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Comparing safety climate for nurses working in operating theatres, critical care and ward areas in the UK: a mixed methods study

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ABSTRACT

Objectives The main aim of the study was to explore the potential sources of variation and understand the meaning of safety climate for nursing practice in acute hospital settings in the UK.

Design A sequential mixed methods design included a cross-sectional survey using the Safety Climate Questionnaire (SCQ) and thematic analysis of focus group discussions. Confirmatory factor analysis (CFA) was used to validate the factor structure of the SCQ. Factor scores were compared between nurses working in operating theatres, critical care and ward areas. Results from the survey and the thematic analysis were then compared and synthesised.

Setting A London University.

Participants 319 registered nurses working in acute hospital settings completed the SCQ and a further 23 nurses participated in focus groups.

Results CFA indicated that there was a good model fit on some criteria (χ^2=1683.699, df=824, p<0.001; χ^2/df=2.04; root mean square error of approximation=0.058) but a less acceptable fit on comparative fit index which is 0.804. There was a statistically significant difference between clinical specialisms in management commitment (F (4,266)=4.66, p=0.001). Nurses working in operating theatres had lower scores compared with ward areas and they also reported negative perceptions about management in their focus group. There was significant variation in scores for communication across clinical specialism (F (4,266)=2.62, p=0.035) but none of the pairwise comparisons achieved statistical significance. Thematic analysis identified themes of human factors, clinical management and protecting patients. The system and the human side of caring was identified as a meta-theme.

Conclusions The results suggest that the SCQ has some utility but requires further exploration. The findings indicate that safety in nursing practice is a complex interaction between safety systems and the social and interpersonal aspects of clinical practice.

Strengths and limitations of this study

- The results of the study indicate that there is an important and complex link between human factor approaches used in nursing practice and the interpersonal aspects of care.
- This work makes a unique contribution to understanding safety climate in nursing practice in the UK setting.
- The confirmatory factor analysis of the Safety Climate Questionnaire indicated that the model fit could be improved but further psychometric exploratory analysis may be warranted.
- The results need to be considered in the light of a cross-sectional survey response rate of 57% and a low number of participants in some of the focus groups.

INTRODUCTION

There is a growing consensus in healthcare safety research that organisational culture is critical for patient safety[1] and that safety management should move away from depending on lagging indicators of safety issues, such as incident reports, and move towards leading indicators, such as measures of safety climate.[2] Patient safety culture is defined as aspects of organisational culture that are 'the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to and the style and proficiency of an organisations' health and safety management'.[3] Safety climate is defined as a measurable feature of staff's attitudes and perceptions of an organisations underlying safety culture at any point in time.[4] There is evidence that safety climate is open to change and has an impact on individual safety behaviour and an important factor in improving patient safety.[5 6]

The Safety Climate Questionnaire (SCQ) developed in the UK[7] has been used extensively in the National Health Service (NHS) by the Royal College of Nursing.[8] However, the SCQ was originally developed for use in the UK petroleum industry as part of a tool kit to measure safety climate. The SCQ measures nine factors that contribute to safety climate,

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namely management commitment, communication, priority of safety, safety rules and procedures, supportive environment, involvement, personal priorities and need for safety, personal appreciation of risk and work environment.[9] It is noted that the petroleum industry exhibits aspects of a high reliability organisation,[10] defined as 'organisations that are able to manage and sustain almost error-free performance despite operating in hazardous conditions where the consequences of errors could be catastrophic'[11] and as such lessons learnt from high reliability organisations have underpinned developments in safety and risk management in the NHS.[12] The petroleum industry is a very different setting from healthcare organisations but it is possible that their safety management systems could provide beneficial outcomes in safety and risk management in the healthcare setting.[13] Pilot testing of the SCQ undertaken within the NHS tested its usability and found that the tool was useable in this context.[14] However, neither an exploratory or confirmatory factor analysis (CFA) of the tool was undertaken to validate its psychometric properties with a healthcare population.

Research evidence suggests that measures of safety climate vary between and within healthcare organisations and that there is limited understanding of the factors that may influence and explain the sources of these variations.[15] Several research studies have reported safety climate scores varying across different clinical specialities with some reporting less safe climates in operating theatres, critical care and emergency departments compared with surgical and medical inpatient areas[16–18] and others reporting a safer climate in critical care.[19 20] However, none of this research has been undertaken in the UK. The underlying reasons for these variations in safety climate are unclear at the present time. Understanding the underlying factors that influence healthcare practitioner's perceptions of safety climate is important for the development of strategies to improve patient safety.

As a subset of healthcare practitioners, nurses make an important contribution to patient care and evidence indicates that nurse-staffing levels have a direct impact on patient mortality,[21 22] and nurse's perceptions of safety climate impacts on safety behaviours and outcomes.[23] Therefore, it is important to understand how nurses perceive safety climate as this may have a direct impact on patient safety. This mixed methods study set out to explore the underlying factors that contribute to safety climate in nursing practice. The main aim of the study was to explore the potential sources of variation in safety climate between different clinical specialities. The study set out to determine whether there are differences in the perception of safety climate between nurses working in critical care, operating theatres, surgical and medical wards in acute hospital settings in the UK and understand the meaning that nurses working in these different clinical settings attribute to their understanding of patient safety. The factor structure of the SCQ was also explored.

METHOD

The study design was a fully mixed, sequential, equal status, mixed methods design and was conducted in two phases.[24] The first phase of the study measured and then compared safety climate scores between groups of nurses working in operating theatres, critical care, surgical and medical ward areas. As the factor structure of the SCQ had not been evaluated in a nursing sample, a CFA was also undertaken. The results from the cross-sectional survey were used to structure the focus group discussions held with groups of nurses from operating theatres, critical care and ward areas. The results of both phases of the study were then jointly summarised in a statistics-by-theme format to facilitate more in-depth inferences in order to consider potential mechanisms underlying safety climate.[25 26]

Following local ethical approval participants were recruited from a qualified nursing population who attended a university that recruited from a wide range of NHS Trusts and private hospitals in the region. In the UK Band 5 and 6 nurses are qualified nurses who deliver bedside care. They were specifically chosen, because they have a direct impact on patient care and safety in their everyday practice. A convenience sampling method was used and participants were approached by the researcher at the beginning of a teaching session and the purpose of the survey was explained. Information sheets were included with the questionnaire and completion of the questionnaire implied consent. All questionnaires distributed were collected at the end of the afternoon teaching session. The aim was to collect at least 300 questionnaires as this is considered by some to be the minimum number required for robust factor analysis.[27]

A paper version of the SCQ was distributed to participants. Additional questions were added to the questionnaire in order to facilitate a stratified analysis to compare scores between nurses working in different clinical settings and measure potential factors that may influence perceptions of safety. These additional questions collected data on the clinical area the participant worked in, including whether they worked in a surgical ward, medical ward, critical care unit, operating theatre or other acute hospital unit. Further information included how long they had worked in their present position, how long they had worked in the specialty, how long they had been qualified and whether they had safety training and further training in their specialty. Participants were also asked to describe the type of safety training they had undertaken.

The SCQ has 43 questions with a 5-point Likert scale response and is scored by allocating a value of 5 to the 'strongly agree' response, 4 to 'agree' response, 3 to the 'neither agree nor disagree' response, 2 to the 'disagree' response and 1 to the 'strongly disagree' response. The negative worded questions were allocated a reverse score by subtracting the initial score from 6. The initial scores from the questionnaires provided raw scores and these were transferred into an Excel2013 spreadsheet. In order

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to ensure that the data entry was as accurate as possible a double data entry procedure was followed as recommended by Elliott *et al*.[28] The Excel spreadsheet was then transferred into SPSS V.21 and a Little's 'missing completely at random' (MCAR) test was undertaken to ensure that any missing data were not introducing bias into the analysis.[29]

A CFA of the SCQ scores was undertaken using SPSS Amos V.21. The original nine-factor structure as identified by Cox and Cheyne was used as the *a priori* model to be confirmed by the factor analysis.[7] The following goodness of fit indices were used to test the model: χ^2 and the χ^2/df ratio, the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). The χ^2/df ratio overcomes the problem of a statistically significant χ^2 result associated with a larger sample sizes. A value of between 2 and 3 is deemed as being acceptable, the smaller value the better the fit.[30] The CFI measures the difference in the non-centrality estimates of the baseline and proposed model with values ranging from 0 to 1. A cut-off value >0.9 is considered to be an indication of a good model fit. The RMSEA measures the discrepancy between the hypothesised model and the population covariance matrices, and values range from 0 to 1. A RMSEA of <0.06 is indicative of an acceptable model fit with a recommended upper limit of 0.07.[31 32]

Once the CFA had been undertaken, comparisons of safety climate dimensions (factors) were made between different clinical settings. Higher mean scores indicate a good safety climate. Dimension scores were compared between clinical specialisms using a general linear model (GLM) that adjusted for the following characteristics: years in current position, years qualified, years in specialism, specialist qualification and safety training. Adjusted means with 95% CIs were calculated. Where there were differences between clinical specialism, based on the GLM F statistic, Bonferroni post-hoc pair wise comparisons were performed.

A Levene test of homogeneity of variance was conducted and residual plots produced to ascertain whether the assumptions underpinning GLM had been met. A wild Bootstrap analysis was undertaken on the 'Personal priorities and need for safety' dimension to assess whether non-equality of variance had biased the results.[33] The results remained very similar and only those from the GLM have been reported.

Following the survey, a total of 23 nurses were recruited and participated in four focus groups (operating theatre group=8, critical Care group=9, ward A group=3 and ward B group=3). A convenience sample method was used and participants were approached during a teaching session where information was provided and the purpose of the focus group was explained. The focus group discussions were arranged during lunch time. All participants consented to participate in the focus groups. These participants had not participated in the survey and therefore had not completed the SCQ. A priori open questions were used and participants were asked what their overall understanding of safety climate or culture was and what their views on communication and manager commitment to safety were, as these dimensions of safety climate had been found to be different between groups in the first phase of the study. Participants were not told the details of the differences found between different clinical settings in the survey. Each focus group was facilitated by one researcher who acted as facilitator and an observer who noted group dynamics and timed the session. The groups lasted between 40 to 50 min and were recorded and later transcribed. A six-phase approach to a thematic analysis was undertaken.[34] The transcribed discussions were imported into NVIVO 10 for windows to facilitate the development of codes. In-vivo coding was used for first-order coding, as using the participants own words provided a much closer interpretation of their voice in the coding process.[35] The initial codes were refined throughout the process of analysis and codes were checked back to the transcripts to ensure that the meaning of the code was valid in the context of the content of the transcript. During second-order coding, two researchers coded and the initial codes were reviewed and grouped into categories and eventually into subthemes and themes. A process of checking coding between the researchers through discussion and agreement was undertaken to ensure reliability and validity of the coding process.

RESULTS

Survey results

A total of 563 questionnaires were distributed and 319 questionnaires were completed and returned (response rate=57%). Four questionnaires were excluded from the final analysis because they were completed by nurses who did not fulfil the selection criteria, that is, not a band 5 or 6 adult nurse working in an acute hospital setting. Little's MCAR indicated that the missing data were missing completely at random and were unlikely therefore to unduly affect the results (Little's MCAR test: χ^2=2368.11, df=2292, p=0.131)

Table 1 illustrates the demographic data of the participants according to the specialist areas they worked in. There were more participants from critical care units than from other groups. The group identified as other included participants who stated that they worked in acute hospital setting areas such as, out patients, care of the elderly, oncology and haematology. The numbers of participants in these areas was low so these were grouped together.

Across the groups, the participants had been working in their present position between 3 and 4 years. There was more variability across the groups in terms of how long the participants had been qualified with the critical care and surgery ward nurses being qualified as a registered nurse for less time. There was some variation in the amount of time the participants had been working within the specialism and the results indicate that the participants had been working in other areas before finally working

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Table 1 Mean and SD χ^2 and for demographic data for critical care, operating theatres, medicine, surgery and other clinical areas

	Critical care (n=107)	Operating theatres (n=49)	Medicine (n=70)	Surgery (n=54)	Other (n=24)	χ^2
Present position	3.12	4.26	3.69	3.12	3.21	p=0.442
Mean (SD) (years)	(2.60)	(3.58)	(3.35)	(2.22)	(2.48)	
Years qualified	7.63	8.90	8.14	6.93	8.60	p=0.317
Mean (SD) (years)	(5.47)	(6.85)	(6.46)	(6.00)	(6.04)	
Years specialism	4.30	6.34	5.02	4.29	4.13	p=0.195
Mean (SD) (years)	(3.77)	(5.25)	(3.84)	(3.74)	(2.70)	
Specialist qualification	50%	43%	37%	33%	58%	p=0.029*
Percentage	(54/107)	(20/49)	(26/70)	(18/54)	(14/24)	
Safety training	71%	55%	69%	59%	67%	p=0.032*
Percentage	(76/107)	(27/49)	(48/70)	(32/54)	(16/24)	

*Statistically significant difference.

within their specialist areas. The percentage of those reporting having undergone safety training (χ^2=26.12, df=4, p=0.032) and those participants reporting having a specialist qualification (χ^2=29.83, df=4, p=0.029) varied significantly across clinical specialism. All other variables did not vary significantly across clinical specialism. All participants who had reported undergoing safety training undertaken in UK hospitals on an annual basis described this as mandatory training. Typically this includes training in manual handling, resuscitation and infection control.

Confirmatory factor analysis

The CFA goodness of fit measures indicated that there was a good model fit on some criteria with a significant χ^2 test (χ^2=1687.560, df=824, p=<0.001). Both the χ^2/df ratio of 2.05 and RMSEA value of 0.058 (95% CI 0.054 to 0.062) indicated a good model fit. However, the CFI was 0.805, although this was towards the higher end of the CFI range (0–1), it was below the acceptable threshold level (CFI >0.9) and suggests that the model could be improved.

The CFA regression weights (factor loadings) were similar to those from the original petroleum industry study (see online supplementary file 1). However, there were four items that were particularly low and related to the dimensions of supportive environment, personal appreciation of risk and work environment. In relation to a supportive environment the item relating to, 'a no blame approach is used to persuade people acting unsafely that their behaviour is inappropriate', had a regression weight of 0.150 and the item relating to, 'when people ignore safety procedures here I feel it is none of my business', had a regression weight of 0.291. In the dimension of personal appreciation of risk, the item, 'I am rarely worried about being injured in the job', had a regression weight of 0.110 and in the dimension of work environment the item, 'this is a safer place to work than other trusts I have worked for', had a regression weight of 0.270. These items may not make a significant contribution to the perception of safety climate in a nursing population. Cox and Cheyne[7] kept lower regression weighted items in their original questionnaire and suggested that these items should be used with caution.

Cronbach's alpha was >0.70 for five of the nine dimensions (management commitment 0.84, priority of safety 0.76, communication 0.70, personal priorities and need for safety 0.72, work environment 0.72). There were four dimensions with a Cronbach's alpha of <0.70 (safety rules 0.67, supportive environment 0.55, Involvement 0.58, personal appreciation of risk 0.48). There was some marginal improvement in Cronbach's alpha when items with standardised regression weights of <0.3 were excluded (supportive environment 0.55–0.57, personal appreciation of risk 0.48–0.50, work environment 0.72–0.74).

Comparison of safety climate scores

Following the CFA, the factor scores derived from the survey were used to go onto explore differences in safety climate scores between nurses working in different clinical specialisms. Comparisons were made between nurses working in critical care areas, operating theatres, medical wards, surgical wards and other acute hospital settings as described above. Table 2 shows the adjusted GLM mean, 95% CI by clinical specialism and F statistic for all of the safety climate dimensions. Overall, the scores were towards the higher range on the safety climate scale and suggested that participants reported a fairly positive safety climate for most of the dimensions. However, the work environment factor had lower scores across all the groups while personal priority of safety scored highly across all groups. There was a statistically significant difference between groups for management commitment (F (4,266)=4.66, p=0.001) and for communication (F (4,266)=2.62, p=0.035).

A Bonferroni post-hoc test revealed that there was a statistically significant difference in mean safety climate scores for management commitment between operating theatre nurses (mean=3.27, 95% CI 3.07 to 3.47), compared with

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Table 2 Comparison of the nine safety climate dimensions across clinical specialism adjusting for profile variable

		Critical care	Operating theatres	Medical wards	Surgical wards	Other	F test, p Value
Management commitment	Mean	3.48	3.27[m,s]	3.75[o]	3.66[o]	3.31	F (4,266)=4.66, 0.001
	(95% CI)	(3.34 to 3.62)	(3.07 to 3.67)	(3.59 to 3.91)	(3.47 to 3.85)	(2.99 to 3.63)	
Priority of safety	Mean	3.54	3.44	3.73	3.50	3.61	F (4,266)=1.29, 0.27
	(95% CI)	(3.39 to 3.69)	(3.22 to 3.66)	(3.55 to 3.91)	(3.30 to 3.71)	(3.26 to 3.96)	
Communication	Mean	3.19	3.17	3.50	3.35	3.13	F (4,266)=2.62, 0.035
	(95% CI)	(3.04 to 3.33)	(2.96 to 3.38)	(3.33 to 3.67)	(3.15 to 3.54)	(2.79 to 3.47)	
Safety rules	Mean	3.18	3.23	3.43	3.40	2.90	F (4.266)=1.96, 0.10
	(95% CI)	(3.01 to 3.36)	(2.98 to 3.48)	(3.22 to 3.64)	(3.17 to 3.64)	(2.49 to 3.31)	
Supportive environment	Mean	3.66	3.67	3.86	3.75	3.63	F (4,266)=1.85, 0.12
	(95% CI)	(3.55 to 3.76)	(3.51 to 3.82)	(3.73 to 3.98)	(3.60 to 3.89)	(3.38 to 3.88)	
Involvement in safety	Mean	3.31	3.45	3.50	3.63	3.37	F (4,266)=1.87, 0.12
	(95% CI)	(3.16 to 3.46)	(3.24 to 3.66)	(3.33 to 3.68)	(3.43 to 3.82)	(3.03 to 3.71)	
Personal priorities and need for safety	Mean	4.20	4.31	4.37	4.33	4.11	F(4,266)=1.89, 0.11
	(95% CI)	(4.10 to 4.30)	(4.16 to 4.45)	(4.25 to 4.48)	(4.20 to 447)	(3.88 to 4.34)	
Personal appreciation of risk	Mean	3.19	3.15	3.36	3.44	3.35	F (4,226)=0.92, 0.080
	(95% CI)	(3.05 to 3.32)	(2.96 to 3.34)	(3.20 to 3.52)	(3.26 to 3.61)	(3.04 to 3.65)	
Work environment	Mean	2.62	2.65	2.68	2.82	2.85	F (4,266)=0.092, 0.45
	(95% CI)	(2.47 to 2.77)	(2.44 to 2.86)	(2.50 to 2.85)	(2.62 to 3.02)	(2.51 to 3.20)	

m, significantly different from medicine; o, significantly different from operating theatres; s, significantly different from surgery.

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nurses working in medical wards (mean=3.75, 95% CI 3.59 to 3.91) and surgical ward settings (mean=3.66, 95% CI 3.47 to 3.85). Although there was significant variation in safety climate scores for communication across clinical specialism, none of the pairwise comparisons achieved statistical significance at the 5% level, although the difference between critical care (mean=3.19, 95% CI 3.04 to 3.33) and the medical wards (mean=3.50 95% CI 3.33 to 3.67) came close (p=0.056).

Thematic analysis

The results of the cross-sectional survey indicated a difference between nurses on the dimensions of management commitment and though not statistically significant, communication. During the focus groups participants were invited to discuss their understanding of safety culture and for their views of management and communication related to safety. Specific details of the differences found in the survey were not disclosed to the participants in order not to lead the discussion. Though these two aspects were discussed several other issues were also raised by participants. Three main themes emerged from the thematic analysis of the focus group data. These were human factors, clinical management and protecting patients. A further meta-theme was also identified as the system and human side of caring.

Human factors

The theme of human factors related to aspects of the environment such as design and staffing, the use of checklists and incident reporting. Aspects of physical environment were viewed as carrying potential risks and hazards to patients and the nurse is important in constantly checking equipment to ensure safety. For example, this participant stated that,

'I have to go round everywhere, checking the emergency crash call, check the monitors. The date they were serviced'. (critical care group). Other participants recognised environmental design that has improved patient safety, such as, laminated flooring, '*We have a laminated grip flooring. They can still have a fall but it is much better for them'*. (medical ward group). The ratio of the numbers of patients to nurses was a concern, for example, *'Even in the current era, the ratio of nurses to patients is still a bit high. In terms of care, sometimes we are under so much pressure'*. (medical Surgical group). All the groups mentioned the use of checklists. The operating theatre group mentioned the use of the WHO checklist and the ward groups mentioned the use of intentional rounding. Though the content of these checklists are different they were seen as having advantages for patient safety and have been embedded in nursing practice. For example, '*We're very serious about protocols and policies as well and….we live by the checklist now*'. (operating theatre group) and '*We have a checklist now and we check every single patient on the ward is safe'*. (medical surgical ward group).

There were ambivalent feelings regarding the use of incident reports where some participants viewed them as positive opportunities to learn from error, for example, '*You can learn from error, you can see it's not about blame culture*'. (medical ward group), or were seen negatively, as this participant articulated, *'Yeah, a weapon, not something to help you. We're going to tell on you*'. (critical care group). All of these approaches are systematic ways of managing error that are evident in nursing practice and the participants recognised the importance of these approaches to patient safety.

Clinical management

The theme of clinical management was related to communication processes and management behaviours that were relevant to the day-to-day management of patient care. Structured approaches to communication, such as handover, team briefing and ward rounds, were viewed as important for patient safety. Generally communication between nursing teams was seen as positive but communication between professions was identified as problematic, *'I think communication between nurses is good and between doctors and doctors is very good, but I think that there is a massive communication breakdown in people from different professions….I think information is lost all the time*'. (critical care group) The role of the medical notes was viewed as being very important in communicating medical decisions to nursing staff but this was problematic for many participants. For example, *'Sometimes you are on night shift and you handover to the nurse who is taking over in the morning and you handover things that have happened and there's nothing written in the notes, nothing written by the doctors*'. (critical care group). The nurses perceived medical staff as not understanding the significance of the medical record for safe nursing care.

Manager behaviour was also identified as very important for the participants feeling supported in patient safety. Managers who were seen as approachable and proactive in managing patient safety were generally viewed as providing support for example, '*My manager tends to pay a lot of attention to those small details where the chart is not updated, he will remind staff, so he is very picky on the small things, which is good because it reminds everybody about what you are doing*'. (medical surgical group). Those managers who were seen as unsupportive tended to be reactive and not supportive of staff, for example, '*Just telling me what to do. It's just like another surgeon telling me what to do'*. (operating theatre group).

Protecting patients

Protecting patients was a key theme that emerged as being important aspect of nursing practice relating to patient safety. This focused on how nursing skill is applied to patient care and acting as a gatekeeper and advocate for patients. There was an overall sense that patients are vulnerable, for example, '*The nature of our patients we're receiving acutely unwell patients who are suffering from delirium and are vulnerable*'. (medical ward group). There was a sense that nurses protect patients by ensuring safety while undertaking nursing tasks, for

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Table 3 Differences in the dimension of communication between critical care, operating theatres, medical and surgical wards for the SCQ and theme

SCQ communication score	Summary of thematic analysis
Critical care mean=3.19 (3.04, 3.33)	The main mechanism for communication was the ward round. Problems were identified where communication was poor following a ward round or where medical staff do not record in the medical record
Operating theatres mean=3.17 (2.96, 3.38)	The main mechanism for communication was the WHO checklist and team briefing. There were challenges associated with compliance with these approaches from surgeons
Medical wards mean=3.50 (3.33, 3.67)	The main focus of communication was related to handovers between nursing teams and ward rounds
Surgical wards mean=3.35 (3.15, 3.54)	These seem to work well

example, *'Administrating medication is a major thing and I think safety should be ensured all the time and I see we always check, because you've got a critically ill patient and the last thing you want is a drug error'*. (critical care group). There was also a sense that nurses need to challenge others. For example, *'I think when it comes to patient safety everyone has to take responsibility for safety, the doctors just don't do it. We encourage, we try to make everyone to be attentive but you have to challenge them'*. (critical care group). There was a clear sense that the participants felt that they had a role in protecting patients from harm.

Joint synthesis of survey and focus group findings

The results of the cross-sectional survey found a variation in the dimension of communication between nurses working in critical care and medical wards, though pairwise comparisons were not statistically significant. Table 3 shows the mean and 95% CIs for the dimension of communication and a summary of the themes identified in the thematic analysis of the focus group discussions. The ward focus groups identified nurse-to-nurse communication as important for patient safety and these groups had slightly higher safety climate scores in this area. The critical care and operating theatre focus groups highlighted challenges associated with nurse-to-doctor communication.

There was a statistically significant difference in mean safety climate scores for management commitment between operating theatre nurses, compared with nurses working in medical and surgical ward settings, with operating theatres having a lower score for management commitment. Table 4 shows the mean and CIs for the dimension of management commitment and the themes that were identified in the focus groups. The operating theatre group reported more reactive and unsupportive manager behaviours in the focus group discussion. Whereas the other areas generally reported proactive and supportive manager behaviours in the focus groups, the operating theatre focus group reported reactive style of management.

The system and human side of caring

A meta-theme, or overarching theme was identified from the three main themes and was labelled the system and the human side of caring. This holistic view of the data captures two aspects of patient safety that seemed to be apparent within the data. That is, the system in which caring takes place, and this includes the physical environment, the design of that environment and the system processes that have been put in place to assist patient safety with the use of checklists and incident reporting. These systematic organisational structures and processes provide the backdrop and the context in which caring

Table 4 Differences in the dimension of management commitment to patient safety, between critical care, operating theatres, medical and surgical wards for the SCQ and themes

SCQ management commitment score	Summary of thematic analysis
Critical care mean=3.48 (3.34, 3.62)	Being approachable and accessible to support staff. Having experience and clinical credibility
Operating theatres mean=3.27 (3.07, 3.67)	The perception that manager take sides with medical staff, not providing help and advice to nurses when they approach managers for assistance, and having an agenda related to targets, managers side with the surgeons and do not support the nursing staff, that the rules do not apply to surgeons
Medical wards mean=3.75 (3.39, 3.91) Surgical wards mean=3.66 (3.47, 3.85)	Being proactive in supporting patient safety and reminding staff about compliance to safety procedures. Working clinically in the area and having clinical credibility with the nursing staff was highly valued and being approachable and accessible to nursing staff when they feel that they need support with problems related to patient safety

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takes place. The human side of caring includes the personal and the interpersonal aspects of care, the need to communicate within nursing teams and to handover care to each other. The relationship with clinical managers was important to provide support for safe clinical care. The importance of interaction with other disciplines and the problems associated with that was a key component. Finally, the acknowledgement of patient's vulnerability within the system and that nurses feel it is an important aspect of their role to act as an advocate and to protect patients through acting as a gatekeeper. Safety lies within an interaction between these two aspects of the clinical environment.

DISCUSSION

The application of high reliability organisation theory has underpinned the approach to patient safety in the past decade in the UK.[12] and the introduction of human factor approaches to patient safety is high on the agenda in the UK at the present time. The results of this study indicate that though human factor approaches are an important aspect of safe nursing practice, these approaches need to be supported with communication and management behaviours that rely on good interpersonal skills. The emergent meta-theme of the system and the human side of caring indicate that attitudes and organisational culture are shaped and developed within the context of the transpersonal and the results indicate that support and communication empower nurses to advocate and protect their patients. The advent and development of checklists, the implementation of human factor and high reliability approaches are important and these have had a significant impact on patient safety but this study highlights other aspects of social behaviour and communication that can have an impact on patient safety. Indeed, too much focus on targets and processes can be counterproductive.[36]

The SCQ has been used in the NHS extensively, however, the factor structure had not validated within a healthcare population before its use. The results of the CFA undertaken here with a nursing sample indicated that the SCQ did have an acceptable level of model fit for some but not all criteria. The main focus of this study was to explore and understand variation in safety climate between specialisms and the SCQ provided some measurement that enabled further exploration of this variation. However, further work needs to be undertaken to fully validate this tool in the healthcare context. This tool was used extensively in the NHS without confirmation of its factor structure and these results illustrate that it is important to ensure that tools developed in one context are evaluated for fit into another context.

The findings indicated there was a lower safety climate in operating theatres compared with ward areas for management commitment. Both critical care and operating theatre groups also scored lower for communication than medical ward areas, though this was close to but not statistically different. This may seem surprising, given that in recent years there has been widespread introduction of high reliability organisation approaches into critical care units and operating theatres, such as the WHO checklist into operating theatres and the introduction of reliability and standardisation measures in intensive care units.[37 38] However, these results are consistent with results from other countries and may indicate that there is a fundamental difference in safety climate in different clinical settings and it has been suggested that these differences are associated with the severity or complexity of the patient condition, high patient turnover or the technological complexity of the care delivered.[16–18] The results of this mixed methods study may point to other factors associated with management and communication differences in these areas rather than the highly technical aspects of patient care associated with critical areas. It is interesting to note that the SCQ does not stipulate whether management commitment indicates middle or senior management. It was clear in the focus group discussions that nurses see their ward or unit manager as their manager. How nurses interpret these issues has implications for how safety climate scores can be interpreted.

In a post Francis's inquiry[36] era, nursing care in particular has had increasing scrutiny of its practice, and these results indicate that there is a focus on safety in clinical practice and this is reflected in the perceptions and attitudes of the nurses who participated in this study. The factor scores of personal priorities and need for safety were consistently high across all groups, suggesting that for the participants, safety is an important priority in patient care for these nurses and this was reflected in the focus group discussions. The factor scores for work environment were consistently low across all groups and the focus group discussions highlighted the availability of equipment, staffing, the resources and time available to undertake the work are important aspects of safety in nursing practice.

It is acknowledged that the results need to be considered in the light of a cross-sectional survey response rate of 57% and the fact that the number of participants in some of the focus groups was low. However, the response rate is similar to other work undertaken in the field and although there were low numbers in some focus groups, robust data were generated. However, the results of this study raise some important issues relating to the underlying drivers of safety climate in nursing practice and the importance of using a mixed methodology to provide a deeper insight into the mechanisms driving safety climate in nursing practice. Using a mixed methodology enabled a much deeper investigation of potential factors driving safety climate. The usage of mixed methodology and a further investigation of manager behaviours are potentially fruitful areas for further investigations in patient safety climate.

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