies (Bahouth et al., 2018). Our participants noted that no standard protocols existed to guide hydration care practice in the stroke units. There is no target in relation to the actual provision of hydration care, or for ongoing monitoring included in the SSNAP (Rudd et al., 1999). The most relevant SSNAP target relates to the performance of dysphagia screening only. As identified by the participants, this may lead to a lack of emphasis in practice on hydration itself as opposed to the initial identification of patients with post-stroke dysphagia.

Although our study was conducted only in relation to stroke care, hydration is of broader importance across adult inpatient healthcare settings. Major investigations in the UK, notably the Francis Report (Francis, 2013) and to a lesser degree the Keogh Report (Keogh,

2013) have highlighted that lack of assistance to drink or provision of fluids is a common failing when there are more general shortcomings in the quality of care, and it is often noted as an indicator of poor care by patients and their relatives in such situations. Staff in our study recognised the importance of hydration care in stroke but were hampered in their efforts by a lack of local policies to guide hydration care, lack of agreed terminology and procedures, and, at times, by a lack of multidisciplinary coordination and communication. Further research is needed to identify whether there are similar issues affecting hydration care in other fields of adult medical and surgical nursing.

This study strengthens the need for further research and quality improvement in this area of practice. Evidence-based methods for hydration assessment and management should be developed and tested, taking account of the wide variety of signs and symptoms that clinicians customarily rely upon in practice. Work is also required to raise awareness regarding the breadth of implications of dehydration on prognosis and recovery after stroke including associated development, implementation and evaluation of staff education and training interventions. Quality improvement should include the whole multidisciplinary team but may benefit from focusing on junior doctors and nurses, both because of their close and frequent contact with patients at the bedside, but also to harness their innovative capacity (Keogh, 2013) as potential champions of this area of practice.

5.1 | Strengths and limitations

A major strength of this study is its in-depth exploration of the views and experiences of representatives of the whole multidisciplinary stroke team, and is, to the best of our knowledge, one of the first to explore this topic. The variability in practice which was reported may itself be reflective of the limitations of the clinical guidance in this area. However, as data collection was limited to two stroke units, the findings may not be transferable to other settings, particularly those not in the UK. The study was conducted prior to the COVID-19 pandemic, and the challenges described may have been exacerbated since then. Caution should also be exercised in interpreting the findings as they represent practitioners' reported practice which may differ from actual practice.

Open-ended questioning was the intended design for this qualitative exploration, although the construction of some questions in the interview guide did not fully align to this approach. Whilst the use of closed questions does have the potential to limit effective data collection, all participants provided full and detailed answers to those questions.

Although we used the TDF to structure our analysis, there was variation in the depth to which the different TDF domains were represented in the findings. The main findings focused on the domains of Skills, Social Professional Role and Identity, Beliefs about Capabilities, Environmental Context and Resources and Social Influences, reflecting the very practical, multidisciplinary nature of

this area of health care work. Beliefs about Consequences was also a key theme, reflecting participants' awareness of the serious effects of poor hydration management. Two TDF domains—Intentions and Behavioural Regulation—did not occur in our analysis.

6 | CONCLUSION

This study, spanning multidisciplinary team perspectives, has provided a greater understanding of the facilitators and challenges to achieving adequate hydration in acute stroke care. Findings highlight the importance of assessing and maintaining hydration but have also identified barriers to, and variation in, good clinical practice. Findings might be replicated in other clinical settings, particularly acute medical and aged care settings. In order to provide optimal care, barriers to the prevention and treatment of dehydration after stroke must be further understood and addressed.

7 | RELEVANCE TO CLINICAL PRACTICE

This study provides valuable insight into the multidisciplinary nature of hydration care provision. Hydration care in stroke must be grounded in teamwork that respects the expertise and in-depth knowledge, both technical and of individual patients, of those with the most patient contact time. However, the contributions of many different occupational groups have been shown to be important, and recognition of the impact of dehydration on the ability of some professions to deliver effective care for example, therapists providing rehabilitation, is needed. Fundamental aspects of care, such as accurate completion of patient records regarding hydration status, can be improved to aid effective collaboration and information sharing between members of the MDST.

Findings highlight the lack of guidance for, and variation in clinical practice approaches to, hydration care. Work is required to develop evidence-based protocols to guide hydration care practice that are acceptable to, and valued by, the wider team to ensure adoption and sustainability. Such protocols should be complemented by the implementation of robustly evaluated education and training interventions which raise awareness of the impact of dehydration on stroke prognosis and outcomes, and on the multidisciplinary nature of effective hydration care practice.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

All the authors contributed to the conception and design of the study. Data Collection: A-MT, AM and ER collected the data. BC, JG, SJ, CM and CLW performed data analysis. All authors contributed to the drafting of the manuscript, revised it critically for important intellectual content and approved the final version for submission.

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SUPPORTING INFORMATION

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APPENDIX 1

Interview schedule

Vignettes	
1	<p>A patient is admitted to A&E on a Saturday morning and is confirmed to have had a stroke. They have passed a nurse dysphagia screen and can eat and drink normally.</p> <ol style="list-style-type: none">1. How would you assess their hydration status?2. What would your next steps be for assessment and planning for this patient's care over the next 24 hours?
2	<p>Now, imagine a similar patient, also admitted to A&E on a Saturday morning with an unclear onset time and is confirmed to have had an ischaemic stroke but is outside of the thrombolysis window. The patient fails a dysphagia swallow screen but has no other physical deficits from the stroke.</p> <ol style="list-style-type: none">1. How would you assess their hydration status?2. What would your next steps be for assessment and planning for this patient's care over the next 42 hours?
Interview questions	
1	Generally, do you think that stroke patients have any additional needs in relation to hydration? If yes, could you describe these?
2	Do you think there are any barriers to the identification of hydration levels in stroke patients?
3	Do you think there any barriers to maintaining adequate hydration levels in stroke patients?
4	Can you tell me how you would define dehydration?
5	Whose responsibility do you think it is to ensure that patients are adequately hydrated?
6	Do you think you have a role to play in ensuring that patients are adequately hydrated?
7	Why do you think it may be important to monitor stroke patient's hydration status closely in the acute stages of a stroke occurring?
8	Do you think there is a systematic approach to managing stroke patients who become dehydrated? If yes, can you describe this approach?
9	What changes, if any do you think could be made to ensure adequate hydration in stroke patients?