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Do the principles and theories of the Safety-II concept help obstetricians work more safely?

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Abbreviations:

CAS	Complex Adaptive System
CPD	Continuing Professional Development
CTG	Cardiotocograph
DHSC	Department of Health and Social Care
HRO	High Reliability Organisation
MDT	Multidisciplinary Team
NHS	National Health Service
NRLS	National Reporting and Learning System
NTS	Non-Technical Skills
PPH	Post-partum Haemorrhage
RCOG	Royal College of Obstetricians and Gynaecologists.
SUI	Serious Untoward Incident
WHO	World Health Organisation

Glossary:

Cognitive Load is the amount of information a person holds and processes within working memory; working memory is the ability to remember and use relevant information whilst in the middle of an activity.

Heedfulness is the trait of staying aware (paying close attention to) of your responsibilities.

High Reliability Organisation is an organisation that has succeeded in avoiding catastrophes in an environment where normal accidents are expected, due to risk factors and complexity.

Non-technical Skills are the cognitive and interpersonal skills that complement practical and technical competencies. Non-technical skills include team working, leadership, situation awareness, decision-making and communication.

Psychological Safety is a shared belief that the team is safe for interpersonal risk taking. Psychological safety is present when colleagues trust and respect each other and feel able – even obligated – to be candid[1].

Reliability is the degree to which the result of a measurement, calculation, or specification can be depended on to be accurate.

Resilience refers to a work systems capacity to adapt to challenges and problems and still deliver safe and high-quality care.[2]

Safety-I is a reactive approach to respond to clinical incidents that have already occurred. It is also characterised by direct causal reasoning. A problem in a process is seen as leading directly to a change in outcomes, which can be measured and quantified[2].

Safety-II relates to the system's ability to succeed under varying conditions. A Safety-II approach assumes that everyday performance variability provides the adaptations that are needed to respond to varying conditions, and hence is the reason why things go right [3].

Situational awareness is the cognitive state of being aware of what is happening around oneself and understanding how evolving events could affect ones goals and objectives.

Transformational Leadership is a leadership style in which leaders encourage, inspire and motivate employees to innovate and create change that will help grow and shape the future success of an organisation.

Workaround is a situation where an employee devises a solution to address a block in workflow.

Work as done consists of the adaptations and adjustments in the daily activities of clinical work to keep people safe.

Work as imagined takes account of the formal task under normal working conditions and disregards the changing conditions of the environment[3].

Abstract:

Aim

Giving birth is one of the most precious miracles in life but also one of the most precarious events. Reducing harm to a mother and her baby during the intrapartum period is a global priority and an unmet clinical need. Thankfully, the majority of women using National Health Services have good outcomes and report a positive experience of care. Things often go well because obstetricians make sensible adjustments and vary their performance in response to the situation to ensure safety, usually within a highly pressurised environment. Understanding what these adaptations and performance variables are under these complex circumstances is not well understood.

By combining the concepts of capability mindfulness, positive deviance and resilience engineering as the principles of safety-II and understanding the 'work as done' by obstetricians and their performance variability, may bring insights to help build adaptive capacities and capabilities when working in unpredictable and unanticipated stressful clinical environments. The research set out to address the question **"Do the principles and theories of the 'Safety-II' concept help obstetricians work more safely?"**

Methods

This study employed a two part mixed methods approach which included an online survey of practising consultant obstetricians and telephone interviews with a smaller cohort of consultant obstetricians. The data was analysed using the inductive thematic analysis technique.

Results

The survey had a response rate of 65% (17/26) and the interviews of 75% (6/8). The results demonstrated that consultant obstetricians are already working in a proactive and safety resilient manner that aligns with the safety-II concepts.

Conclusion

The obstetricians articulated the qualities of constant monitoring of situations, anticipation of risks, responding through preparedness and the importance of learning. These qualities fall within the principles and theories of the safety-II concept and demonstrate that embedding safety-II concepts could help obstetricians work more

safely. The obstetricians expressed the significance of trusting relationships with colleagues that fostered excellence in team working and the ability to be collectively and consciously alert to risks and mitigations. Overall, they expressed excellent leadership attributes and the inherent commitment and passion for the safety of mothers and babies.

Background:

The Landscape of Maternity Care in England:

Maternity services support mostly healthy women and their families through pregnancy and childbirth. The majority of women using the National Health Service (NHS) the main provider of healthcare in England have good outcomes and report a positive experience of care. However, in comparing outcomes to other high-income countries, in England, many babies are stillborn or die soon after birth. Data from the UK National Reporting and Learning System[4] (NRLS) reported that in 2015 there were 134,747 maternity related patient safety incidents and 143,526 in 2016.

A report from the Royal College of Obstetricians and Gynaecologists (RCOG) 'Each Baby Counts project' [5] found that in UK maternity units *"out of 723 251 term babies born in the UK in 2015, a total of 126 term babies died during labour, a further 159 term babies were born alive following labour but died within the first 7 days after birth. There were 854 term babies reported as meeting the severe brain injury definition"* (p26). In 2015-17, 209 women died during or up to six weeks after pregnancy, from causes associated with their pregnancy, among 2,280,451 women giving birth in the UK.[6] The impact is devastating, especially if the outcome could be prevented.

Neonatal and maternal wellbeing is high on the global health agenda, and although relatively safe, it is not consistently safe. In the landmark report by Berwick in 2013[7], 'A promise to learn – a commitment to act' commissioned by the UK Prime Minister to advise on how to improve the safety of patients, it stated that *" the quality of patient care, especially patient safety must be above all other aims"* (p4). This report catalysed the development of safety collaboratives across the NHS to identify and spread safety improvement approaches. The Maternity and Neonatal Safety Improvement Programme aims to improve the safety and outcomes of maternal and neonatal care in England by reducing unwarranted variation, providing a high quality healthcare experience for all women, babies and families and to contribute to the national ambition, of reducing the rates of maternal and neonatal deaths, stillbirths, and brain injuries that occur during or soon after birth, by 50% by 2025[8].

The costs associated with avoidable harm to women and babies renders the maternity health services inefficient and places undue burden on resources through the consequences of brain injury and long term disability, litigation costs and the incalculable cost of the heart-breaking devastation caused to families. Public inquiries into adverse events in maternity care such as the 'Morecambe Bay inquiry' in 2015[9], have recommended and supported that further learning on improving safety in maternity care is essential.

Despite focused efforts to improve the delivery of safe care to patients, progress over the last twenty years globally has been slow. In England, the NHS is committed to achieving a vision of continuously improving patient safety through their recently launched 2019 strategy[10]. The strategy identifies that more knowledge is required on the interplay between normal human behaviour and safety systems.

In July 2020, the UK Parliament Health and Social Care Committee[11] launched a 'call for evidence' for a new inquiry into the safety of maternity care in England. This was borne out of the recurrent failings in maternity care. The inquiry will examine evidence of the on-going issues that plague maternity services despite efforts made to improve outcomes.

Safety in England

The principle approach to patient safety in England is learning from clinical incidents. This focuses on failure such as errors or mistakes, which are graded from near misses to death. Classified as either patient safety incidents, serious incidents or never events, then lead to investigations. This approach is retrospective and emerging terminology refers to this as **safety-I.** This method of analysing incidents has led to critique and has little evidence to support the concept, methods, reliability and outcomes of analysis [12].

Although there can be some learning from past failures, if used with other methods such as human reliability analysis, safety audits and horizon scanning for risks, this may optimise safety performance[12]. This proactive approach to safety is termed as **safety-II**. The purpose of investigations changes to become an understanding of how things usually 'go right' and then looking at why it did not go right at a certain time compared to the normal performance. Safety-II, is a proactive and positive approach

that strengthens clinicians' ability to prevent problems before they occur to ensure high quality care even when there are pressures and competing demands. A safety-II approach also views clinicians (or people) as a resource for system flexibility and resilience. Adapting and responding flexibly to unanticipated problems is a skill and contributes greatly to the high quality and safety of care. Learning from successful outcomes and normal day to day work is a concept termed as safety-II [13].

Statistically[3] more things go right than go wrong. Learning how clinicians enable good care or adapt in unpredictable and stressful environments requires understanding. The concept of safety-II may provide additional insights that can further enhance safety learning.

Introduction:

The Complexity of Maternity Care

Maternity care is delivered in the face of complexity, surprise and variation. Multi professional staff work together to manage women with low or high-risk complex pregnancies and this requires a wide range of skills, knowledge and expertise.

Women are choosing to start their family later in age, there has been a steady increase in the average age of first time mothers from 27.2 years in 1982 to 30.2 years in 2014[8]. *"More than half of women (50.4%) with a recorded BMI at booking in 2016/17 were overweight or obese (up from 47.3% in 2015/16). The proportion of mothers' aged 35 years or older at birth in England and Wales has increased year on year from 19.9% in 2010 to 23.4% in 2018, which continues to be a long term upward trend since the 1970s. The proportion of deliveries complicated by diabetes mellitus has increased from 5% to 8% between 2013-14 and 2018-19. While this increase may be linked to increases in maternal obesity it may also partly be an indication of improved identification and recording of the condition during pregnancy"* [14] (p8).

These trends have seen a higher number of births involving more complex care, which requires risks to be managed and more interventions[8]. Birth can be on a spectrum of normal delivery to a life threatening obstetric emergency that can happen unexpectedly and very quickly.

Avoidable harm to women and babies is firstly a devastating life changing tragedy and secondly extremely costly. Between 2000 and 2010, the cost to the NHS was £3.1 billion [15]. In 2018-2019, obstetric claims represented 10% (1,068) of clinical claims by number, but accounted for 50% of the total value of new claims, £2.4 billion of the total £4.9 billion.[16, 17].

In 2015, the Department of Health and Social Care refreshed the Maternity Safety Strategy[18] to focus on improving the rigour and quality of investigations into incidents along with including measures to facilitate learning to improve safety.

Why Healthcare is a Complex Adaptive System (CAS):

Healthcare had been described as a complex adaptive system[19] and consists of interrelated numerous components that are constantly changing and interacting in response to the environment.

A healthcare system is the organisation of people, institutions and resources that deliver healthcare to populations. The NHS is a set of sub-systems that make up the entire system of healthcare. There is no order in a complex system as there are too many variables, which are constantly changing, so outcomes are also hugely uncertain.

Characteristics of a complex adaptive system are that of emergence (new things coming into existence or not predictable) and non-linear relationships (no cause and effect chain)[20]. Due to this constant change in a system, standardisation through guidelines, protocols etc. are of limited benefit as new conditions emerge and evolve. The people within these systems will constantly adapt to respond to these changes. This is known as **performance variability** (or adaptation) and is an essential factor in this interaction between complex infrastructures and human behaviour[21]. Efforts to acknowledge the existence of performance variability, monitor it and support and amplify it in the right direction (i.e. towards a positive outcome), is known as taking a safety-II approach.

Taking into consideration the dynamic and non-dynamic properties of healthcare and examining the varying characteristics, the variables, the forces and influences across healthcare[22] as well as looking at the patterns in the behaviour of the system and the interconnections, may help to improve healthcare. This is in contrast to looking solely at isolated problems to learn from past errors. Safety-I is not a replacement of safety-II and both must be used together.

Key Components of the Safety Landscape:

What is Safety-I and Safety-II

"Safety-I is defined as 'a state where as few things as possible go wrong'. The safety-I approach presumes that things go wrong because of identifiable failures or malfunctions of specific components [3]*"*(p3) e.g. technology parts, procedures or staff. The principle of safety-I is to eliminate the cause or improve barriers or both. Root cause analysis methods are focussed on this concept and concentrate predominately on the outliers of the system and aim to manage these outliers that have failed [22].

Hollnagel et al in 2014[3] described the safety-II approach to safety management **as the study of how people and systems make sure things go right and can succeed with positive outcomes under varying conditions.** They advocate that the same behaviours and decisions that produce good care can also produce poor care; a variation of the same actions can produce success or error. Hollnagel's view as cited by Woodward [22] is that *"patient safety is more than the absence of risk or incidents but more the ability to perform in a resilient manner"* (p3). Safety-I does not consider the adaptations and performance variability that enable clinicians to work safely, it takes a 'find and fix' approach.

When taking a safety-I approach to errors or clinical incidents; the reality of what every day work looks like is removed. Assumptions or theories are made of what 'should' happen which is far removed from what actually happens. This is termed as **'work as imagined'.** Many policies, guidelines and standards are written by policy makers or managers and are based on 'work as imagined' and staff can be held accountable for not following protocols that are based on notions of what 'should' happen. They may also be impractical, irrelevant and in conflict with other goals and this then creates a disconnect[21]. Because healthcare is constantly evolving and complex, by looking more closely at everyday work and finding out what actually happens, it allows an understanding of what it is, that frontline clinicians do to ensure successful outcomes. This is termed as looking at **'work as done'** and informs us about the nuances, the adjustments, the compromises, the workarounds, the actions and the decision making that is taken to meet the needs of the patients they are caring for. 'Work as done' is a combination of expertise, clinical decisions, experience and tacit knowledge. It is

because clinicians are flexible and can vary their performance that allows the system to function albeit with acceptable or adverse outcomes. As healthcare is intractable (not easily controlled), performance adjustments are vital.

In the Swiss cheese model of accident causation for risk analysis and risk management, Reason[23] coined the terms

- **sharp end -** the point at which a clinician delivers care to a patient or where active failure can happen; where 'work as done' happens.

- **blunt end** - the latent features, things that lie dormant but contribute to an incident/accident; where 'work as imagined' takes place.

'Work as done' is always different from 'work as imagined'. Safety-I focuses only on what happens at the sharp end and common terms such as 'human error' are used. A safety-II approach will look at what happens at both the sharp and blunt end examining the system and organisational contributors as well as the human influences to understand why adverse events happen and how safety can be managed proactively for the future. Safety-II acknowledges that 'work as done' is different from 'work as imagined', and concludes that to understand the difference, 'work as done' must be studied[21].

Resilience Engineering

Despite the fact that healthcare is complex, intractable and uncertain the majority of things go right more often than wrong[21]. By beginning to understand how to achieve acceptable outcomes in complex conditions, further insights on how adverse or unwanted outcomes happen may be gained. This is known as resilience engineering.

Resilience engineering is a promising perspective on safety within a CAS that tries to highlight and understand the nature of adaptations that occur in complex clinical environments and how learning from these successful outcomes can be translated into building capacity for adaptation within teams and organisations. It can be defined as *"the ability of the health care system to adjust its functioning prior to, during or following*

events, changes, disturbances and opportunities and thereby sustain required operations under both expected and unexpected conditions" [24] (p2).

Woodward [20] describes four areas that can help embed resilience into a system. These are:

- anticipation- knowing what to expect, this involves thinking ahead and envisioning problems and being prepared.
- monitoring- knowing what to look for.
- responding- knowing what to do in a robust and flexible way.
- learning- knowing what happened, in success and failure and harnessing the learning to influence future functioning.

Because healthcare is intractable, clinicians are relied upon to adjust to the situations (emergency cases, staff shortages, high patient numbers etc.) to create safe outcomes as well as recover from unexpected events. Reliability is a necessary requirement of safety and is concerned with the likelihood of occurrence of failure[25]. Clinicians are vital to creating high reliability and a resilient system.

High reliability relies on leadership qualities and professional teamwork. All team members will be pivotal in detecting and monitoring concerns, bringing this to the attention of their team, adapting their performance and communicating this to everyone involved. This approach of flexibility and resilience in a dynamic and well-co-ordinated cohesive team will enhance collective decision-making[26]. A central feature of high reliability organising is the appreciation that each individual plays a part in the broader system of activity, and has a shared understanding and heedfulness towards the actions of others.[15]

Positive Deviance

Under the umbrella of Safety-II is 'positive deviance' which is the study of the behaviour of exemplary individuals, teams and organisations[27]. This approach identifies the 'positive deviants' in organisations that consistently perform outstandingly well and then examines this closely by undertaking an in-depth study (known as ethnography) of the practices in the organisation. Lawton et al [28] proposed this as an approach to achieve

safer care in a complex adaptive system on the grounds that the key to solutions for issues or concerns lies within the clinical community themselves and is far removed from external managers and political advocates. This is due to the tacit knowledge and wisdom generated within these clinical communities and is better accepted and increases the likelihood of adoption elsewhere.

Capability Mindfulness

Another similar perspective that focuses on the context i.e. the particular environments such as organisational processes and structures, human behaviours, practices and values that all contribute to safety, is an approach that is used by high reliability organisations (HRO) (such as aircraft carriers, nuclear power plants). In this approach they successfully manage the unexpected, by discovering and correcting errors before they escalate into unwanted outcomes[29]. By fostering a collective mind-set of awareness and alertness, HRO's work to anticipate, detect, manage and recover from unexpected events.
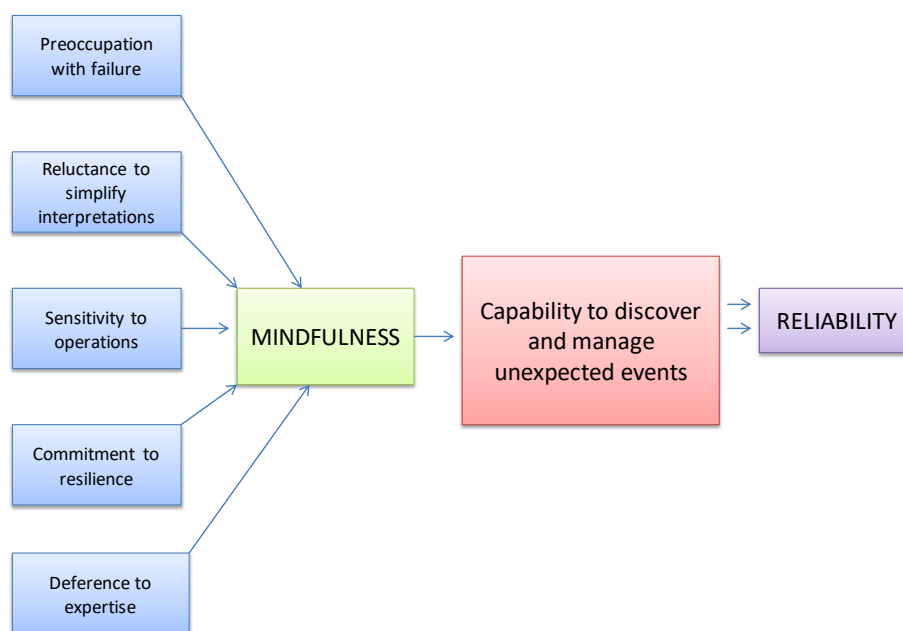
Figure 1: A mindful infrastructure for reliability[29]

(Adapted by Weick and Sutcliffe 2001)

Figure one, depicts the interrelation of cognitive processes in detecting errors. When focus is placed on these five concerns, it brings together their joint capability to encourage a high awareness of discriminatory detail and capacity for action.

The components[29] of mindful organising are

- **Preoccupation with failure**- this is practising with a constant suspicion of failure and discussing potential threats to reliability. Failure is a precondition to learning; learning can be converted into improvement. Analysing failure also provides a window into the health of a system.
- **Reluctance to simplify interpretations**- constant tending to procedures to mitigate complacency and rigidity and taking purposeful steps to question assumptions and consider reliable alternatives. It reduces the likelihood of eventual surprises.
- **Sensitivity to operations**- this is having shared mental representations and assessing situations with continual updates through collective story building. It is also having an awareness of how this contributes to the bigger picture.
- **Commitment to resilience**- enhancing capabilities to rapidly identify, contain and learn from unexpected events. It entails paying attention to error prevention and prepares for inevitable surprises. This commitment also adds to the repertoire of action capability from learning.
- **Deference to expertise** - loosening of the hierarchical access structures and linking experts with problems, solutions and decision making in the moment.

These components create capability mindfulness and for the unexpected situations, it means enacting these processes routinely to increase alertness and awareness and to create capabilities to cope[30]. *"It is the high awareness for these distinctive concerns of HROs with potentials for catastrophe that facilitates the construction, discovery, and correction of unexpected events"* [29] (p37).

In order for capability mindfulness to work, it also requires

- Respectful interaction- trust, trustworthiness and self- respect between colleagues.
- Heedful interrelations- colleagues do their best to reach the organisational goal and understand their part in the bigger picture.

Weick and Sutcliffe[29] describe this collective state of mindfulness as *"the combination of stable cognitive processes and variations in action patterns, enables the more successful high reliability organisations to manage unexpected events effectively. Mindfulness is less about decision-making and accident prevention, and more about inquiry and interpretation **grounded in capabilities for action.** Furthermore, mindfulness is not activated solely by novelty, but rather is a persistent mindset that admits the possibility that any "familiar" event is known imperfectly and is capable of novelty. This ongoing wariness is expressed in active, continuous revisiting and revision of assumptions, rather than in hesitant action.[29]"* (p38)

Maternity and Safety-II

Within maternity care, obstetric clinical work is hugely complex; it requires technical skills, [non-technical skills](#), interpersonal skills and a high level of professional judgement to ensure that the care is appropriate, effective, safe and timely for pregnant women.

A recent ethnography study[31] in one UK maternity unit, found various mechanisms within the unit that promoted safety. These included the collective competence of the team. *"Collective competence cannot be broken down into the sum of individual competencies, but instead conforms to three normative principles: making collective sense of events in the workplace, developing a sense of interdependency, and developing and using a collective knowledge base"* [31](p66). Several factors contributed to this, which were an understanding of each other's roles and responsibilities, confidence in each other's technical skills and a strong sense of cohesion and belongingness that identified with the unit's values.

When things go right, they go unnoticed especially because clinicians' actions are tacit or habitualised. Habituation is a form of behaviour that is described as non- associative learning[21], and when the behaviour is ignored because it happens too frequently, it becomes partially invisible, so it is very rarely examined and receives little attention[31].

Successful outcomes also go unnoticed, which can have a detrimental effect as it decreases vigilance and increases the tendency for complacency and inaction [32].

Things often go well because obstetricians make sensible adjustments in response to the situations to ensure safety, often within a highly pressurised environment. Understanding what these adaptations and performance variables are under these complex circumstances is not well understood. Combining the concepts of capability mindfulness, positive deviance and resilience engineering as the principles of safety-II and understanding the 'work as done' and the performance variability of obstetricians' (that results in good or successful outcomes), may bring insights that can be used to help build adaptive capacities and capabilities in obstetricians when working in unpredictable and unanticipated stressful clinical environments.

Research question:

Do the principles and theories of the Safety-II concept help obstetricians work more safely?

Methods

Aims

The research is to determine if the concepts of Safety-II can help obstetricians work safer. Things often go well because obstetricians make sensible adjustments and vary their performance in response to the situation to ensure safety. Understanding what these adaptations and performance variables are under these complex circumstances is not well understood.

Ethical approval

Ethical implications of this research were reviewed and approved by the Head of Department (Imperial College) and the Joint Research Compliance Office. The proposal was not required to go to the full ethics committee (please see appendix 1 for letter for approval).

Study design

This study employed a two part mixed methods approach. This included an online survey of practising consultant obstetricians and telephone interviews with a smaller cohort of consultant obstetricians. This methodology was chosen over a case study, which would have only considered a small cohort of obstetricians in a single organisation. An ethnography[33] study, (which is the visual observations of behaviours, social interactions and perceptions that occur within teams) was also considered but was deemed to be impractical and unrealistic due to the ethical considerations of consent, as well as time factors.

Participants

The obstetricians (participants) details were on a database (Invited Reviews Database) held by the RCOG and permission was granted to use the database. (Please see appendix 2). The obstetricians on the database served as reviewers on behalf of the RCOG to undertake reviews of UK maternity services. The participants were purposively selected as they had prior contact with the researcher and had consented to being contacted for research purposes. It enabled the researcher to build up a

sample group to satisfy specific needs in the project. In this case, the research was to test knowledge of the theory and use of safety-II. A representative sample was not required for its own sake nor was the need to do random sampling from a known population to achieve statistical generalisability. Purposive sampling enabled the researcher to gain information that helped generate conceptual categories within a grounded theory methodology. Grounded theory[34] allows a theory to be generated from the data and the participants help to formulate the theory.

Consent

Participation in the survey was voluntary. Participants were informed that responses would be anonymised to facilitate honest responses. It was explicit in the invitation email that consent was implied by completion of the survey. The invitation email also included the participant information sheet, which had the contact details of the researcher. (Please see appendix 3 for the invitation email and appendix 4 for the participant information sheet). Personal information was not collected to preserve participant anonymity. This also helped to promote reliability. No incentives were offered to the participants.

Participation in the telephone interviews included an invitation email and the participant information sheet sent to eight obstetricians. Six obstetricians were interviewed. One had moved out of the country and one did not respond to the invitation. For those willing to participate a consent form was later sent. (The consent form can be found in appendix 5). All participants completed the consent form prior to the interview taking place. The participants were informed that the interview would be recorded and verbal consent was again confirmed at the beginning of the interview. This was a purposive sample selection, and the researcher had already developed a professional working relationship with them.

Inclusion and Exclusion Criteria

All UK practising consultant obstetricians registered on the RCOG Invited Reviews database that had given prior consent to being contacted for research purposes were invited to participate. Those that had not given consent were excluded. As obstetrics and gynaecology is a combined speciality that is taught together, usually doctors will

choose to specialise in one, not all consultant doctors practice both obstetrics and gynaecology. Only those that actively work as an obstetrician met the inclusion criteria.

Pilot Phase:

The survey questions were developed by the researcher and uploaded to an electronic survey platform called Qualtrics. The survey was piloted and feedback was sought from three other obstetricians. Changes were made in light of the feedback, which included having less open-ended questions and avoiding ranking of a large numbers of options. Some of the open-ended survey questions were transferred to the interview questions, so that a deeper understanding and probing of the topics could be ascertained. Pretesting of the survey tool was undertaken with four non-obstetricians and three obstetricians to test ease of use, flow, usability and understanding of the tool.

The telephone interview questions were piloted with three obstetricians and feedback was incorporated into the final interview protocol. (Please see appendix 6).

Methodology:

Using the COREQ[35] checklist as best practice for reporting qualitative studies, the interviews were conducted over the phone by the researcher, an MSc student, who currently also works as a manager at the RCOG. The participants have a current professional relationship with the researcher, which may cause a bias towards supporting the researcher with her studies. The participants also have a high interest in maternity safety, being responsible for the overall safety of their maternity unit.

The methodological approach to this study was through content analysis and using a purposive sample selection. The findings will be shared with all the participants. Each participant had given consent for quotes to be used in a non-attributable manner. There was consistency between the data presented and the findings and the major and minor themes have been discussed in the results section.

Qualitative Phase:

Interviews with six consultant obstetricians who had been in senior clinical leadership roles for ten years or more were undertaken. There was 50% gender mix of three male and three female obstetricians. Interviews were selected as they provided a depth of narrative and an opportunity to explore the different components of safety and resilience. One week prior to the interview, each participant was asked to think and reflect on a scenario of an unanticipated high-risk case that resulted in a good or satisfactory outcome (no adverse event or serious incident). As the questions were based on finding out about the obstetrician's performance in high risk unanticipated scenarios, the context was very important to help draw out the nuances of the situation as well as their performance, when trying to ensure safety for the mother and her baby.

One to one telephone interviews were scheduled for 45 minutes and ranged from between 25 - 35 minutes each. The interviews were recorded using a digital recorder and transcribed by the researcher. The interview transcripts were not returned to the participants for accuracy checking.

The researcher coded the data. Themes were identified from the data and not pre-identified in advance. Software packages were not used. The data was analysed using the inductive thematic analysis[36] technique. This is a six-staged process, which involves familiarity with the data, generating initial codes, looking for themes, reviewing the themes, defining the themes and then naming the themes. A manifest analysis of the coded data was performed using the content analysis technique. An example is shown below.

Data Extract	Initial Codes	Sub Themes	Overall Theme
"I think it was having the willingness to step in and take that level of responsibility in that situation. And I think it was also familiarity with the team and communication with the team, and drawing in the expertise of cardiologists and the anaesthetist so that we did have a cohesive joined up plan that we'd all agreed on and we'd communicated out to everyone."	Take responsibility	Leadership	Non-Technical Skills
	Familiarity with the team	Team working	
	Communication with team.	Communication	
	Expertise of cardiologist and anaesthetist	Joint decision making	
"To me it about staying calm, understanding what the whole situation is, I think it's about gaining the trust of the woman and the staff, gaining the trust of the staff is much easier if it's a team that you know."	Staying calm	Reducing cognitive load	Intentional approach to safety.
	Helicopter view of situation	Monitoring	Resilience Engineering
	Trust of woman	Trust	Leadership Quality

Quantitative Phase

The survey was sent to 26 consultant level obstetricians that resided in the UK, in the form of an invitation email containing a link to the survey, alongside a participant information sheet with explicit guidance that responding to the survey was a proxy for providing consent to participate.

The survey contained 23 questions, divided into sections. (Please see appendix 7 for survey questions). Participants responded to a series of open and closed questions. The survey asked the following:

- demographic data
- an understanding of their knowledge of safety-I and safety-II
- an understating of what their daily work looks like, details about their 'work as done' to maintain safety in complex scenarios
- aspects such as contributing factors to safety, behaviours and decision making
- learning outcomes and sharing learning
- organisational and unit level influences on safety
- self-perceived resilience qualities
- joy at work

The survey remained open for five weeks and a single email reminder was sent three weeks after the initial invitation along with the link to the electronic survey. No further participant follow-up was undertaken.

Results:

Findings from Interviews:

Six consultant obstetricians' were interviewed and asked the same set of questions. The tables below are the consolidated findings from each question.

1. What do you understand by the term safety-II?

What do you understand by the term safety-II	It is a systemic way of looking at things. People are assets and will work around (vary their performance) to ensure safety. It is a holistic approach to safety management. Good practice makes good outcomes and we need to learn from this. Looking at things that go right, what people have done and promoting collaborative behaviours. Learning from good things that have gone well. Where things go right, rather than wrong, scenarios where things go well. Looking at what works in standardised systems. Reduce variation in systems.
Areas of confusion	We learn from things and mitigate to try to reduce things going wrong.

<u>Table 1: The obstetricians understanding of safety-II.</u>

All but one of the consultants interviewed had a basic understating of safety-II. This could have resulted from acquisition bias from the participant information sheet or that all the consultants interviewed had been in senior leadership roles and already had knowledge in safety concepts due to the high-risk nature of their work. There is some minor confusion between the current approach to safety management (safety-I) but overall the descriptions of safety-II were accurate.

"People are assets and will work around (vary their performance) to ensure safety,"

"Looking at things that go right, what people have done and promoting collaborative behaviours."

2. Why do you think that currently 'patient safety' is still a concern for maternity professionals in the UK?

The consultants drew upon their roles and responsibilities to ascertain their perspectives of why maternity safety was still an issue.

Obstetrics is a risky profession.	Safety incidents will always happen- we cannot achieve perfection. Obstetrics is a high risk, highly pressured specialty and things do not always go right. Preventable problems will continue to occur. The speed of deterioration is so fast in adverse events. The system is not prepared to react efficiently to emergencies. Acuity (business of unit) and not enough staff, lack of staff resources will dilute team effectiveness and increase risk.
Influenced by other factors.	The media has a strong influence. Fundamental issue with obstetric leadership. The diversity of women is changing and we need to understand this better. Access to care, inefficient risk stratification, socioeconomic status and cultural characteristics need to be better understood. Care pathways need to adapt to different cultural characteristics.
Measure of safety not well defined.	Safety is measured by rare events in maternity, e.g. maternal deaths, this is low and rare, and so improvements on these rates have stayed the same.

Table 2: The obstetricians' perceptions of why maternity safety is still a concern.

It is evident from the interviews that the obstetricians themselves see maternity as a high-risk profession; NHS Resolution (NHS body undertaking litigation claims) has also evidenced this.[16] By nature, emergencies are rare and surprising events. Obstetricians must manage the unstable, highly pressurised situation to maintain safety, but also not only is the system unprepared, the resources are not always in place, especially if the maternity unit is busy or there are not enough staff with the right skill set and this increases risk.

The obstetricians are also aware of the changing demographics of the population; the diversity of cultures and that socio- economic status all have an impact on mothers accessing care early on in pregnancy when risks can be identified earlier. The risk profile[14] of a woman can also change very rapidly and systems to support risk stratification may be helpful but are not available.

3. What are your ideas of how we can tackle working safely as a maternity profession?

Improve clinical competence and non-technical skills	Ensuring individual competence, training, knowledge and skills are up to date. Individual expertise in having the insight and confidence to follow unwritten rules. More positive feedback and positive reinforcement is needed and less criticism. Need to embrace the human factors side of education more. Voicing concerns in an appropriate way.
Share best practice wider	What works well in good maternity units is not replicated. Expansion of consultant presence on labour wards. Using the 'old fashioned adage' of expertise of hands and minds. Remembering to disseminate changes in practice, especially when staff rotate.
Improve accessibility	Ability to access care in a timely manner. Hard to reach women are more at risk with social problems.
Assess risk better	Use of electronic patient management system, using a standardised approach to map a woman's journey and identify risk rather than relying on human ability. Analysing identification of risk, good decision making and then supporting caregivers to provide appropriate and individualised care. Reviewing incidents and making changes happen.
Identify system issues	The design of processes. Staffing issues need to be addressed. The environment is not open and transparent, people do not challenge you, and people have stopped engaging. Automations can be helpful, but not to be used as a tick box exercise.

Table 3: Ideas to improve safety in maternity care.

The obstetricians perceived that maternity safety could be improved and put forward many ideas. One obstetrician believed that the presence of the most senior expertise should be available at all times, which was previously recommended by the RCOG[37] but is now outdated practice[38]. As well as clinical competence, the obstetricians highlighted following unwritten rules as something they would do to maintain safety

based on their tacit knowledge and clinical experience in responding to an unpredictable emergent event. This is taking a proactive approach to safety.

Half of the obstetricians recognise that sharing best practice and replicating a safe maternity unit, although complex due to the multiple interrelated aspects and contexts could be plausible. Replication of a safe maternity unit could begin with the positive deviance approach as shown by Lawton et al [28]. Each unit within a hospital will have unique organisational structures and processes that may or may not facilitate best practice.

One obstetrician discussed the value of risk stratification using algorithms or tools and assessing women's risk status, as a method to stratify their risk and use standardised decision-making tools as an automated way to prevent incorrect classification of risk. This supports the literature on capability mindfulness [29] in harnessing resilience, proactive risk identification and mitigation alongside having an ongoing and constant awareness to detect risk or errors and mitigate them before they become unwanted outcomes.

4. Can you on reflect on any recent, unanticipated high-risk case that you were involved in, that resulted in a good/satisfactory outcome for a mother and her baby. Please could you describe the scenario briefly? Thinking specifically about the things that you did that went well in this scenario.

The purpose of this question was to understand in detail **what they did well,** in the case they presented and **what averted the failures,** alongside **how they coped and adapted** to the unexpected and emergent, how they created order from disorder and **how they varied their performance**. This is the premise of the safety-II concept.

Table 4 below shows the themes, sub themes and coding that were derived from the data extracts from the narrative from each obstetrician. The data was analysed using the inductive thematic analysis[36] technique.

THEME	SUB-THEME	CODING
Non - Technical Skills		
	Decision Making	Joint decision making/collaboration with team. Having the confidence and being in the role to undertake decision-making. Agreeing decisions with colleagues as care plans change. Seeking support for decision-making.
	Communication	Communication with colleagues from different specialities. On-going dialogue with staff. Constant communication with staff and women. Informing and updating staff with women's progress/care plans.
	Team Working	Familiarity with team. Strong team collaboration. Team approach- draw in additional expertise. Good relationships with colleagues from within and outside specialty. Delegating tasks.

		Problem solving together.
		Team cohesion.
		Organisation of care with team.
		Supportive team colleagues.
	Leadership	Being a leader to give direction.
		All having common goals.
		Can delegate effectively so can focus on own task.
		Insight into own limitations.
		People management- having a flat structure.
		Openness to constructive challenge.
		Bringing team together.
		Role modelling professional behaviours.
		Mentoring colleagues to constructively challenge.
		Going over and above what is required.
		Using supportive body language.
		Taking responsibility for women.
		Willingness to step in.
	Situational Awareness	Calm environment for good concentration- reducing distractions and interruptions
		No loud voices (asked to leave)
		Quietness
		Flow
		Moving things slowly without panic
		Staying calm
		Reducing cognitive load
Resilience Engineering		
	Responding	Acting immediately.
		Decision making with colleagues as woman's condition changes.
	Monitoring	Understanding the whole situation.
		Constant monitoring for deterioration of woman's condition.
		Having a plan 'B'
		Revision of care plans if needed.
		Forward thinking.
		Time outs and safety huddles (human factors approach).

	Learning	Emphasis on giving feedback to colleagues.
		Pulling team together to discuss.
		Inclusiveness of all around.
		Recognition that:
		Not always good at sharing
		No promotion of wider learning
		Staff come together to discuss incidents only
Leadership Qualities		
	Appreciation	Email compliments.
		Knowledge that should thank and appreciate more.
		Give positive feedback – people need to understand their part in it.
		Recognition that:
		Time does not allow this.
		Not good at appreciating people.
		Not good at saying 'we did things well'.
	Trust	Can act as a driver.
		Earned respect of the team for opinions.
		Implicit trust with colleagues.
		Mutual trust for making decisions and trust in colleague's decision-making.
		Support for one another.
		Trust building between doctor and woman.
		Taking own personal risks.
	Visibility	Being physically present.
		Being approachable.
		Invitation /permission granted to be called at any time.
		Accessible to the team.
		Can call in middle of the night.
		Following up on women that are not their own (for learning and to provide support).
Competence		
	Clinical Knowledge	Skill set- clinical and visual signs of the woman.
		Clinically competent.

		Takes immediate action.
		Knowledge of the condition.
		Recognition of the issue.
		Tacit knowledge.
		Regular training of emergency scenarios and debriefing.
		Use of tools such as checklists.
	Professional Behaviours	Raising concerns in a professional manner.
		Challenges in correct manner if needed for alternative care plan.
		Having difficult conversations.
		Practising human factors approach to safety (e.g. time outs).
	Collective competence/interdependency	Knowledge of colleague's skill set and limitations.
		Knowing when to ask for help and asking for it.
		Working with a familiar team.
		Knows how to escalate and to whom.
Shared goal and vision		
	Shared goal of safety and wellbeing of women	Building rapport and trust with woman and family.
		Constant information sharing with women.
		Agreement of change in care plans with woman and family.
		Taking time to communicate to woman and family.
		Communication to staff about the woman's condition and care plan.
		Support to woman and family.
		Best interests of women.
		Taking responsibility for the woman.

Table 4: Themes from the data extracts

The findings from this question have been themed in the following five categories:

a. Non-Technical Skills (NTS)

All of the obstetricians demonstrated all of the attributes of NTS, in particularly working with a familiar team and joint decision making with colleagues about the plan of care. They demonstrated interrelatedness and reliance on one another but with role boundaries and a clear leader. This concept supports the findings articulated in an ethnography study [31] as collective competence. Each obstetrician supported this cooperation and reciprocal arrangement. These skills have the potential to enhance high levels of safety performance in healthcare[39].

"Being able to reach out to other team members to support and discuss and agree decisions"

"Willingness to step in, make the difficult decisions and take that level responsibility"

All of the obstetricians mentioned having a calm environment with quietness and being able to minimise distractions and interruptions to reduce their cognitive load during a stressful situation.

"Just being there as a leader keeping everyone calm and moving things smoothly without panic"

"I quietened down the room to reduce the chaos, to allow time to think about what I was doing"

b. Resilience engineering

All of the obstetricians described concepts of resilience. These encompassed how well they anticipated and responded to changes in a situation, ensuring the right staff were available, keeping a watchful eye for deterioration of the woman's condition, making collective decisions, revising care plans and taking time to regroup to discuss and update their team and the woman about the situation. They also recognised the importance of sharing the learning from good outcomes, but were not good at this in

practice. To be a resilient system and learn following an unexpected event, is using the ability to learn from what went well and adjust this for future performance[21].

"Knowing which staff are needed"

"Constant monitoring for any changes and the revision of care plans as required"

c. Leadership Qualities

The leadership qualities raised most commonly were appreciation, trust and being visible. Appreciating colleagues by saying 'thank you' and giving positive feedback. All of the obstetricians spoke of being accessible, visible and approachable to their staff. They spoke of mutual trust as being a driver for good relationships, social cohesion, earning respect and supporting one another[40].

"Being approachable and accessible, being called in the middle of the night"

"Trust in colleague's decision making and clinical skills"

"Good teamwork as we are accustomed to working together and have implicit trust with my colleagues".

d. Competence

The obstetricians discussed their own competence, clinical knowledge and tacit knowledge, the importance of being aware of the knowledge and skill set of their colleagues and their limitations, as well as professional behaviours and interactions with their colleagues in an emergency. Having the competence to escalate an issue to the correct person within or out with their immediate team and knowing when to ask for help in the right manner was also raised. This supports the findings of previous literature that in an emergency there is a team acceptance that, rather than deferring to organisational or professional hierarchies, instead the person with the most relevant expertise would lead the situation. This deference to expertise is a component of capability mindfulness[29].

"Being the senior consultant helped, drew on tacit knowledge and past experience"

"Knowing when to ask for help and asking for it"

"Drawing in expertise of colleagues (cardiologist and anaesthetist)"

e. Shared goals and vision.

All of the obstetricians clearly articulated an explicit goal that was shared by all of their team members of *'the safety and wellbeing of the woman'*. This was demonstrated in strategies for building trust with women and their families, sharing the care plans, open and honest communications, providing support and taking responsibility and actions that were in the best interests of the woman and her baby. This also supports the literature on heedful interrelations by Weick and Roberts as cited by Callari et al [30] in having an understanding of the bigger picture and the end goal.

"Taking responsibility for the women"

"Perception of a common goal"

"Spent time telling the team about the woman".

Findings from the Survey

There was a 65% response rate to the survey. Of those that completed the survey, ten were male and seven were female. Most of the consultants were based in England, apart from two that were from Scotland. Most of the consultants (94%) had been at a consultant level for over 11 years or more, with 76% of them having 16 years or more experience.

The survey guided them through a series of questions, some required comments and others required a selection from specified options. The results are displayed as graphical representations or for open text comments grouped under headings of similarity.

The first section considers their overall views on safety.

What do you understand by the current approach to safety, termed as safety-I?

Terminology is unclear	Not sure of this classification
	Not familiar with this categorisation
	I am unfamiliar with this term
	I don't understand the term
	I was entirely unfamiliar with this concept until I read the information sheet.
	It is traditional.
An investigating Method	Public discussion of adverse outcomes and near misses to promote learning and continuing improvement.
	Using incidents and near misses to identify system weakness and apply system remedy. Using appropriate training, supervision and regular skills training to ensure the right skills are available for each clinical scenario.
	An approach looking to learn lessons from what went wrong.
	Presupposes that things go wrong for an identifiable reason (equipment/people). We respond when there has been a problem.
	Focus on errors, low frequency event, seeing people as error prone in a human factors context and generally adding layers of 'safety' into systems.
	Analysis of poor outcomes.
Aim is to reduce harm	As few things as possible go wrong and it is assumed that things go wrong due to failures in the system.
	Ensuring that patients and staff do not come to harm.
	Take all measures possible to ensure safety - good initial training - ongoing CPD - multidisciplinary training - audit of practice - WHO checklist - etc.
	Co-ordinated approach to combine all current safety initiatives under one umbrella heading.
	Protection from harm

Table 5: The obstetricians' understanding of Safety-I

Although obstetricians do undertake serious incident investigations, the terminology of safety-I and safety-II is unfamiliar to some of them. 63% who had heard of this terminology were able to accurately describe some aspect of the meaning of safety-I such as it being an investigating method and reducing harm.

"An approach looking to learn lessons from what went wrong"

The obstetricians were asked if they had heard about the emerging approach to safety, termed safety-II prior to receiving the survey.

24% responded to this question with a 'yes' and described their understanding accurately as

- focussing on what makes things go well particularly at the people level.
- presupposes that things go right most of the time, and the people within the system adapt to maintain the 'right'
- it is more about what works, than what fails.
- analysis of the structures underpinning good outcomes (positive deviance).

Interestingly from the responses regarding their understanding of safety-I, highlighted in red in table 5, are some descriptions of systems and processes, which could demonstrate the realisation that 'human error' is not always the cause of incidents and although unfamiliar with proactive safety terminology, some understanding of safety-II concepts are present.

Section 1: The purpose of this three-part question was to try to ascertain their **work as done, any workarounds they may undertake and those workarounds that have now become routine to how they practice clinically to ensure safety.** The obstetricians were asked:

1a. Reflecting on your everyday clinical work in caring for a mother and her baby with an aim of having a good or satisfactory outcome, what do you do well to meet the demands of unanticipated high-risk cases. They were asked to rate certain activities and how often they undertook these to ensure safe outcomes. Please see figure 2.

What do you do well in everyday clinical practice to ensure a good outcome
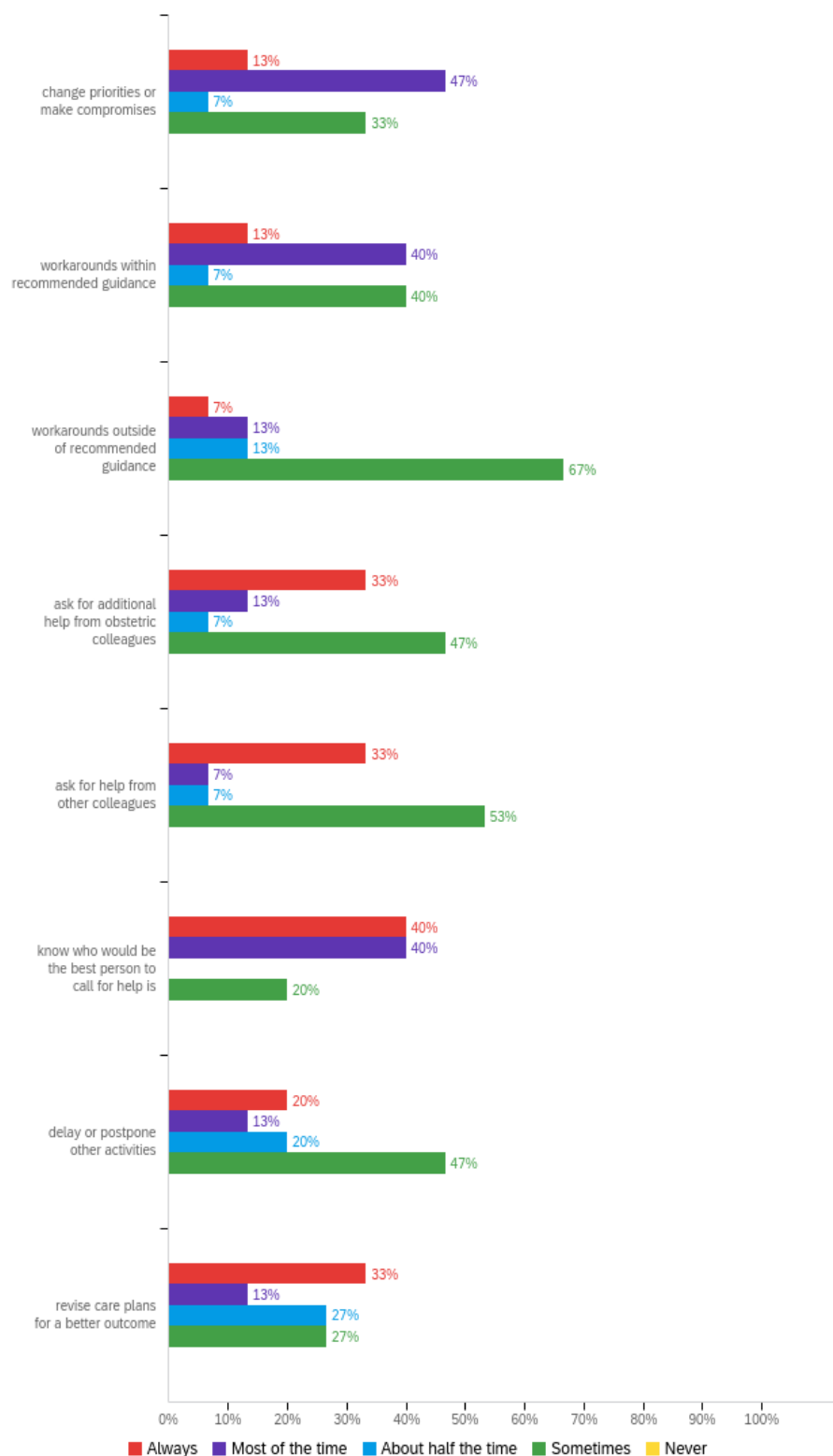
Figure 2: Frequency of activities undertaken to ensure safe outcomes

The findings from figure 2 showed that 47% will change priorities or make compromises and 40% will undergo workarounds (within guidance) **most of the time** to ensure a safe outcome. 67% would **sometimes** undertake workarounds outside of guidance. 33% would **always** ask for help from colleagues (obstetric or other colleagues). 40% would **always** know who would be the best person to call for help to. Looking at all of the listed activities, all the obstetricians would undertake some form of the activities listed as none of them selected 'never' as an option.

1b. Can you think of any specific workarounds that have become part of your everyday routine:

None - no self-recognition of workarounds/performance variability. (53%)	Over half of the consultants (53%) wrote no / none for this question.
Re-prioritising care	Triaging priorities for theatre or obstetric intervention when more than one woman needs this at once. Prioritising women undergoing induction of labour when labour ward is too busy to take each woman, as she is ready. If labour ward is busy, splitting the ward round team to ensure all women are seen in a timely manner and to allow priorities to be reassessed.
Flexibility of planned care	When a high-risk woman needs a planned caesarean at an unexpected time it may be best for the anaesthetist to see them first to keep the obstetric team free for other women if required. Transfer of a woman from a local birthing centre in second stage is a high risk unanticipated situation and I will try to be a part of the handover from the transferring midwife to ensure I have first-hand information about events to date. So the ward round can flex. The junior tier can be deployed for tasks during the ward round but the core doctors continue and then we all meet around the board as a huddle to update. This addresses urgent issues, keep things going to create flow, and provides support for the team. Review the team structure and workload and decide if other team members have the skill to undertake a review that I would ideally perform in person.
Professional informal agreements.	Always have a second colleague available on-call for advice and discussion. They will attend for extreme decisions/situations e.g. post-partum hysterectomy. This is an informal agreement between professional colleagues, not a Trust initiative.
Guideline adaptation with justification	Workarounds re guidance- require justification but again one of the things we try to foster is the ability to improvise (with justification) because guidance usually pertains to one issue when there are more than one, and some can conflict.

Table 6: Workarounds part of obstetrician's daily routine.

Over half of the obstetricians (53%) stated that they did not recognise any workarounds as part of their daily activity. Because of the potential changing risk status of a pregnant woman, performance variability and adaptation by the obstetrician is key to ensure safety. These adjustments are purposive and recognised by the obstetricians, but because they are performed so often they have become 'mundane', automatic or habitualised and do not necessarily trigger any attention or invite any further analysis [41]. This may be why over half of the obstetricians did not recognise anything further as 'workarounds' to ensure safety.

1c. Is there was anything you would do to make the situations safe.

Ensure effective teamwork	Frequently a team approach is best for the women (s) you are managing; however there are times when one needs to be didactic to ensure things are done quickly and safely. Excellent working relationship with local tertiary centre, always available for advice or discussion, transfer if needed where clinically appropriate. This is a region wide arrangement. The North East has always had a collective approach to ensuring safe care. Start from scratch, challenge assumptions, and engage team members.
Prioritise care	On labour ward sometimes, it is necessary to deliver one woman early (e.g. forceps) to ensure staff or facilities are available when another woman is likely to need them. This form of prioritisation is common on a well-run and safe delivery suite.
Ensure effective handovers and communication	Adequate handovers between team members. Clear communication. Talk to my team. Ensure accurate information is shared and if the situation changes be available to understand what has changed.
Escalate when needed	Escalate to colleagues when activity is high or complex - we have another consultant available if activity is beyond what can be safely managed and will postpone elective work if necessary to support an extreme emergency. Open culture so staff can seek help at any time and can question what is unusual.
Monitor for changing scenarios and mitigate risks	Stop and re-evaluate. Speak to other team members to get their opinion. Consider a safety huddle. Maximise preparation. MDT meetings before any difficult surgery. Adequate senior assistance and back up. Constant reflection. I always try to keep a log of the time when I am told about something unexpected to ensure that I am able to track progress is occurring e.g. with an assisted delivery or a bleeding woman - otherwise things can evolve slowly into more serious situations.
Ensure adequate resources	Address staffing shortages

Table 7: Additional activities undertaken to make a situation safe.

20% of the obstetricians replied that they would do nothing further to make the situation safe. Of particular note one obstetrician mentioned they would challenge assumptions and engage team members and another mentioned constant reflection. These are both components of capability mindfulness.[30]

Overall the responses to this three-part question correlated well with the findings from the interviews. These include ensuring effective team working (NTS), prioritising care, communication through effective handovers, escalating concerns (leadership qualities), monitoring for changing scenarios and trying to mitigate them (resilience engineering) and having an intentional approach to safety through ensuring adequate resources are in place.

Section 2: The purpose of this two-part question was to try to understand the factors that can impede their 'work as done'.

2a. The obstetricians were asked to rate which conditions or contributory factors can affect their decision making and actions when managing an unanticipated high-risk case.

This is depicted in the figure below.

Contributory Factors: Affect 0= no Affect, 10= most affect
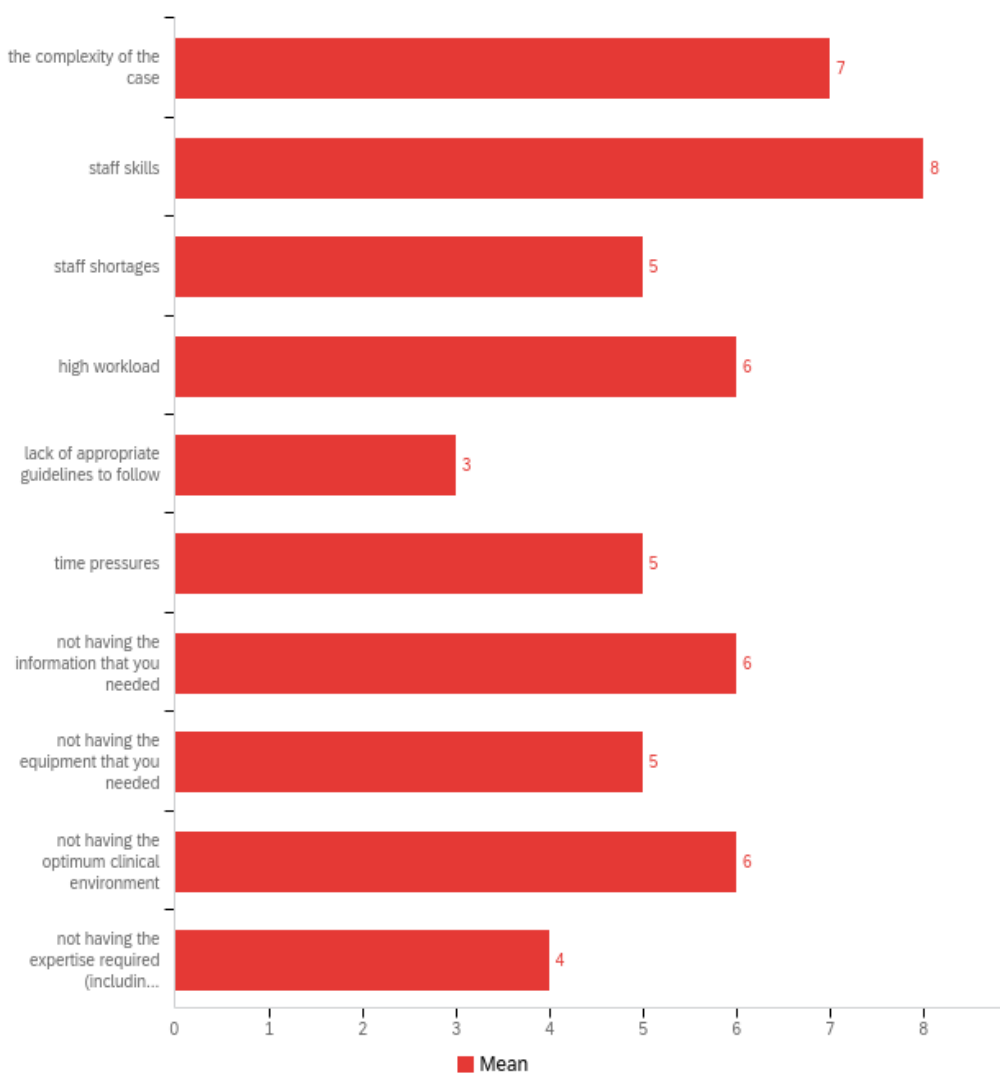
Figure 3: Contributory factors affecting decision making and actions.

All of the factors affected obstetricians' abilities to make decisions and take the right actions, to some degree. Unfortunately all of the factors are present on any maternity unit and are often unaccounted for in guidance, system designs and policies[21]. Some of these are system issues, such as not having the right equipment, high workload and time pressures and are common error provoking properties. This is further complicated by the complexity of the case, the emergent condition of the woman, not having the right skill set of staff available and the changing environment [42].

2b. The obstetricians were asked to rate attributes of negative behaviour on their actions and decision-making.

Behaviour affects on decisions and actions
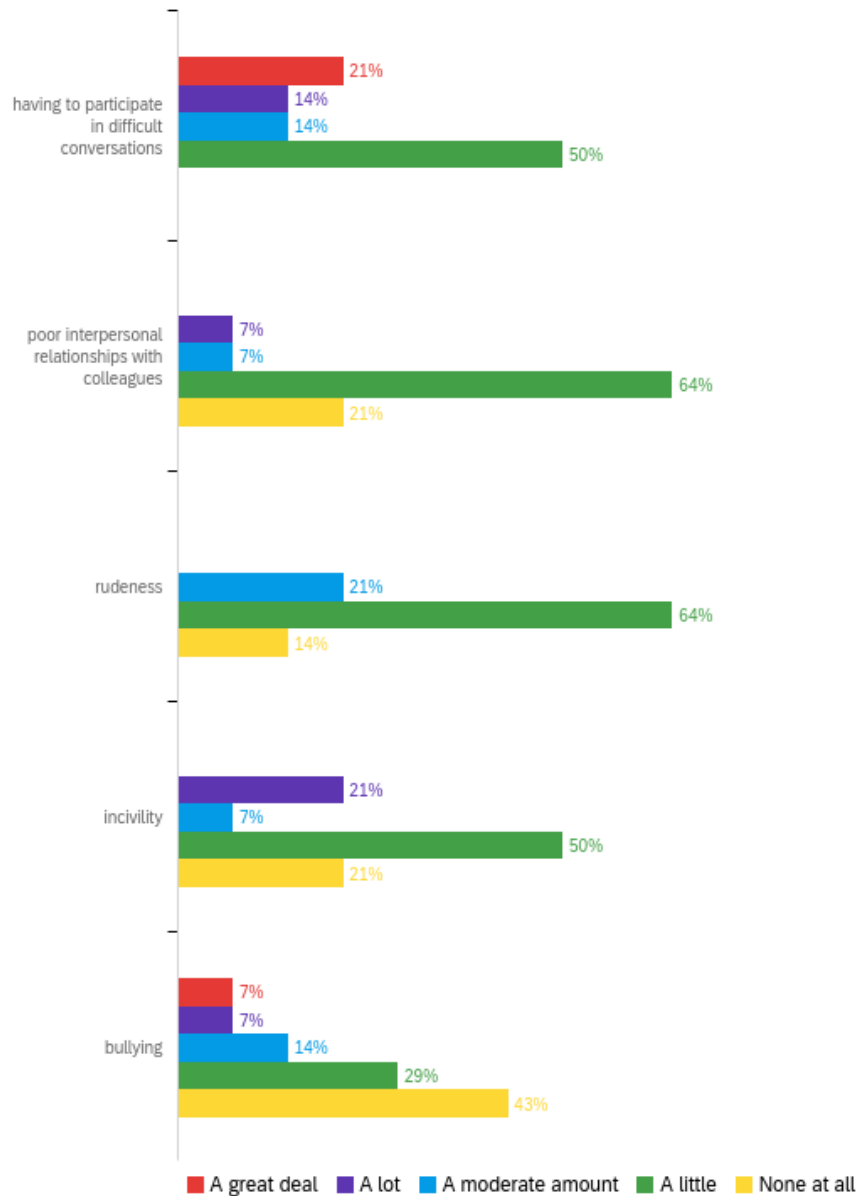
Figure 4: Negative behaviour affecting decision-making and actions.

Figure 4, shows that all of the behaviour attributes had some impact on obstetricians' decisions and actions.

Behaviour attribute	Aggregated % (A great deal to a little affect)	No affect
Participating in difficult conversations	100%	0%
Poor interpersonal relationships	79%	21%
Rudeness	86%	14%
Bullying	79%	21%
Incivility	57%	43%

Table 8: Aggregation of behaviour attributes.

On aggregating the data to demonstrate the percentage impact, all of the obstetricians rated participating in difficult conversations as having an effect. This could be breaking bad news to a woman or having an unwelcomed conversation with a colleague, although this was not defined. Incivility, which is defined as purposeful rudeness, had a lower but notable impact on actions and decisions.

Section 3: The purpose of this two-part question was to determine the methods and forums that are used for capturing and sharing learning. **3a. The obstetricians were asked to describe the methods that they use to capture any learning from everyday situations, not only when an incident occurs.**

Debriefs and Reflection	Self-reflection. Discussion of cases with trainees or midwifery staff after the event. Often sit down for a coffee and talk things over with the team if there is time.
	Conversation.
	Reflection, discussing/debriefing with a colleague.
	Try to have a team huddle when things have been completed e.g. a significant PPH, assisted delivery or interpretation of a difficult CTG.
	Daily debrief for unit and for each shift change.
	If time allows after the evening handover can be a good time to share learning but the reality is that the day team are going home and the consultant is busy with the evening workload.
Audit	Clinical audit, near misses, trigger list of outcomes to be measured,
Training/Learning	CTG interpretation sessions.
	Learning from Datix's (serious incident) teaching.
	Regular assessment for trainees, I supervise trainees directly doing ward rounds and procedures, to be able to feedback.
	Cases deemed to provide learning are prepared and discussed at the monthly MDT meeting.
	Any learning identified goes onto the staff alert board and into the newsletter.
	Well-developed Trust system for identifying, investigating and sharing learning from SUIs.
No methods	*"We don't really. Maternity dashboards could be considered to capture the everyday, though this is not really fed back to staff in a manner that 'a good job is being done' ".*

Table 9: Methods to capture learning from everyday situations

The most common methods (48%) were through debriefs, reflections and through training and learning forums. A small number of obstetricians (13%) use audits as a way of capturing learning and 13% do not use any form of learning from everyday situations.

It was insightful to see that one obstetrician put forward a proactive suggestion about focussing on the variation in a system. This clearly demonstrates an understanding of the safety-II concept. ***"Understand what causes variation in a system rather the error. Looking at the continuity of leadership, the skill mix and the level of team working. We try to teach respect and trust as a means of creating an environment for challenge and that there is a team responsibility for the woman, not just the lead".***

3b. The obstetricians were asked how good or successful outcomes are currently shared with the wider team members.

The table highlights the findings:

Through meetings	The daily risk management meeting, is a good focus for discussing what went well and why, especially around CTG management and overall labour management - but this can be a place where behaviour can be poor with criticism of management by absent colleagues so it has been a mixed experience.
	Audit meetings.
	Consultant meetings.
	Intrapartum care meetings,
	At handover, at department meetings
	Case review meetings and a successes section in the mandatory skills.
	I also try to ensure any positive feedback received from a woman at a debrief is shared with the appropriate individuals.
	There is also a region wide system for Maternity review with a structured panel review of identified cases and an annual report with commentaries from experts from all specialities i.e. O&G, Midwifery, Anaesthetics, Neonates etc.
Through verbal recognition/appreciation	Positive encouragement.
	Public congratulation and thanks, certificates of excellence.
	Verbally say thank you but I also try to put in writing to individuals after an event.
Forums	Labour ward forums.
Staff awards	"Greatix" positive incident reporting.
	Staff awards - but infrequently and inconsistently.
	We do celebrate the service provided, and enter for various service awards for teams and individuals, so on a service level we do.
Newsletters	Hospital newsletter.
	Internet newsletters.
	Not as often as we should- but yes in the risk newsletter
	Department and publications in literature.

Acknowledgement that more sharing could be done	Sometimes. By email or verbal discussion within the team.
	We do not look at specific (complex) cases or celebrate where these were managed well.
	Probably not done because of time pressure, and of the fact there are incidents where things have not gone well to be reviewed which inevitably take priority.
	Very little.
	No.

Table 10: How wider sharing is undertaken.

Two thirds of the obstetricians recognised the value of sharing good outcomes wider. This was carried out through various structured face-to-face meetings (which could imply that sharing wider was embedded in their organisation although there is no indication of attendance figures or format), through verbal appreciations, forums, newsletters and staff awards. However, a third (33%) of obstetricians acknowledged that this was a weakness in their units and that they either never or seldom shared good outcomes.

The purpose of this two-part question was to determine **the importance** of wider organisational and everyday factors.

4a. The obstetricians were asked to rate what wider organisational factors that were important to them, to help them work more safely.

The chart below summarises the findings.

Importance of Wider Organisational Factors Influencing Safety
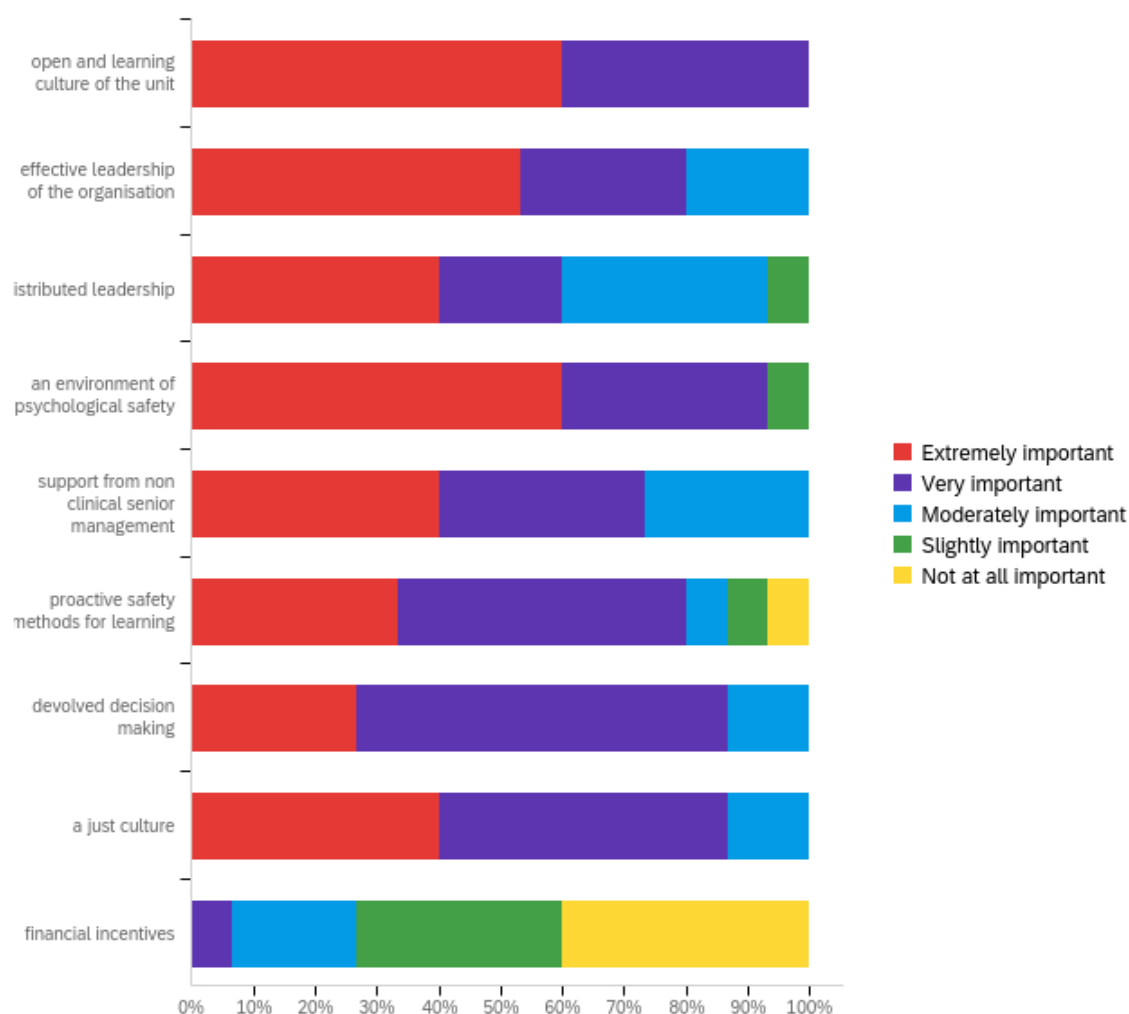
Figure 5: Importance of wider organisational factors on safety

Looking specifically at the 'extremely important' and 'very important' options, the organisational factors that the obstetricians rated highest were

- An open and learning culture of the unit (100%)
- An environment of psychological safety (93%)

- Devolved decision making (87%)
- A just culture (87%)

Followed by

- Effective leadership of the organisation (80%)
- Proactive safety methods (80%)

4b. The obstetricians were asked to rate what conditions were important to them, in relation to everyday factors, to help them work more safely. The table below summarises the findings.

Importance of everyday factors to help you work more safely.	Extremely Important & Very Important (amalgamated %)	Extremely Important %
Good team working and relationships with your colleagues in an advisory and /or supportive capacity	100	60
Open and honest communication	100	60
Shared understanding of the woman's needs and their condition	100	47
Clinical leadership of the maternity team	100	47
Co-operation of your colleagues for technical skills	93	33
Confidence in the skills and knowledge of your colleagues	87	47
Better job satisfaction	86	33
The health and wellbeing of your staff or team	80	33
Access to appropriate good quality training	73	20
Your individual health and wellbeing	66	13
Flexible and fluid non-hierarchical decision making	60	27
Tools such as checklists, care bundles and standardisation (forcing functions) are needed	54	27
Better learning capability from incidents	54	27
Guidance/standards/unit policy are adhered to	53	20
Guidance/standards/unit policy are up to date	40	20

**Table 11: The importance of everyday local factors influencing safety.**

Amalgamating the extremely and very important scores, it can be seen that good team working and relationships, shared understanding of the woman's needs, clinical leadership of the maternity team and open and honest communication were rated the highest maximum possible.

Guidance documents that are supposed to provide accurate evidence based recommendations for clinical practice and checklists for standardisation were scored low as being important. This could be because they demonstrate 'work as imagined' or because they are not used in the correct manner and have become a tick box exercise.

Standardised protocols can be seen as a constraint that restricts necessary performance variability affecting the ability to achieve a goal. The constraint may influence clinicians to work around protocols, to ensure safety[43]. Better learning capability from incidents was also scored low and this could be the recognition that safety-I methods such as root cause analysis and incident investigations are not improving learning capability at an acceptable pace.

5. The obstetricians were asked to rate their level of confidence in situation management, anticipation and monitoring in their everyday work.

Resilience quality- Confidence in
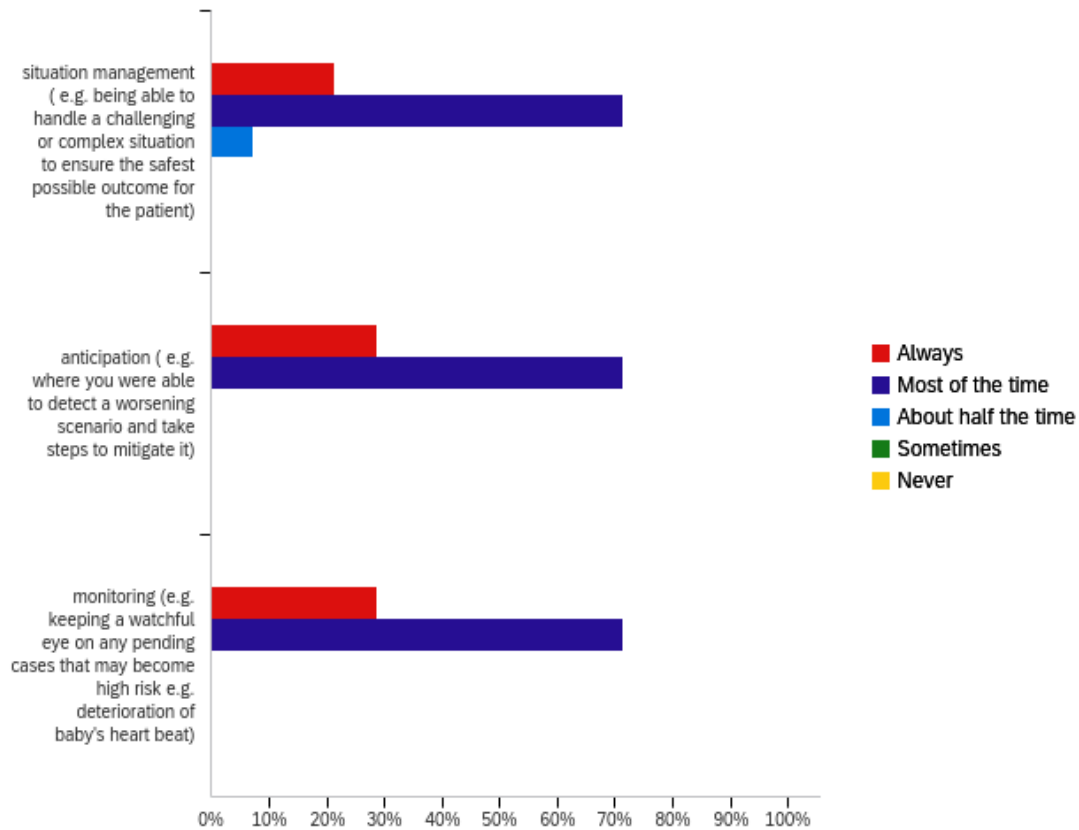
Figure 6: Obstetricians level of own confidence in resilience qualities.

Almost all of the obstetricians rated their level of confidence in all three resilience qualities as being **always** or confident **most of the time**. Only 10% felt confident in situation management half of the time. This shows that they perceive themselves to be practicing in a resilient manner most of the time.

6. The final question asked the obstetricians to list three things that bring them joy at work:

Mindful of safety and good outcomes	Good outcomes. Safe practice. Providing high quality care with good outcomes. Positive outcomes for parents and babies. Patient safety. Success. Quality improvement initiatives.
Team relationships	The camaraderie of the unit seeing others (especially trainees) develop and mature into specialists. Great working relationships with colleagues. Working well with colleagues / effective teamwork. Good people. The diversity of my colleagues and team in terms of personalities and ways of doing things that can often better me / surprise me. Motivated co-operative staff. A good team-working ethos where we share challenges / difficulties freely. Being part of a close and effective team. Team working.
Women and baby centred care	Feedback from women and colleagues. Patient satisfaction. Happy women and healthy babies. Facilitating an individual woman's journey to safe motherhood especially when there are complexities. Being inspired by how women deal with incredibly difficult situations and decisions that are often deeply isolating.

	Sharing a patient journey and using communication skills to ensure that there is a good relationship of respect and trust.
	Seeing parents with their new baby.
The unit environment	Positive learning environment for trainees.
	A cup of tea and a biscuit.
	Nice people to work with.
	Contact with women, colleagues and wider staff.
	Teaching and training others.
	Clinical work
Making a difference	The fact that I am making a positive difference.
	Making a difference.
	Personal feeling of a job well done.
	Doing a good job.
Going home	Ensuring I get home on time
	Going home

Table 12: The obstetrician's perception of what brings them joy in the workplace.

All but one of the obstetricians completed this question. It was extremely satisfying to see that all of the obstetricians valued safe care that was centred on the woman and her baby, a warm unit environment, good working relationships with their colleagues and the feeling that they have made a positive difference to the care of women and their babies.

Summary of key findings

The obstetricians had a good understanding of the proactive safety management concepts. It was recognised by the obstetricians that obstetrics is a high-risk profession. They suggested that safety could be improved by better risk management, identifying system issues, sharing best practice wider and improving accessibility for women with social care issues. The obstetricians take pride in their own skills in decision-making, communication, team working, leadership, resilience engineering, offering appreciation, trust, being visible and having an intentional approach to safety alongside their clinical knowledge as things they value and depend upon when working within a high-risk environment.

All of the obstetricians will undertake some form of workaround to ensure the safety of the women, although they may not recognise these as workarounds. They will re-prioritise care, be flexible with planned care and use professional informal agreements. They appreciate the merit of effective team working, handovers, communication, escalations and constant monitoring for changing scenarios.

Their decision making and actions can be impeded by working on complex cases, working with staff that do not have the right skill set, having to undertake difficult conversations, rudeness and poor interpersonal relationships.

Learning is valued and takes place mainly through debriefs and reflections, although a small number do not undertake any form of learning from everyday work. Sharing the learning wider with the team is mainly accomplished through face-to-face meetings, but there is extensive acknowledgement that sharing wider is a weakness.

On an organisational level, the obstetricians regard an open and learning culture and working in an environment of psychological safety as being extremely and very important to them. On a unit level they placed importance on good team working relationships with colleagues, shared understanding of the woman's needs, open and honest communication and the clinical leadership of the maternity unit.

They rated their own perceived confidence in resilience attributes of situation management, anticipation and monitoring highly.

The rewarding aspects of the role were stated as delivering safe care to women, knowing that they had made a positive difference, their relationships with their colleagues and a good working and learning environment.

Figure 7 shows a visual representation from a safety-II perspective that enabled the obstetricians to work safer.

Figure 7: Summary of obstetricians' actions in relation to capability mindfulness in their clinical work.

Discussion:

The obstetricians demonstrated their adaptive capability to mount a robust response to unforeseen, unpredictable and unexpected demands and recover from a high-risk situation [23]. Within the maternity unit setting, complexity emerges from the constant local interactions between staff and the context of the situation and the environment. A diversity of responses are required to cope within this. To function efficiently it is important to understand the intricate relationships, the interrelatedness and cross dependencies among teams that are also changing as staff come and go. Ways of working emerge and create a sense of order (out of chaos), but this is not stable as relationships and systems are constantly reshaped [9]. The ability of obstetricians and their teams to be in a state of constant alertness and sensitive to changes in women's conditions, continually re-evaluate their safety supposition, and respond as appropriate is a key resilient strength that was evident in the responses within the research. This is due to them having a stable cognitive infrastructure and using their collective alertness and awareness of risk and to respond quicker when appropriate, otherwise known as capability mindfulness [20]. *"Collaborative working will depend upon situational awareness, a shared understanding and heedful interaction in relation to risk"* [15] (p5). This process of having an adaptive capability is transient and dynamic and will only be preserved by timely performance adjustments, but also requires an organisational culture that fosters a climate of trust and respect to maintain these HRO values.

Trust amongst colleagues has shown to be key to opening up to communication and forms a basis of building relationships and mindful interrelations. This was evident and strongly articulated by the obstetricians. This respectful interaction within teams is sustained by task interdependencies and working together over time. These interrelations with colleagues allows them to visualize the situation as a whole and see how their part is played in the wider scenario.[23] Trust also promotes psychological safety[1].The Institute for Healthcare Improvement (IHI) [40] has based their framework on nine critical components to engage the workforce. The framework discusses psychological safety (one of the critical components) as a team attribute and a shared belief that is founded on respectful interactions with one another and confidence that others will respond in a positive manner. Leaders can build psychological safety by being accessible and approachable and relies on a degree of trust between colleagues.

"*Psychological safety is present when colleagues trust and respect each other and feel able – even obligated – to be candid.*" (Edmondson, 2018)[1].

The importance of having an open and learning culture was noted by the obstetricians. Culture can be thought of as the attributes of beliefs, morals, values, assumptions, norms, skills and language that a group develops over time. It can work in the background by controlling staffs' expectations of the consequences of certain behaviours (risk taking, procedure violation, and unsafe actions) and a safety culture fosters an efficient and reliable workforce with little surveillance. A safety culture is shaped by leaders' actions, especially their commitment to safety, through the visions they create and the goals they set [23]. As leaders of their maternity units, the obstetricians displayed this through their responses in dedicating themselves to providing safe and effective care through a strong ethos of teamwork and wanting the best outcome for women. The obstetricians spoke of the qualities of camaraderie and teamwork, team cohesion, a shared understanding and trusting relationships frequently during interviews. Camaraderie and teamwork featured as another one of the critical components of The IHI framework [40] for '*Improving Joy at Work*'.

The obstetricians recognised and articulated qualities of [transformational leadership](#). In particular, the obstetricians highlighted the interrelated aspects of engagement, discussions and deliberations with colleagues in their efforts towards the end goal of achievement. They in effect mobilised their teams to handle the emerging situations. They set the direction, modelled professional behaviours, facilitated the shared vision, delegated effectively and motivated staff to take ownership and responsibility.

One of the striking findings from the research was the learning from everyday events that took place. Learning provides a way and an obligation for units to build on response repertoires and competences so that staff can better cope in the future with surprising events. Learning from both failures and success enables discrepant information to become known to help strengthen the resiliency of a system. Learning can also be a way of illustrating the kinds of behaviours that an organisation may want to encourage or discourage[30]. In the NHS, serious incidents investigations are mandatory, but learning from everyday events is not and the results showed that nearly half of the obstetricians do capture the learning - both formally and informally.

Two recently published studies offer adaptations to current methods used to investigate incidents. Anderson [44] explored using never event reporting as a window on the work system and applying safety-II and resilience concepts that focus on 'work as done' and adaptive capacity, as an opportunity to identify vulnerabilities and create actions that incorporate building a safer system. This will advance the philosophy about how safety can be created in a CAS.

Verhagen [45] proposed that mortality and morbidity meetings could be used as platform for recognising that surgical practice can have various outcomes. (e.g., expected good, unexpected bad or unexpected very good). By focusing the assessment on why an outcome was good can reinforce the safety-enhancing behaviour that led to achieving the desired outcome and facilitate how teams manage to create safety in challenging environments.

Sharing wider was acknowledged as being important by the obstetricians, but not frequently carried out. The most common methods used for capturing learning were through debriefs, reflections and through training and learning forums.

Debriefing and reflections can also be a method for attaining personal emotional support. Debriefs allow an opportunity to think about performance in a collegiate environment, to give and receive constructive feedback and strengthen the activities that promote success. Giving feedback in an honest, inspiring and constructive manner allows for individual growth and opportunities for transformative changes. Learning also depends on feedback. When feedback about strengths is not an organisational value, staff will question their contribution and the organisations commitment and this can lead to disengagement [46]. Allowing practice around oneself to be examined, reflected on, reorganised and improved upon will allow for adaptive change. On a system level, reflecting on a regular basis encourages a culture of inquiry and noticing, embedding the activity of capability mindfulness [29].

An example of this is seen in Schwartz rounds, which is a facilitated forum for healthcare workers to regularly meet to discuss the social and emotional aspects of caring for patients. The premise is to show compassion for staff and in turn to patients [47]. It allows for reflection, multi-professional support and to understand the challenges and rewards that come with providing care. By sharing feelings, this can normalise

experiences of fear and inadequacy. In a recent study[48], Schwartz rounds were found to create an open culture, normalise emotions, promote connectedness, role model good behaviours and build resilience.

Learning from excellence[49] has been pioneered as a new approach to incident reporting. It captures learning from episodes of excellence in healthcare with the forethought to further enhance the safety, as well as appreciating, recognising and thanking staff. Psychologists note that humans have an innate negativity bias and are influenced more by this, than positive events. This is seen in medical training where simulation is always focussed on 'worst-case' scenarios and shortcomings. Studies have been shown that nurturing the positive aspects in teams and individuals is linked with improving resilience, morale and the ability to deal with adversity. [50]

Obstetrics is deemed a high-risk profession by the obstetricians themselves, but they candidly revealed nuggets of insight that illustrate the 'softer aspects' of their passion and commitment for their work. These included the simple joys of having a cup of coffee and a biscuit at the end of their shift, working with nice people, a personal feeling of doing a good job, seeing parents with their new baby, the camaraderie of the unit and seeing others, (especially trainees) develop and mature into specialists. These aspects create a sense of pride and joy in their work and this is in alignment with Deming's work[51] who was famously remembered for his 14 Points for the Transformation of Management . Deming had listed point 12 as *"remove barriers that rob the hourly workers of their right to pride of workmanship"* (p23).The IHI [40,] in their framework describes joy *"as a system property, it is generated by the system and occurs organisation wide".* Leaders can create joy at work by being aware of their own behaviour as a way of showing how others should behave. Joy at work has been shown to create a positive safety culture by promoting good relationships, listening and learning from one another.[20]

Behavioural factors such as rudeness, bullying and poor interpersonal relationships were recognised by the obstetricians as being an impediment to their work. Bullying is described as *"offensive, intimidating, malicious or insulting behaviour, through means intended to undermine, denigrate or injure the recipient" [52]*(p189). It can create a culture that has a negative effect on patient safety and it is a particular problem in the speciality of obstetrics and gynaecology[52]. Intimidating and disruptive behaviours can

foster medical errors and contribute to poor patient satisfaction and to preventable adverse outcomes[52].

Other contributory factors which impeded their work apart from working on complex cases (see figure 3) were system issues (not having the equipment needed, high workload, time pressures, staff shortages). Staff are required to be constant critical thinkers and to continuously reprioritise care. The ability of obstetricians to maintain 'situational awareness' and to think ahead will be inhibited by the pressures and additions to their cognitive load whilst working in a stressful environment. This can lead to clinical incidents[42].
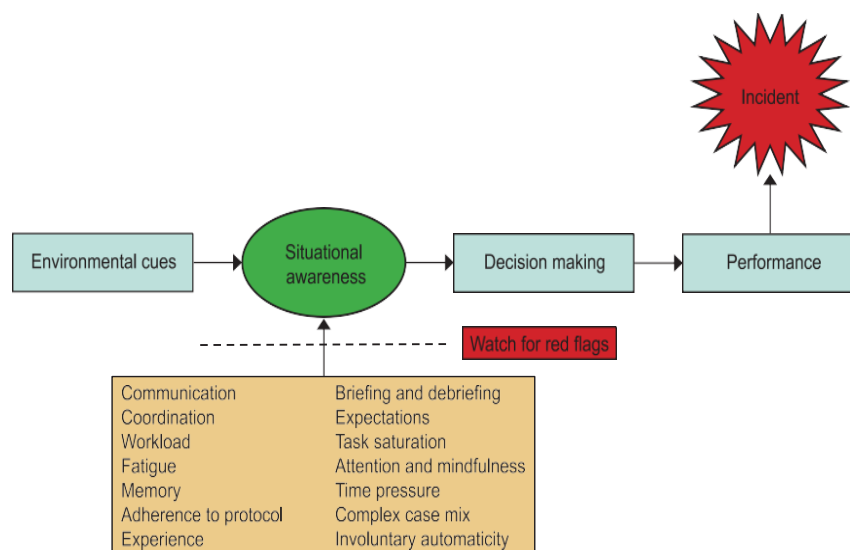
Figure 8: Factors that shape situational awareness[42]

These contributory factors are also ignored when guidelines, protocols and the design of systems are developed. They represent 'work as imagined' and removes the reality of how work is actually done. That is why there is a wide gap between 'work as imagined' and 'work as done'. Safety-II is aiming to close this gap by taking a microscopic lens to look closely at 'work as done'[20] to understand how people behave, how they work when conditions change and although complex, what the interdependencies are.

The results from this research demonstrated that consultant obstetricians are already working in a proactive and safety resilient manner that aligns with the safety-II concepts.

The obstetricians articulated the qualities of constant monitoring of situations, anticipation of risks, responding through preparedness and the importance of learning. These qualities fall within the principles and theories of the safety-II concept and demonstrate that embedding safety-II concepts could help obstetricians work more safer. The obstetricians expressed the significance of trusting relationships with colleagues that fostered excellence in team working and the ability to be collectively and consciously alert to risks and mitigations. Overall, they expressed excellent leadership attributes and the inherent commitment and passion for the safety of mothers and babies.

The latter stages of this MSc Programme coincided with the global Covid -19 Pandemic. The pandemic required health systems to change much faster adapting to new practices in patient safety and accelerated learning. Rapid learning cycles, behavioural choices, redeployment, social isolation, crisis communication and risk perception to name a few were all at play. The well-being of healthcare staff coupled with working with an unknown virus and mortality rates rising threw the NHS into chaos. However, the crisis saw new teams quickly being created and performing to high standards. Safety emerged through resilience, adaptation and risk management that enhanced team working and communication in complex and moving systems. Success (although not perfect) came from adapting to varying conditions.[53]

Recommendations:

1. A systems approach to maternity safety including human factors and safety management must be adopted by policy makers and guideline developers to understand 'work as done' in more detail. This must also involve frontline clinical staff as key stakeholders.

2. The curriculum for undergraduate medical students and trainees must include the knowledge and teaching of proactive safety management strategies along with simulation examples of implementation in clinical practice.

3. Clinical leaders in maternity units must allow time to promote reflective learning and consider adopting and embedding the 'learning from excellence' approach.

4. Clinical leaders in maternity units must foster consistently giving positive feedback and praise to staff as part of reflective learning and as a way of appreciating and showing gratitude for their hard work.

5. Clinical leaders in maternity units must encourage 'pride' in the workplace by highlighting and celebrating their good news stories at staff events, conferences and national maternity awards.

Strength and limitations

This study used a mixed methods approach, which provided an in-depth richness and greater understanding of how obstetricians work to ensure safety. Triangulation of the analysis from the research findings with the existing literature provided a strong argument for the conclusion that consultant obstetricians do already work in a resilient manner. There was also a good response rate to the survey completion.

The limitations of the study were the survey used was not a validated tool and there is no assurance that it measured what was intended. The researcher undertook the coding solely, which may have introduced a bias on analysing the data and the validity of the findings. The interview participants were from the same ethnic background, which may have resulted in missed opportunities for diverse insights. The purposive sample of consultant obstetricians, with the majority having over 11 years of experience may not allow for generalisability across all obstetricians.

A response bias may have been evident, as some questions may have been perceived by the obstetricians to challenge their professional practice or knowledge, resulting in a biased response. This was mitigated by the fact that the responses were anonymous, confidentiality was assured and participation was voluntary.

Conclusion

Achieving safety in maternity care is a challenge. It relies heavily on maintaining awareness to identify and manage obstetric emergencies in the background of providing day-to-day care. As obstetric emergencies can progress very quickly, there is a dependency on obstetricians to make prompt decisions, efficiently organise multiple activities and co-ordinate care rapidly, all within an already complex system.

This research set out to address the question **"Do the principles and theories of the 'Safety-II' concept help obstetricians work more safely?"** and the aim of this research was to focus and understand how obstetricians varied their performance, when working in unpredictable and stressful environments, which resulted in positive outcomes.

Although there is some confusion with the terminology that is used (Safety-I, safety-II, workarounds), it is evident from the results that obstetricians are using the concepts of safety-II to help them work more safely.

Complexity is uncontrollable due to the constant changes in a system, however, if the 'adaptive capacity' of staff to handle unknown disruptions are controlled and for more things to go well, this could progressively influence safety[54].The diversity of professionals that work in maternity settings (obstetricians, midwives, anaesthetists, support workers etc.) are the key. They can foresee the solution pathways, they keep the conversations about 'risk' alive through regular safety briefs, they have the ability to say 'stop - lets reconsider' and they defer to expertise[29]. This allows for a successful team to have the inherent ability to provide internal assurances for safety[54] (not external regulators) and for them to openly take pride in their successes[51]. Instead of controlling critical risks, human behaviours and incidents, if adaptive capacities are proactively harnessed in teams and they seek a sense of control of these, then safety can be positively impacted. In the longer term, it will enable staff to keep meeting the emerging variable demands, rather than constantly scrambling around in an emergency mode. We must **trust** human beings to do the right thing.

Further Research

To become an entry-level consultant can take 7-10 years from completing undergraduate study. The majority of consultants in this study had a minimum of 11 years at consultant level and had the benefit of experience on their side. They were in leadership positions and many of them supervised trainees. If these proactive ways of approaching safety are embedded earlier in trainees' careers, this could pave the way forward and bring the new generation of obstetric doctors already equipped with the capability mindfulness to practice safer. Jackson et al [55] have presented the principles of resilience for clinicians through the use of a video game and 64% of the participants reported that it helped their learning in the concepts of resilience. This could have potential as an interactive teaching tool.

There is also merit in spreading the value of learning from excellence as a way of cultivating new habits in focussing on the activities that foster good outcomes, hence strengthening resilience as well as continuing to learn from the inevitable errors that will persist. Learning from excellence is also an opportunity to encourage and model good professional behaviours and interpersonal skills[30]. The obstetricians cited 'time' as being a factor that impeded them from sharing learning from excellence wider.

Human reliability analysis is a technique that's used in HRO as a way of looking at a process of care and systematically examining the process to pinpoint and foresee possible failure points[25]. Some methods are already in use in healthcare, such as failure mode and effects analysis (FMEA). A recent study[56] using FMEA in the management of vaginal birth after caesarean section found that it promoted vaginal birth after a caesarean section and also maintained a low risk of uterine rupture. Using FMEA more widely for processes of care in maternity may encourage obstetricians and other maternity staff to consider this as a way of proactively managing safety on a maternity unit.

Given that the NHS Patient Safely Strategy 2019[10], is striving to embed safety-II principles in its national policy, healthcare regulators must consider how proactive safety management can be measured and developed as part of their inspection frameworks[57]. Preliminary studies[58] have begun on how to measure resilience

potential in emergency departments and this may bring further insights to the safety management arena.

Indicators for resilience engineering are also emerging which will assist with assessing a resilient work environment. A 2020 systematic literature review of research[59] from high risk industries showed that the top commonly used indicators were:

- a commitment from the top-management to provide resources for implementing safety activities and being interested in the value of human performance,
- an awareness of safety through promoting safety messages and an awareness of the quality of performance in the workplace,
- learning from both successes and failure,
- flexibility in reconfiguring systems after emergencies.

All of these indicators have a strong relationship with resilience engineering and form promising groundwork in providing metrics for safety measurement.

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Appendices

Appendix 1: Imperial College Ethics Approval

Imperial College London

Imperial College Research Ethics Committee
Imperial College London
Room 221
Medical School Building
St Marys Campus
London
W2 1PG
Tel: +44 (0)207 594 1872

researchethicscommittee@imperial.ac.uk

19/12/2019

Dear Dr Suzette Woodward

Study Title: Can the principles and theories of safety II help obstetricians work safely?

ICREC reference: 19IC5585

The above study was approved by your Head of Department on 24/10/19 and by the Joint Research Compliance Office on 19/12/19.

Under the Imperial College Research Ethics Committee process, a study that has been reviewed by the Joint Research Compliance Office and Head of Division/Department (or Principal), where no significant ethical issues have been identified in the protocol or ethics application, can be approved without requiring it to go to full committee.

Documents
The documents reviewed were:

- ICREC-SETREC Application form (v4 05/12/19)
- Protocol (v4 05/12/19)
- Participant Information Sheet (v4 05/12/19)
- Consent form (v4 05/12/19)
- Invitation email (v1 16/11/19)
- Interview protocol (v4 07/12/19)
- Survey questions (v10 12/12/19)
- RCOG database approval letter (12/12/19)

Yours sincerely,

Ruth Nicholson,
Head of Research Governance and Integrity,
Imperial College London

Appendix 2: RCOG Approval to use Invited Reviews Database

Royal College of Obstetricians & Gynaecologists

Royal College of Obstetricians and Gynaecologists
10-18 Union Street
London,
SE1 1SZ

12 December 2019

Dear Lord Darzi,

I am writing on behalf of the Royal College of Obstetricians and Gynaecologists (RCOG) with regards to an employee of the organisation ▮▮▮▮▮▮▮▮

▮▮▮▮ is undertaking an MSc in Patient Safety with Imperial College and as part of her dissertation she would like to invite members (Obstetricians) of the College to seek their consent to participate in a survey.

Please be reassured that RCOG is following the correct procedures under the data protection law (the General Data Protection Regulation 2016 and the Data Protection Act 2018) and only those members who consented to being contacted in this way are being invited to participate.

I understand that this letter forms part of the documentation that is required for ethics approval by Imperial College.

Please could you notify me on dataprotection@rcog.org.uk once the ethics process has been approved.

Kind regards

▮▮▮▮▮▮▮▮
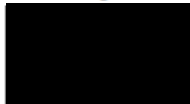
Executive Director, External Affairs

Appendix 3: Email Invitation for Survey Participants

Dear Dr x

My name is xxx and I am the Invited Reviews Manager at the Royal College of Obstetricians and Gynaecologists. I am currently undertaking a part-time MSc in Patient safety with Imperial College London.

As part of my dissertation, which is entitled **'Do the Principles and Theories of Safety II help Obstetricians work safer?'** I would like to invite you to participate in a short survey so I can understand more about the performance variability that occurs during working in unpredictable and stressful environments, with a focus on when things go right.

The project is being supervised by [Dr Suzette Woodward](). Findings from this preliminary research can help the RCOG to support healthcare organisations, in enhancing working more safely. Examples of good practice can be shared nationally through the RCOG services such as the Invited Reviews Service.

Participation in this survey is voluntary and all information is anonymous and confidential. If you do not wish to take part, this will in no way influence any relationships with any of the research or RCOG team. This survey is estimated to take approximately ten minutes to complete.

It has ethics approval from Imperial College Research Ethics Committee. Please ensure that you have read the participant information sheet accompanying this email.

Accessing the survey

Please click [here]() or on the link below to participate in the survey, or copy and paste into your browser: https://imperial.eu.qualtrics.com/jfe/form/SV_09sYARzdmSpgAgB

Best wishes

Participant Information Sheet

- **Study title**

Do the principles and theories of safety II* help obstetricians work safely?

*Learning from success, is a concept known as safety ll. In Safety-II, the purpose of investigations changes to become an understanding of how things usually go right. This is powerful, since things go right more often than they go wrong. Learning how medical doctors produce good care under difficult circumstances may be more meaningful and this concept of investigating what goes right may provide additional information that can further enhance safety learning.

Primary Investigator: Dr Suzette Woodward
Collaborators:

- **Invitation paragraph**

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish.

Part 1 tells you the purpose of this study and what will happen to you if you take part. Part 2 gives you more detailed information about the conduct of the study

Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.'

- **What is the purpose of the study?**

A maternity unit is a highly complex environment and is one of the high-risk professions where things can go wrong with fatal consequences to a mother and/or her baby.

Obstetricians will frequently adapt and vary their practice to ensure safety, often within a highly pressurised environment. Understanding what these adaptations and variables are under these complex circumstances is poorly understood.

The aim of this project is to understand, whether Safety II could help obstetricians work safely by studying the way they work in detail and the workarounds that obstetricians utilise in order to adapt to the given situation.

This study is being carried out as part of an MSc dissertation research project.

- **Why have I been invited?**

As a practising obstetrician and a member of the RCOG Invited Reviews Database, you have been invited to participate in an online survey. The survey is being circulated to all obstetricians who have given their consent to participate in research. We are hoping to reach as many obstetricians as possible.

- **Do I have to take part?**

It is up to you to decide whether or not to take part. If you would like to take part in this study, please click on the link to the survey which you will find in the email sent to you by XXX. This will take you to the online survey, which will take less than fifteen minutes to complete. There is not a separate consent form for participating in this survey. **Submitting responses to the survey questions will be taken as consent to participate in the project.** If you do decide to take part you will be given this information sheet to keep. If you decide to take part you are still free to withdraw at any time and without giving a reason. **This will not affect you in any other capacity.**

- **What will happen to me if I take part?**

You will be sent a link by email to participate in an online survey. They survey should last no more that 15 minutes. The survey will be open for 6 weeks and no more than three reminders will be sent. The survey responses will be anonymous.

You may also be invited to take part in a telephone interview, this will be made at a convenient time and last up to an hour. The telephone interview will be recorded and transcribed. Any recordings will be destroyed after transcription.

No personal data will be shared.

- What are the possible disadvantages and risks of taking part?

The possible disadvantages are it may take a little time to complete the survey but the researcher has tried to ensure it is as easy as possible to complete. Other disadvantages are that it may make the participant realise that their care could be safer or could have been safer in the past so this may worry them.

- **What are the possible benefits of taking part?**

The benefits for the participants they will learn about safety II and may learn about the choices and decisions they are making that are keeping people safer and will want to continue and replicate that behaviour. They can share that good behaviour with others.

The findings from this preliminary research can be used to develop a methodology to utilise as part of the College invited reviews to specifically look at what attributes obstetricians have or need, to enhance the safety of a maternity unit. Examples of good practice identified can be shared nationally.

- **What if something goes wrong?**

If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way, you have been treated during the course of this study then you should immediately inform the Investigator. If you are still not satisfied with the response, you may contact the Imperial AHSC Joint Research Compliance Office.

- **What will happen to the results of the research study?**

The results of the research study will be published in October 2020 as a dissertation project and copies will be available on request by contacting the investigator. Participants will not be identified in any report or publication.

- **Who is organising and funding the research?**

The research study is organised by the Department of Surgery and Cancer, Imperial College London;

- **Who has reviewed the study?**

This study was reviewed and approved by the HoD and the Joint Research Compliance Office (JRCO).

- **Contact for Further Information**

Please contact the investigator should you require any further information.
We would like to thank you for taking part in the study.

Consent Form for Participants Able to Give Consent

Full Title of Project: Do the principles and theories of safety II* help obstetricians work safely?

Name of Principal Investigator: Suzette Woodward

Please initial box

Add/delete/amend clauses as appropriate]

1. I confirm that I have read and understand the participant information sheet dated 5th December 2019 version 4 for the above study and have had the opportunity to ask questions which have been answered fully.	
2. I understand that my participation is voluntary, and I am free to withdraw at any time, without giving any reason and without my legal rights being affected.	
3. I understand who I can go to if I am concerned about being involved in the study.	
4. I understand that no personal identifiable data will be collected and I will be given a unique reference number. If I take part in any interviews, any recordings will be destroyed after transcription.	
5. I give permission for Imperial College London to access my records that are relevant to this research.	
6. I understand that the interview will be recorded using a digital voice recorder. I give permission for this recording to take place. I understand that this recording will be deleted once it has been transcribed.	
7. I understand that anonymised quotations from the interview will be used in publications.	
8. I give/do not give (delete as applicable) consent to being contacted to potentially taking part in other research studies.	
9. I give/do not give (delete as applicable) consent for information collected about me to be used to support other research in the future, including those outside of the EEA.	
10. I give consent to participate in the study.	

_____   _____   _____
Name of Participant   Signature   Date

_____   _____   _____
Name of Person taking consent   Signature   Date
(if different from Principal Investigator)

Suzette Woodward   _____   _____
Principal Investigator   Signature   Date

1 copy for participant; 1 copy for Principal Investigator

Interview Protocol: (telephone interviews and approx 45 mins)

1. What do you understand by the term safety II?

2. Why do you think currently 'patient safety' is still a concern for maternity professionals in the UK?

3. What are your ideas of how we can tackle working safely as a maternity profession

4. Can you on reflect on any recent, **unanticipated high risk case** that you were involved in, that resulted in a good/satisfactory outcome for a mother and her baby. Please could you describe the scenario briefly?

5. Thinking specifically about the things that **you did that went well** in this scenario-
   - Did you have to change priorities or make any compromises (within the scenario or to outside pressures)
   - Did you make any shortcuts (in or out of best practice) or practice any alternative ways of working?
   - Did you have to revise any care plans
   - Did you have to ask for help from obstetric colleagues
   - Did you have to ask for help from other colleagues
   - Did you know who would be the trusted person to call
   - Anything else that you can recall that made this situation safe

6. Did anything unexpected happen or were there any unanticipated complications? Please describe what you did to cope with this, please include the details of (if applicable) who you communicated with, delegated to, called for, any revisions to the care plan and how you overcame the problem.

7. Where there any contributory factors that affected your decisions and actions at the time?

8. Did you share this experience wider? how?

'Do the principles and theories of the Safety II model help Obstetricians work more safely?'
Survey of UK Obstetricians

Thank you for agreeing to participate in this survey. It should take no longer than 15 minutes to complete.

I would like to understand more about the performance variability that occurs when working in unpredictable and stressful environments, with a focus on when things go right. Findings from this preliminary research will help the RCOG to support healthcare organisations, as well as our Members and Fellows.

Section 1: This section is about you

1. Please state your gender:

Male
Female

2. How many years have you been practising as a consultant?

0-5 years
6-10 years
11-15 years
16+ years

3. Please state your geographical location

UK
South East
London
North West
East of England
West Midlands

South west

Yorkshire and the Humber

East Midlands

North East

Scotland

Wales

Northern Ireland

Section 2: This section considers your overall views on patient safety

4. What do you understand by the current approach to safety termed as safety I?

    Open text box.

5. Have you heard of the emerging approach to safety termed as safety II before receiving this survey?

    Yes- Please explain what you understand
    No

Section 3: This section will ask for specific details of everyday clinical practice when you are managing unanticipated high-risk cases:

Reflecting on your everyday clinical work in caring for a mother and her baby and having a good or satisfactory outcome, **what do you do well** to meet the demands of **unanticipated high-risk cases?**

6. On a scale of 1-5, how often would you (1= never, 2=rarely, 3=sometimes, 4=often, 5= always)

- change priorities or make compromises
- change your normal routine, vary your performance or find alternate ways of doing something (workarounds) within recommended guidance

- change your normal routine, vary your performance or find alternate ways of doing something (workarounds) outside of recommended guidance to adjust to the circumstances you face
- ask for additional help from obstetric colleagues
- ask for help/advice/support from other colleagues
- know who would be the best person to call for help/advice/support
- delay or postpone other activities
- revise care plans for a better outcome

7. Can you think of any workarounds or shortcuts that are now part of your everyday routine?

     Please explain: Open text box.

8. Is there anything else that you would do to make the situation safe?

     Please explain: Open text box.

When managing unanticipated high-risk cases, what conditions or contributory factors affect your decisions and actions?

9. Please rank in order of importance with 1= most important to 9= least important:

- the complexity of the case
- staff skills
- staff shortages
- high workload
- lack of appropriate guidelines to follow
- time pressures
- not having the information that you needed
- not having the equipment that you needed
- not having the optimum clinical environment
- not having the expertise required (including being able to call for additional expertise)
- other- please state

When managing unanticipated high-risk cases, what behaviours have you experienced that affect your decisions and actions?

10. Please rank the behaviour in order of impact on your decisions and action with 1= most impact to 5= least impact:

- having to participate in difficult conversations
- poor interpersonal relationships with colleagues
- rudeness (lack of manners, discourteousness, impolite, insensitive or disrespectful behaviour by a person who has a lack of regard for others)
- incivility (rudeness or unsociable behaviour / speech that occurs with ambiguous intent)
- bullying (seeking to harm, intimidate, coerce, torment, or intimidate someone who is perceived as vulnerable)

11. What methods do you use to capture and analyse learning from **everyday situations** (not when an incident occurs).
    Please explain: Open text box.

12. Do you share your good/successful outcomes wider?

    Yes- Please explain where, how and with who, or if there is a specific forum
    No - Please explain why not

Section 4: This section looks at other conditions that are important to you and enables you to work in a safer manner (assuming that all the required resources are present).

13. What conditions are important to you in relation to the **wider organisational factors** to help you work more safely with 1=not important, 2= slightly important, 3=moderately important, 4=important, 5=very important.

    a) open and learning culture of the unit
    b) effective leadership of the organisation

c) distributed leadership

d) an environment of psychological safety (being able to speak up without fear of ridicule, blame or punishment)

e) support from non-clinical senior management

f) proactive safety methods for learning

g) autonomy for devolved decision making

h) a just culture (supporting a consistent, constructive and fair response to the actions of staff involved in things that go wrong or raised in concerns, complaints or patient safety incidents)

i) Financial incentives

14. What conditions are important to you in relation to **everyday factors** to help you work more safely with 1=not important, 2= slightly important, 3=moderately important, 4=important, 5- very important

a) confidence in the skills and knowledge of your colleagues

b) co-operation of your colleagues for technical skills

c) good team working and relationships with your colleagues in an advisory and /or supportive capacity

d) guidance/standards/unit policy are up to date

e) guidance/standards/unit policy are adhered to

f) shared understanding of the patient's needs and their condition

g) clinical leadership of the maternity team

h) open and honest communication

i) access to appropriate good quality training

j) your individual health and wellbeing

k) the health and wellbeing of your staff or team

l) tools such as checklists, care bundles and standardisation (forcing functions) are needed

m) better job satisfaction

n) better learning capability from incidents

o) flexible and fluid non-hierarchical decision making

15. **In your everyday work,** on a scale of 1-5 with 1=not confident at all, 2=slightly confident, 3=somewhat confident, 4= fairly confident, 5= completely confident, how confident do you feel (as an individual clinician) in your level of

   a) situation management (e.g. being able to handle a challenging or complex situation to ensure the safest possible outcome for the patient)
   b) anticipation (e.g. where you were able to detect a worsening scenario and take steps to mitigate it)
   c) monitoring (e.g. keeping a watchful eye on any pending cases that may become high risk e.g. deterioration of baby's heart beat)

16. Please list three things that brings you joy at work.
      Please explain: Open text box.