LESSONS LEARNED FROM MEASURING SAFETY CULTURE: AN AUSTRALIAN CASE STUDY

Background

Adverse events in maternity care are relatively common but often avoidable. International patient safety strategies advocate measuring safety culture as a strategy to improve patient safety. Evidence suggests it is necessary to fully understand the safety culture of an organisation to make improvements to patient safety.

Aim

This paper reports a case study examining the safety culture in one maternity service in Australia and considers the benefits of using surveys and interviews to understand safety culture as an approach to identify possible strategies to improve patient safety in this setting.

Setting

The study took place in one maternity service in two public hospitals in NSW, Australia. Concurrently, both hospitals were undergoing an organisational restructure which was part of a major health reform agendaNSW, Planning Better Health. The priorities of the reform included improving the quality of care and patient safety; and, creating a more efficient health system by reducing administration inefficiencies and duplication.

Design

A descriptive case study using three approaches:

- Safety Attitudes Questionnaire and Safety Climate Scale surveys administered to maternity health professionals (59/210, 28% response rate) measured six safety culture domains; Safety climate; Teamwork climate; Job Satisfaction; Perceptions of management; Stress recognition and Working conditions.
- Semi-structured interviews (15) with key maternity, clinical governance and policy stakeholders augmented the survey data and explored the complex issues associated with safety culture.
- A policy audit and chronological mapping of the key policies influencing safety culture identified through the surveys and interviews within the maternity service

Results

The safety culture was identified to warrant improvement across all six-safety culture domains. There was reduced infrastructure and capacity to support incident management activities required to improve safety, which was influenced by instability from the organisational restructure. There was a perceived lack of leadership at all levels to drive safety and quality and improving the safety culture was neither a key priority nor was it valued by the organisation.

Conclusion

The safety culture was complex as was undertaking this study. We were unable to achieve a desired 60% response rate highlighting the limitations of using safety culture surveys in isolation as a strategy to improve safety culture. Qualitative interviews provided greater insight into the factors influencing the safety culture. The findings of this study provide evidence of the benefits of including qualitative methods with quantitative surveys when examining safety culture. Undertaking research in this way requires local engagement, commitment and capacity from the study site. The absence of these factors is likely to which limit the practicality of this approach in the clinical setting.

Significance
The use of safety culture surveys as the only method of assessing safety culture is of limited value in identifying strategies to potentially improve the safety culture.

Introduction

Adverse events in maternity care are relatively common but often avoidable. National and international patient safety strategies and policy identify the importance of developing positive safety cultures to improve patient safety (Australian Council for Safety and Quality, 2002; Barraclough & Birch, 2006; NPSA, 2004; NSW Health, 2004). Evidence suggests it is necessary to understand the safety culture of an organisation to make improvements to patient safety.

Improving safety culture in the health care setting is a key strategy being implemented in a number of countries to improve patient safety in health care (Kohn, Corrigan, & Donaldson, 2001; NPSA, 2004; NSW Health, 2004; Pronovost et al., 2005) and reviewing the safety culture is recommended as a patient safety strategy (Hindle, Braithwaite, & Iedema, 2006; Kirk, 2005; NPSA, 2004). There is only limited evidence that the measurement of safety culture at the ward or clinical unit level has resulted in improvements in safety culture. Whilst the results of these few international studies are promising (Pronovost et al., 2005), it is unknown if this process is either generalisable or offers a practical method in the clinical maternity setting.

There are many variations in the interpretations and definitions of safety culture. Some define safety culture as a sub-facet of organisational culture that affects the attitudes and behaviours of members with regard to the health and safety performance of an organisation (Cooper, 2000; Kirk, Parker, Claridge, Esmail, & Marshall, 2007). Safety culture is also defined as 'a 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 organisation's health and safety management' (Sexton, Helmreich et al., 2006). The culture of an organisation, or the attitudes and beliefs of those health professionals within it, will influence its ability to respond to adverse events.

A common interpretation of culture is 'the way things are done around here' (Pronovost & Sexton, 2005, p. 231). Positive safety cultures in health care were identified to include strong leadership to drive the safety culture and a strong management commitment where safety is made the key priority for the organisation (Hindle et al., 2006; NPSA, 2004; Perry, 2002). Leadership and management commitment in this context was considered to be important as their actions and attitudes are thought to influence the perceptions, attitudes and behaviours of staff in the organisation towards safety culture (Flin, 2007). Organisations with positive safety cultures have: staff who are constantly aware that things can go wrong; have an acknowledgement at all levels of the organisation that mistakes occur; and a strong organisational commitment and ability to learn and take action to prevent their reoccurrence (NPSA, 2004).

Patient safety culture is influenced by a number of factors collectively described as safety culture dimensions or domains (Flin, Burns, Mearns, Yule, & Robertson, 2006; Kirk, 2005; Kirk et al., 2007; NPSA, 2004; Sexton, Helmreich et al., 2006; Sexton et al., 2004; Singla, Kitch, Weissman, & Campbell, 2006). Safety culture domains are broadly reported to include organisational, work environment, team and staff factors (Hindle et al., 2006; Vincent et al., 2000). There is no agreed classification or definition describing these patient safety culture domains in the literature (Singla et al., 2006). A number of reviews of existing patient safety culture surveys conducted by various authors has resulted in views about the fundamental domains influencing patient safety culture (Flin, 2005, Singla, 2006, Colla, 2005, Fleming, 2009).

Dimensions of safety culture includes: management and supervision; safety systems; risk; work pressure; competence; procedures and rules; teamwork; communication; organisational learning; feedback and communication; beliefs about the cause of errors and adverse events; job satisfaction and overall perception of safety (Singla et al., 2006). Other work highlights the importance of leadership; safety systems and risk perception; job demands; organisational reporting; teamwork, communication and feedback, physical resources and safety attitudes in understanding safety culture (Fleming and Wentzell, 2009; Flin et al, 2006; Singla et al , 2006; Colla et al , 2005). Sexton and colleagues postulate that there are six specific patient safety culture related domains in the health care setting, (1) Safety Climate; (2) Teamwork climate; (3) Job Satisfaction; (4) Perceptions of Management; (5) Stress Recognition and (6) Working Conditions (Sexton et al., 2004). The factors included in each of the six safety culture domains are summarised below (Table 1).

Safety culture surveys examining the various dimensions are being advocated as one way to examine health services (Hindle, Braithwaite, & Iedema, 2006; Kirk, 2005; NPSA, 2004). These surveys quantitatively measure various domains safety culture by identifying strengths or weaknesses perceived by respondents (Flin, 2007). Safety culture surveys however, only provide a snapshot of an organisation's safety culture sometimes also described in the literature as climate (Pronovost & Sexton, 2005; Sexton, Holzmueller et al., 2006). As such, they are limited and often only provide superficial understanding about the safety culture (Kirk et al., 2007). In addition, qualitative research should be undertaken to examine the human factor components of cultures (Braithwaite et al., 2005; Flin, 2007; Kirk et al., 2007). Qualitative methods can explore the safety culture and to identify specific interventions (Flin et al., 2006; Perneger, 2006). There are limited studies which describe safety cultures in clinical settings using both safety culture surveys and qualitative methods such as interviews.

There is little known about the safety culture in Australian maternity services. In an effort to understand whether measuring and examining the safety culture using both surveys and interviews was a practical method which could help improve patient safety in the clinical maternity setting, we undertook a case study to explore the safety culture in one maternity service in Australia.

We originally designed the study to measure at two time points and examine the safety culture to inform the development and implementation of improvement strategies and then remeasure the culture for changes post intervention. However, early challenges in gaining ongoing local stakeholder engagement and limited capacity to support the study combined with and low response rates to surveys indicated that this plan was premature. The study was then revised to measure and examine the safety culture and identify the barriers and challenges to improving the safety culture in this setting. This paper therefore reports the study as a case study and considers the processes designed to understand safety culture as an approach to identify possible strategies to improve patient safety in this setting.

Description of the case site
The study took place in one maternity service located in two public hospitals in NSW, Australia. Concurrently during the study, a health reform agenda in NSW, Planning Better Health (NSW Health, 2004a) was being rolled out. The priorities of the reform agenda included, improving the quality of care and patient safety; and, creating a more efficient health system by reducing administration inefficiencies and duplication. The reform agenda included a number of policies such as, The Patient Safety and Clinical Quality Program providing a framework for the systematic identification, reporting and management of events and risks; and, the organisational restructure of all NSW Health Services. The restructure resulted in changes across the whole of NSW, where the existing 17 Area Health Services (AHS) were restructured into eight new AHS (NSW Health, 2004a).

The restructure resulted in two AHS amalgamating. This required significant reorganisation of clinical services into area clinical streams and smaller divisions within new governance structures. At the study site, this resulted in one maternity service amalgamating with a second in a facility located eight kilometres away. The maternity service operated as one maternity service across two sites. The restructure resulted in changes to, and the displacement of, key local stakeholders shortly after the study commenced. The changes to leadership at the study site meant a period of instability for the existing quality and safety infrastructure of the service and the staff.

Methods

A descriptive case study was undertaken in one maternity service in the Sydney, Australia. The service is representative of many mid-range maternity units in Australia which provide care to women with low to moderate risk factors.

Three approaches were used to collect data. All data was collected by the Doctoral candidate researcher who was a midwife but not employed or known to the majority of staff working at the study sites. Initially a survey was used to measure the safety culture quantitatively and secondly, interviews collected qualitative data. The interviews were undertaken to explore the complex issues associated with safety culture that the survey could not be able to address. The third approach included a policy audit and chronological mapping of the key policies influencing safety culture identified through the surveys and interviews within the maternity service. This approach will not be discussed in this paper. Ethical approval for the study was obtained from the Human Ethics Committees in the AHS and the university. All participants provided written consent prior to participation.

The survey sample consisted of maternity health professionals working full-time or part-time in the maternity service at the two study sites. The demographics of the health professionals was similar across all groups at both sites and some of the staff worked at both sites. Due to the similarity and low response rates the sample was combined. The sample included midwives, obstetricians, paediatricians, registrars, resident medical officers, midwifery unit managers and student midwives. Eligible participants were identified through staff rosters provided by unit managers. Surveys were administered during regular scheduled meetings, by hand to those not at the meetings and through the internal hospital mail.

Two standardised safety culture surveys were used, the Safety Attitudes Questionnaire (SAQ), was used to measure the following six safety culture domains; Safety climate; Teamwork climate; Job Satisfaction; Perceptions of management; Stress recognition and Working conditions (Sexton et al., 2004). The Safety Climate Scale (SCS) a shorter survey measured only the Safety climate domain. Nine questions in the SAQ and the SCS relating to the Safety Climate Domain are the same. Both surveys were included as a way to cross check the consistency of responses across each survey for the Safety climate domain. Both surveys are scored according to a Likert scale from strongly disagree (scored as one), slightly disagree (two), neutral (three), agree slightly (four), agree strongly (five) and not applicable (not scored). Each question is assigned a mean score. The mean score is also represented on a zero to 100-point scale. The safety culture domain score is the mean score of all questions in the survey that measure that domain. Each survey also includes demographic items. The SAQ also includes questions about collaboration and communication and open-ended questions about how patient safety could be improved in that clinical setting. These surveys have been validated in maternity settings in the United States (Sexton et al, 2006). According to the survey authors a response rate 60% is desirable when undertaking safety culture surveys (Sexton et al, 2006).

Survey data were descriptively analysed to identify the mean scores according to the standardised method developed by the original authors of both surveys (Sexton et al., 2004). Safety culture domain scores of less than 75 points for the purpose of the study were considered to warrant improvement.

Open-ended questions were analysed using Template analysis (King, 2008) A preliminary template using the six safety culture domains was used. Each response was then reviewed and assigned a code and then assigned to one of the six safety culture domains. Each of these coded responses were reviewed and similar responses were combined into a sub theme. Further detail about Template Analysis is provided below.

Participants for interviews were identified purposively using a critical case sampling approach. Critical case sampling means that cases who are thought to be likely to provide the most information enabling the development of the knowledge are selected (Hansen, 2006; Patton, 1990). Therefore, individuals who have the most experience and knowledge about the infrastructure, processes and issues related to safety culture at the study sites were interviewed. The individuals most likely to have this knowledge were those in key management and leadership positions. These were the midwifery unit managers, educators, midwifery consultants and obstetric staff specialists. These participants had also completed surveys. Interviews were conducted in private settings by the Doctoral candidate researcher using a question guide. The question guide included the identification of the incident management, quality and safety activities undertaken at the case site; the key issues which were impacting on the safety of the maternity service; and, the ways to improve the safety of the maternity service. The interviews were tape recorded and transcribed verbatim.

Qualitative data from both the surveys and the interviews were analysed initially by the Doctoral candidate researcher using Template Analysis (King, 2008). Template Analysis uses a coding template which is developed and refined during the process of data analysis. The purpose of the template is to identify and summarise the themes which the researcher believes are likely to be important in the data and relevant to the research question (King, 2008). The template allows the data to be organised in a hierarchical fashion under overarching broad themes through to narrower subset themes. The transcripts were recoded and categorised without the template to identify the existence of any additional themes not present in the template. This acted as a quality check ensuring the analysis was not restricted. The template was then modified to reflect this final analysis then checked by two other researchers (Research supervisors) for accuracy and appropriateness.

Results

A total of 59 out of 210 (28%) surveys across the two sites were returned. The response rates were similar at both sites. The different methods of distributing the surveys met with varying response rates. The highest response rates (100%) occurred when surveys were handed directly to individuals. The second highest response rates (92%) were when surveys were administered during meetings with time allocated for completion. When time was not allocated during meetings the response rate was 24%. The lowest response rate (21%) occurred when surveys were personally addressed and mailed to individuals.

The majority of the 59 respondents (71%) were midwives. There were five (8%) obstetric registrars or resident medical officers and three (5%) obstetric staff specialists. There were no obstetric or paediatric Visiting Medical Officers. The average age was 40 years (SD 10.4); most were experienced with an average of 12.2 years (SD 9.1) working in the speciality and worked mostly (63%) rotating shift patterns. The demographic of respondents from both sites were found to be similar so were combined.

All the safety culture domains, with the exception of the Job satisfaction domain had a score below 70. The safety culture score was 64. These results were indicative of a safety culture warranting improvement. The Job satisfaction domain scored the highest with a score of 71. The Perception of management domain was the lowest scoring domain at 51 (Table 1). The results across both sites were very similar.

The Safety Attitudes Questionnaire and the Safety Climate Scale have nine questions in common which measure the Safety climate domain. The Safety climate domain scores for both surveys were very similar and the score of 72 indicated that the Safety climate could be improved.

There were three open-ended questions in the Safety Attitudes Questionnaire where participants could make recommendations for improving patient safety. Each of the recommendations was analysed using Template Analysis (King, 2008) with the six safety culture domains as the template (Table 2).

Fifteen interviews were conducted with midwifery manager/unit managers (n=7); midwifery educators/consultants (n=3), obstetrician (n=1); policy officers (n=2); and, clinical governance officers (n=2). Of these, 11 also completed surveys.

Interview data provided themes across all of the six safety culture domains however, the Safety climate, Perceptions of management and Working conditions domains scoring the lowest in the surveys were the key themes identified in the interviews. The interview data presented in this paper will focus on one domain only, Safety climate. The themes identified in the Safety climate focused on the challenges that were identified as potential barriers to improving the safety culture at the study sites.

There were three main themes identified in the participant interviews about the safety climate. These were in the past; the present; and, the incident management information system. Each of these themes had a number of sub themes.

A distinction was made by participants between the systems that were present *in the past* for patient safety activities to those present at the time of the study. In the past, participants felt that had a robust system; they had infrastructure; and were valued. The previous system that had been developed at a site level was described as being, *well established, responsive and robust.* The responsiveness and robustness was based on the presence of processes and infrastructure to facilitate incident reporting, the review of these incidents and timely response to any issues that required attention. This process was often referred to by participants as 'closing the loop', for example:

> *We would discuss them [incident reports] and closed the loop*
> *We looked at those [incident reports] on a regular basis and dealt with them in a timely manner*

There was an emphasis on the importance of being able to respond to incidents and issues in a timely manner to close the loop. The past system was able to respond in this way due to the presence of infrastructure, which was established by the Division to support this work. Infrastructure, to support the incident management and safety and quality activities at the study sites, was highlighted as an essential component to the success of the system established in the past. The infrastructure included a quality committee of senior managers and clinicians within the Division; a dedicated position to oversee, coordinate and lead the quality activities, and support from the leaders of the hospital based Clinical governance unit. The motivation to develop this system was driven by a number of interested and committed leaders in the service. There was a perception that developing and running incident management systems and undertaking quality and safety activities was dependent on individuals with the interest and capacity to do this work rather than being directed by an organisational commitment. Nonetheless, participants recognised that there had been a strong culture of patient safety, for example:

> *We had even in an embryonic way, a good safety culture, people reported. I think we had a just culture ... some of the things that were reported and dealt with, we looked after the staff*

This culture was accepted and valued by a number of the participants and they were proud of the system and felt valued for this work by the hospital organisation.

There was a distinction made by participants between the systems to manage quality and safety activities *in the past* to those *in the present* at the time of the study. *The present* included three sub themes, *the organisational restructure; being in a transition and not closing the loop.*

The *organisational restructure* included the amalgamation of two hospitals, changes in staffing, the introduction of the new computer based Incident Information Management System (IIMS) and changes to the infrastructure to support the incident management and patient safety activities. The restructure was most hardest felt in the staffing changes which meant the quality manager role was disbanded to be an area-wide role, rather than a hospital-specific role. Participants felt this made a big difference:

> *We had a really good system in place ... you know this person* [quality manager] *that was responsible for it, was doing a really good job, yes she had capacity to do it because of the nature of her job but, ... it was working really well, they took her position away and now we're in a mess*

The deletion of the quality manager position resulted from a reorganisation of a number of midwifery and management roles at the time of the restructure. This resulted in the creation of new clinical streams and the amalgamation of the two sites into one service.

Participants felt *in transition* between the previous system and the establishment of a new system to support incident management (IIMS) and patient safety activities. The restructure meant that new work pressures had been created for the midwifery unit managers as they took on the responsibility for incident management. Competing priorities for managers meant that patient safety was often not a day to day priority. For example:

> *I sometimes wonder whether or not this sort of thing is as much a priority as it probably once was, certainly the day to day management of the unit does take precedence over such things.*

The demands of running a busy maternity service had resulted in incident management being managed in a less systematic way than in the past and often resulted in incidents no longer being followed up or *not closing the loop.* While the new patient safety systems were supposed to be more systematic and coordinated, this was often not the case at the ward level. This lack of a coordinated response was thought often to result in incidents not being followed up, analysed, managed and fed back appropriately. An important component *of closing the loop* was providing feedback to the clinical staff on the ground about the outcome of incident reports and incident management. Providing feedback was thought to be important to engage staff and to reassure staff they were being heard but this was more difficult in the new systems which removed the process outside the maternity unit. It was identified that, despite reporting incidents, there never seemed to be *closing the loop* with feedback. This lack of feedback about reported incidents was described by some participants as, the '*great big ether*' or '*the black computer hole*'. The lack of feedback was a disincentive to make the effort to report adverse events, as they perceived their efforts were not valued, or worthwhile.

The third theme was, *Barriers to the Incident Information Management System* (IIMS). IIMS was introduced as the incident reporting and management system component of the Patient Safety and Clinical Quality Program. This theme emerged when participants described difficulties with the specific processes of incident reporting at the study sites. Incident reporting and management is one component of having a safety climate. One barrier to reporting on the IIMS system was a general lack of awareness by the staff about what should be reported with limited guidance about what constituted a maternity

reportable incident. This lack of awareness about what constituted a reportable incident was thought to have created a situation where clinicians tended to report minor incidents rather than the more serious incidents. Another related to using the IIMS itself including technical difficulties while entering and saving reports and the restrictiveness of reporting maternity-related incidents. The limitations of the available fields and limited flexibility to document maternity related incidents were further barriers to reporting.

Another barrier to incident reporting was that entering IIMS reports was not seen as a priority and was *not on the radar* of the staff particularly the midwives. One reason given for a lack of reporting was that midwives just *don't think [about] IIMS* as it, *wasn't on their radar.* This was thought to relate to the fact that whilst most midwives were very aware of their responsibility *for the safety of their patients* and *obligation to provide a safe service*, when it came to their responsibility to report incidents, there was a lack of awareness of their role. This was illustrated where a midwife who said *am I responsible for that as well?*

Discussion

This paper describes the safety culture in a maternity service in NSW, Australia. The safety culture in this setting was based on data from safety culture surveys and interviews.

The small sample size of survey respondents is a limitation. It is not clear how representative the results are of the safety culture in the study setting. It was not possible to undertake complex statistical analysis. Those who responded to the surveys were likely to be the ones with the most motivation and passion about improving the safety culture in this setting or those who had the most negative things to say. The low response rate to the survey may have been due to many reasons including a lack of time, or may indicate a prevailing attitude toward the safety culture.

Recruitment rates varied according to administration method. The highest response rate (albeit n=3) was found when the researcher was able to opportunistically discuss the study and recruit on a one to one basis. The number of participants may have been greater if the researcher had more access to the clinicians . However, the positioning of the researcher as an 'outsider' was thought to have limited the opportunity for promotion and recruitment. It is possible an insider researcher may have had greater success, this highlighting the importance of researcher positioning in this type of research. Recruitment rates were also higher when meetings were organised where staff were specifically given time in the meeting to complete surveys as recommended by survey authors. The success of this method was often limited by competing workloads where meeting times were often cancelled due to clinical workloads or busy meeting agendas.

The results of the survey reflect the views of the respondents who chose to participate in this study and firm conclusions from the measurement of safety culture cannot be drawn from these findings alone. A further limitation is that the study reflected the safety culture at only one time point. Nonetheless, this experience shows that administering safety culture surveys can be challenging and low response rates may occur. Therefore, other ways of engaging with staff about patient safety is critical and surveys need to be augmented with other types of data including interviews and possible, observation.

The safety culture within the maternity service was complex, perceived negatively and influenced by a number of inter-related factors present within and outside the maternity unit clinical setting. This was a service which, on survey measurement alone, indicated it could be improved across all domains including the Safety climate domains. However, low response rates render this result unreliable. The combination of the data arising from interviews corroborated the results of the survey and provided insight why this culture was perceived negatively. Interviews identified a Safety climate domain in

particular that was not responsive to incident management activities, including a lack of feedback to staff regarding reported adverse events. This was influenced by a reduction in infrastructure, capacity and leadership to support incident management activities, in addition to technical difficulties to both enter and generate reports. This resulted in a reduced motivation amongst the midwives to report adverse events. The capacity and infrastructure to be responsive to incident management was also reduced due to the impact of transitional instability resulting from the organisational restructure. The lack of infrastructure and leadership resulted in a perception that a safety culture was not valued by the organisation. This ultimately resulted in the erosion of the previously positive safety culture.

Earlier studies have found that important components of positive safety cultures in heath care include strong leadership and a strong management commitment where safety is a key priority for the organisation (Hindle et al., 2006; NPSA, 2004; Perry, 2002). Leadership and management commitment are considered to be important as their actions and attitudes are thought to influence the perceptions, attitudes and behaviours of staff in the organisation towards safety culture (Flin, 2007). Organisations with positive safety cultures have: staff who are aware that things can go wrong; acknowledge that mistakes occur; and have commitment and an ability to learn and take action to prevent recurrence (NPSA, 2004). An important component of developing a positive safety culture in organisations is the ability to recognise, respond, feedback and learn from adverse events, referred to as 'closing the loop' (Benn et al., 2009; Department of Health UK, 2000; NPSA, 2004). The ability to 'close the loop' is considered to depend on the strength of the safety climate (NPSA, 2004; NSW Department of Health, 2005; Sexton, Helmreich et al., 2006). In this study the Safety climate was not strong and the staff felt they were often unable to 'close the loop'.

The Patient Safety and Clinical Quality Program essentially aimed to develop a positive safety culture in NSW Hospitals. One of the key strategies to achieve this objective was the establishment of a responsive incident management program which would enable the health system to learn from and respond to reports generated from the system (NSW Department of Health, 2005). This study has shown that the objective of developing a positive safety culture with a responsive incident management program had not occurred in this maternity setting.

Conclusion
There is trend in Australia and internationally to measure safety culture in order to develop strategies to identify interventions to improve patient safety (Flin, 2007; Kohn et al., 2001; NPSA, 2004; NSW Department of Health, 2005; Pronovost & Sexton, 2005).

The Safety Attitudes Questionnaire used in this study is designed as a stand-alone tool to measure safety culture. This study was limited by a poor 29% response rate to the survey and the results from the survey alone were unable to measure or identify the safety culture at the study sites. Whilst this study never set out to only measure safety culture via survey, the inability to achieve a desired 60% response rate in this setting highlight limitations of using safety culture surveys in isolation as a strategy to improve safety culture. The use of safety culture surveys alone to measure the study sites' safety culture would not have identified the influence of the factors external to the clinical setting. Safety culture surveys, including the Safety Attitudes Questionnaire used in this study, examine the safety culture at clinical level, but do not capture broader influences such as the impact of policy initiatives. The use of interviews in combination with surveys provided greater insight into the broader factors influencing the safety culture in this setting. Failure to consider broader factors influencing the study site would not have provided an understanding about the resulting safety culture and the barriers to improving this culture to be identified. The use of safety culture surveys as the only method of assessing safety culture is likely to be of limited value in identifying strategies to improve the safety culture. The findings of this study do provide evidence of the benefit of including qualitative methods with quantitative surveys when examining safety culture in the maternity setting. Undertaking research in this way does require local

engagement, commitment and capacity from the local study site to influence recruitment rates and implement intervention strategies. The absence of these factors is likely to which limit the practicality of this approach in the clinical setting.

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Table 1 Summary of factors included in the six safety culture domains

Safety culture domain	Factors included in safety culture domain
Safety Climate	Strength toward:
	- Recognition of error
	- Reporting adverse events
	- Response/management of adverse events
	- Feedback to staff regarding actions
	Leadership commitment to patient safety
Teamwork	Level of teamwork:
	- Quality of collaboration between health professionals
	- Quality of communication between health professionals
	Role
	Experience
	Trust
Job Satisfaction	Staff morale
	Job enjoyment
	Autonomy over work practice
Perception of Management	Management decisions related to:
	- Staffing
	- Equipment
	- Leadership
Stress Recognition	Recognition of the influence of:
	- Fatigue on error
	- Long working hours on error
	- Over confidence on error
Working Conditions	Level of supervision of junior staff
	Training for staff
	Disciplinary policy

Table 2: SAQ open-ended responses for recommendations to improve safety

Safety Domain	100 point score	Recommended responses for improving patient safety
Safety Climate	64	Develop quality management infrastructure for: 1. Review 2. Monitoring 3. Response to incidents Improve incident reporting Improve feedback
Teamwork	70	Undertake simulations Undertake obstetric drills Improve communication Undertake handover teaching Enhancing documentation
Stress Recognition	70	Reduce cycle of night shift Handover when tired Improve staffing to reduce workload Reduce paperwork Reduce computer time
Perception of Management	51	Have adequate equipment Have adequate/ more staffing Improve skill mix
Job Satisfaction	71	Improving staff morale Develop continuity of carer models
Working Conditions	60	Improve supervision of junior medical/midwifery staff Visiting Medical Officer presence onsite Improve orientation/ support processes Ward rounds