EMERGING PRINCIPLES IN OBSTETRIC TEAMWORK

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Emerging Principles in Obstetric Teamwork

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Abstract

There is widespread consensus that teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care. In recent years, increasing attention has been given to questions of how to define, teach, measure, and improve teamwork in healthcare. However, one cannot help but feel a certain disconnect between this ongoing trend, with an associated bias towards judgmental and normative language, and contemporary thinking in safety science that explores concepts from complexity thinking, like emergence and resilience. By examining teams that manage peripartum emergencies in different settings and cultures, this study aimed to explore how successful teamwork is constructed and perceived by those directly involved in patient care and contrast these findings with traditional normative approaches.

This qualitative, exploratory case study, based on interviews with healthcare practitioners in Heidelberg, Germany and Mbarara, Uganda, showed that teamwork was more often than not influenced by emergent phenomena, among them power relations in Heidelberg and resource constraints in Mbarara. Safety is created by negotiating conflicts and individual resilience rather than adherence to normative behavioral standards. However, these aspects are rarely represented in existing frameworks on team training or current teamwork literature, where the predominant strategy to achieve safety remains a traditional, reactive approach that regulates behavior and constrains performance variability. Teamwork, while indispensable in the highly subspecialized reality of healthcare, is oftentimes reduced to an aggregated set of individual behaviors. It appears that in the current state of entangled quality and safety agendas, medicine has settled for a reductionist and moral approach towards teamwork to manage the associated complexities, thereby accepting a simplistic but intellectually impoverished and ethically questionable understanding of the concept.

Reinforced by the results of our study, we would contest that, despite the need for measurements and evaluation, the continuous integration of social and cultural aspects in teamwork research will most likely enrich the current discourse for a more humanistic and complete understanding of what happens in healthcare teams. Recognizing power dynamics at the workplace in an effort to understand team processes and guide the serious allocation of resources will certainly address current challenges faced by frontline medical staff more thoroughly than the application of normative frameworks.

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1. Introduction

A collaborative effort

When we first started the M.Sc. program on Human Factors and Systems Safety in January 2017, little did we know that we were in for a journey. Or, more to the point, that we would continue together on one that had begun many years ago, with our respective careers in healthcare. One binding element was an interest in medical education and simulation, another our appetite for knowledge. But the most important was our shared understanding of safety in healthcare, in line with the definition of Vincent and Amalberti (2016), as "[…] a strongly motivational, sometimes emotional, plea that such outcomes cannot and should not be tolerated". First hand, we have experienced the immediate consequences of failure, of harm that resulted from the intention to heal, of decisions made to the best of one's knowledge that proved wrong. This influence should be kept in mind when reading, and interpreting, the following research. We are by no means independent observers that set out to answer a random research question out of curiosity. Quite the contrary, ours is the result of a desire to better understand a very small aspect of the complex construct that is modern healthcare. It is the product of our experience in medical simulation, and it is through that lens that we evaluated and interpreted our data.

Research question

Many of the early safety efforts in medicine were modelled after experiences from the aviation industry, including the implementation of simulation to educate practitioners about human factors. These training programs, so-called 'crew-resource-management' (CRM) programs, usually address a number of cognitive and social competencies that are deemed relevant or essential for safety, sometimes dubbed 'non-technical skills'. In recent years, increasing attention has been given to the idea of teamwork: how to define, teach, measure, and improve it. There is widespread consensus that teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care. However, one cannot help but feel a certain disconnect between this ongoing trend in healthcare, with a heavy bias towards judgmental and normative language, and contemporary thinking in safety science that explores concepts from complexity thinking, like

emergence and resilience. By examining teams that manage peripartum emergencies in different settings and cultures, this thesis aims to explore how successful teamwork is constructed and perceived by those directly involved in patient care, and contrast these findings with traditional normative approaches. Considering safety as an emergent property, this thesis also aims to highlight cultural differences in the perception of teamwork while delivering peripartum care between East Africa and Western Europe.

2. Theoretical foundations

Patient safety

Traditional linear approaches

If one had to choose the predominant theoretical lineage of widespread safety efforts in healthcare, it would most likely lead to a predominantly Newtonian worldview: In order to design a safe system, much emphasis is placed on a good blueprint, proper rules, procedures and compliance therewith, all in order to establish barriers for error detection and prevention. Safety, in this context, is defined as "freedom from accidental injury" by institutions like the U.S. Institute of Medicine or the U.S. Agency for Healthcare Research and Quality (Kohn, Corrigan, & Donaldson, 2000). This concept, which has been described as 'Safety-I' by Erik Hollnagel (2014), is representative of an often encountered, and rarely questioned, one-size-fits-all approach that is prevalent in a domain increasingly susceptible to quick fixes. The idea promotes a linear, binary understanding of work that can either succeed or fail and focuses on transitions between normal and abnormal system states. "According to the logic of Safety-I, safety and efficiency can be achieved if this transition can be blocked. This unavoidably leads to an emphasis on *compliance* in the way work is carried out" (Hollnagel, Braithwaite, & Wears, 2013). It also presupposes that the underlying causes for successes and failures are different. Consequently, safety can be achieved by regulating and constraining performance variability, through means of e.g. training, standard operating procedures, rules or checklists, for which there is ample evidence in healthcare (Allard, Bleakley, Hobbs, & Coombes, 2011; Arriaga et al., 2013; Haynes et al., 2009; Neuhaus, Spies, Wilk, Weigand, & Lichtenstern, 2017; Ornato & Peberdy, 2014; Russ et al., 2013; Rydenfalt, Johansson, Odenrick, Akerman, & Larsson, 2013).

On an individual level, much emphasis is placed on proper behavior, to the extent that it can be categorized, rated, and trained:

> [Non-technical-skills] can be defined as "the cognitive, social and personal resource skills that complement technical skills, and *contribute to safe and efficient* task performance" […] *Poor NTS can increase the chance of error*, which in turn can increase the chance of an adverse event. Good NTS (e.g., high vigilance, clear communication and team coordination) can reduce the likelihood of error and

consequently of accidents. Analysis of incidents, as well as studies of behaviour during routine work (task analysis), can reveal which workplace behaviours positively or negatively influence job performance and adverse events. (Flin & Maran, 2015, emphasis added)

Still heavily based on linear thinking (Dekker, 2014) and clear-cut cause-effect relationships, healthcare has done little so far to embrace alternative approaches to safety (Levitt, 2014).

Safety as emergent property

The overarching idea of more recent approaches to safety that has so far been inadequately addressed in healthcare is as follows: How can we harness the capacity of individuals to successfully collaborate and produce safety as an emergent property of normal work, given the multi-professional and dynamic nature of modern medicine? Many approaches to this question have been described, mostly using examples from other domains: High-reliability theorists (HRT) have made various cases for "large, formal organizations that perform complex, inherently hazardous, and highly technical tasks under conditions of tight coupling and severe time pressure" (Rochlin, La Porte, & Roberts, 1987). What follows is a theory that is much more reliant on a social construction of safety, emphasizing implicit norms, myths and on-the-job training than merely devising SOPs and guidelines (Rochlin, 1999). All these properties invite a transfer to healthcare, of which we have seen little so far (Roberts, Madsen, Desai, & Van Stralen, 2005). Similarities, however, are abundant. Rochlin et al. (1987) describe the culture among US Navy officers as follows: "The potential risk of attempting to operate at present levels under increasing budgetary constraints arises because the Navy is a "can-do" organization, visibly reluctant to say "we're not ready" until the situation is far into the red zone." The same is found in healthcare, although underlying motivations might vary: One could argue that both in the military and in healthcare, there is a certain ethos to be found that extends beyond a mere financial interest, simply because economic profitability is not (or shouldn't be) the organization's top priority.

Beyond HRT, many more ideas exist: Schulman (2004) nuances models of reliability in healthcare. One way to create reliability, Schulman argues, is by having well-formed rules applied to predictable settings. Reliability can then be achieved by mostly controlling or thoroughly knowing the "input". The other form of reliability described by Schulman (2004) is having such robust organizational mechanisms that it can cope with complexity or manage variability. This approach is consistent with ideas from resilience engineering (Hollnagel, Woods, & Leveson, 2007; Woods, 2015), although some authors are reluctant to use the term. Vincent and Amalberti (2016) choose to not

use the term resilience, however they equal resilience with the capacity to adapt and recover without using the exact word[1]. In short, complexity scholars add some distinctive vocabulary to supplement their theoretical approach: Ideas like discretional, or operational, space add their own dimension to understanding safety in healthcare. According to Rasmussen (1997):

> Human behaviour in any work system is shaped by objectives and constraints which must be respected by the actors for work performance to be successful. Aiming at such productive targets, however, many degrees of freedom are left open which will have to be closed by the individual actor by an adaptive search guided by process criteria such as work load, cost effectiveness, risk of failure, joy of exploration, etc. (Rasmussen, 1997)

This applies to both the individual and the organizational level. Although an organization will try to shape individual behavior by defining this operational space (e.g. through the use of SOPs or guidelines), Rasmussen, Nixon, & Warner note that "[…] the structuring of work processes […] by an individual will be a self-organizing, evolutionary process, simply because an optimizing search is the only way in which the large number of degrees of freedom in a complex situation can be resolved" (1990). This becomes increasingly problematic in the dynamic environment of everyday work:

> [A]ll work situations leave many degrees of freedom to the actors for choice of means and time for action even when the objectives of work are fulfilled and a task instruction or standard operating procedure in terms of sequence of acts cannot be used as a reference of judging behaviour […] In consequence, rules, laws, and instructions practically speaking are never followed to the letter. (Rasmussen, 1997)

Constructing a 'discretionary space' out of degrees of freedom paves the way for understanding the aforementioned emergent phenomena: Drawing on complexity theory and systems thinking, they are the result of relationships and interactions of constituent components performing (mostly) normal work. No single component can mirror the behavior of the system as a whole (Dekker, Cilliers, & Hofmeyr, 2011; Rasmussen, 1997), and system behavior cannot be predicted on the basis of the individual components that comprise it (Dekker et al., 2011). Sociotechnical systems

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1 "The broad capacity of adapting and responding has been discussed extensively in the safety literature and made the cornerstone of some approaches to safety such as resilience engineering (Hollnagel et al. 2007). The term resilience is used in very different ways (Macrae 2014), sometimes very broadly in an attempt to describe and articulate the qualities of a safe organisation and sometimes in a more restricted sense of a capacity to adapt and recover from extreme or unusual circumstances. We believe that resilience is an important concept that needs serious consideration and further research and exploration in practice. However to avoid potential confusion we use the more everyday terms of monitoring, adaptation and recovery to denote occasions where or hazards or failures have been detected and are being actively managed or corrected." (Vincent & Amalberti, 2016, p. 66)

are becoming increasingly intractable (Hollnagel, Pariès, Woods, & Wreathall, 2011), resulting in the inability of traditional safety management ideas to serve as the only viable approach, as they presume that the systems' behavior is understood and predictable. This establishes the need to study and understand everyday work with a focus on successful outcomes instead of failures; a fundamental shift in thinking that has been called 'Safety-II' by Hollnagel et al. (2013):

> Safety-II explicitly assumes that systems work because people are able to adjust what they do to match the conditions of work. […] The result of that is performance variability, not in the negative sense where variability is seen as a deviation from some norm or standard, but in the positive sense that variability represents the adjustments that are the basis for safety and productivity. (Hollnagel et al., 2013)

Safety-II acknowledges that our understanding of current sociotechnical systems is incomplete and unable to account for the dynamics, irregularities and goal conflicts encountered in the messy everyday realities of organizational life. It is important to note, however, that Safety-II should not be seen as a replacement strategy of Safety-I, but rather a way of thinking about human performance that complements and enlarges traditional thinking to better address future needs.[2] (Hollnagel, 2014, pp. 145-148)

Finishing the design

Complexity thinkers have advocated for a new understanding of the role of humans in these complex systems: They represent the crucial, and maybe most vulnerable, link between theory and practice, as they are the ones that have to "finish the design" (Dekker, 2014). No workplace design, in the form of procedures, SOPs or guidelines, can include all eventualities in a complex adaptive system (CAS) such as healthcare. Therefore, the individual adaptive capacity of the professional is needed to make things work (Hollnagel, 2014).

> As agents within systems interact, jostle with, and influence each other, […] they exhibit and produce emergent behaviours. Agents (clinical staff, ancillary and support staff, and managers) actively participate in what Strauss et al. (1963) and Strauss (1978) called 'the negotiated order' – a term coined to emphasize the way people parley, confer and make trade-offs in meeting their individual and group objectives. These politically and culturally informed exchanges go a long way towards describing the organisational

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2 This is what Hollnagel calls a 'judicious mixture': "The recommended solution is not a wholesale replacement of Safety-I by Safety-II, but rather a combination of the two ways of thinking" (Hollnagel, 2014)

dynamics underpinning the process of providing care. (Braithwaite, Clay-Williams, Nugus, & Plumb, 2013)

So instead of a problem to control, humans in these systems become the resource to harness. Radically different from the traditional view on safety as described above, this controversy has been at the core of much debate in safety science over the last decades (Dekker, 2011; Dekker, 2014; Woods, Dekker, Cook, Johannesen, & Sarter, 2010). This should be kept in mind when exploring current approaches to teamwork in healthcare.

Teamwork

Understanding Teamwork in Healthcare

General considerations

Together with increasing awareness for patient safety in general, the seminal Institute of Medicine report "To Err Is Human" (Kohn et al., 2000) was one of the first publications that highlighted the importance of team performance in healthcare and inspired subsequent research. One can only speculate about reasons for how readily the connection between patient safety and teamwork was drawn, and we will try to explore some of those aspects in the following sections. Current teamwork literature acknowledges a lack of comprehensive investigations linking team training in healthcare and patient outcomes (Weaver et al., 2010). However, focusing on outcome of work rather than its process demonstrates how entangled the quality and safety agendas have become in medicine. "Because of the conflation of safety with quality, safety is seen as an attribute of quality […] rather than an emergent, thus dynamic, property of everyday work to manage trade-offs without doing harm" (Hollnagel et al., 2013). This has two important implications: First, the predominant strategy to achieve safety remains a traditional, reactive approach that regulates behavior and constrains performance variability. We will show below that, as this strategy is focused on competencies, much of the responsibility for unwanted results is pushed towards the 'sharp end' by the quality agenda, emphasizing personal and professional competence while obscuring systemic issues. Teamwork, while indispensable in the highly subspecialized reality of healthcare, is thereby oftentimes reduced to an aggregated set of individual behaviors.

One of the predominant definitions of a team is "a set of two or more individuals interacting adaptively, interdependently and dynamically towards a common and valued goal" (Salas, Burke, & Cannon-Bowers, 2000). Manser (2009) further highlights aspects that are especially relevant for healthcare, among them task-specific competencies and specialized work roles while using shared resources. Due to the domain's dynamic nature, medical teams have changing membership, are assembled "ad-hoc", and incorporate heavily subspecialized members while integrating different professional cultures (Manser, 2009; Østergaard, Dieckmann, & Lippert, 2011). The fact that healthcare is far from being a homogenous domain might be more crucial for our understanding of teamwork than what has been previously acknowledged: it has been described as "20 different industries under one banner" (Vincent & Amalberti, 2016, p. 7), covering properties from 'high risk' like emergency surgery, through 'high-reliability' like routine daily work on wards to 'ultra-safe' such as transfusion logistics. Both the patient and the healthcare professional constantly, but not always consciously, transition between different categories (Vincent & Amalberti, 2016)[3]. Subsequently, team literature often stresses the need for coordination, communication and leadership (Salas et al., 2000).

Frameworks

Attempts to study and describe team processes started in the 1950s and have exponentially grown in recent years (Paris, Salas, & Cannon-Bowers, 2000). Over time, the sheer number of proposed aspects of teamwork has grown to be both incomprehensibly large and riddled with inconsistencies and confusion (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995). A review by Burke, Volpe, Cannon-Bowers, and Salas (1993) found over 130 different labels to describe aspects of teamwork. While frameworks encompassing these various labels differ greatly in granularity and context, some core concepts, like the input-process-output (IPO) framework (McGrath, 1964) and reference to different types of teams, can be identified (Salas, Cooke, & Rosen, 2008; Sundstrom, 1999). It is important to remember that historically, the main stimulus for team research has been tied to what is commonly understood as 'team failures', particularly associated with high-visibility accidents (Ilgen, 1999); a development that is congruent with predominant understanding of safety at the

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[3] For example, a trauma patient in the ER, with life-threatening injuries, is in the domain of 'high-risk' because of his condition, thereby establishing the same category for the trauma-team. However, the procedure for inserting a bladder catheter to monitor his urine output will be within the 'high-reliability' domain while the type O negative blood that is given has an ultra-safe property. Moreover, the same personnel that treated this trauma patient may treat an elective patient next, a situation where the 'high-risk' categorization would be unacceptable. However, while this might almost fall into the category of 'ultra-safe' (Vincent & Amalberti, 2016), there is no guarantee that the situation will stay that way due to the dynamic nature of healthcare.

time, or what we have introduced above as the 'philosophy' of Safety-I (Hollnagel, 2014). This also resulted in increasingly blurred lines between mere descriptive efforts and more normative guidance for improved teamwork (Paris et al., 2000).

Cannon-Bowers et al. (1995) reviewed and synthesized the field to describe eight generalizable core dimensions of teamwork: adaptability, shared situational awareness, performance monitoring and feedback, leadership/team management, interpersonal relations, coordination, communication and decision-making (for further detail see Table 1).

Table 1: Integrated teamwork skill dimensions (Cannon-Bowers et al., 1995 as cited by Salas et al., 2000)

Skill dimension	Definition	Subskills/alternate labels
Adaptability	Process by which a team is able to use information gathered from the task environment to adjust strategies through the use of compensatory behavior and reallocation of intra-team resources.	Flexibility 　　Capacity for closure 　　Development of innovation 　　Mutual adjustment Compensatory behavior 　　Backing-up behavior 　　Provide/ask for assistance 　　Fail stop Dynamic reallocation of functions
Shared situational Awareness	Process by which team members develop compatible models of the team's internal and external environment; includes skill in arriving at a common understanding of the situation and applying appropriate task strategies.	Situational awareness 　　Orientation 　　Team awareness 　　Development of integrated model of environment Development of system awareness Shared problem model development
Performance monitoring and feedback	Ability of team members to give, seek and receive task clarifying feedback; includes the ability to accurately monitor the performance of teammates, provide constructive feedback regarding errors and offer advice for improving performance	Intra-member feedback 　　Performance feedback 　　Planning review 　　Feedback/reinforcement 　　Acceptance of/giving suggestions, criticism Mutual performance monitoring 　　Monitoring and cross checking 　　Systems monitoring 　　Performance monitoring 　　Error id/correction 　　Intra-team monitoring Strategy development Procedure maintenance

Leadership/team management	Ability to direct and co-ordinate the activities of other team members, assess team performance, assign tasks, motivate team members, plan and organize and establish a positive atmosphere.	Task structuring
		   Delegation and assignment
		   Task assignment
		   Resource distribution
		   Resource management
		   Performance direction
		   Establishment of priorities
		Mission analysis
		Motivation of others
		   Leadership control
		   Goal setting
		   Drive to completion
		   Goal orientation

Interpersonal relations	Ability to optimize the quality of team members' interactions through resolution of dissent, utilization of co-operative behaviors, or use of motivational reinforcing statements.	Conflict resolution Co-operation (interpersonal) Assertiveness Morale building (beh. reinforcemt.) Boundary spanning

Co-ordination	Process by which team resources, activities and responses are organized to ensure that tasks are integrated, synchronized and completed within established temporal constraints.	Task organization
		   Co-ordination of task sequence
		Integration
		Task interaction
		   Technical co-ordination
		   Response co-ordination
		Timing and activity pacing

Communication	Process by which information is clearly and accurately exchanged between two or more team members in the prescribed manner and with proper terminology; the ability to clarify or acknowledge the receipt of information.	Information exchange
		   Closed-loop communication
		   Information sharing
		   Procedural talk
		   Volunteering/requesting info.
		Consulting with others
		   Effective influence
		   Open exchange of relevant info.
		   Evaluative interchange

Decision making	Ability to gather and integrate information, use sound judgement, identify alternatives, select the best solution, and evaluate the consequences (in team context, emphasizes skill in pooling information and resources in support of a response choice.	Problem assessment
		Problem solving
		   Emergence of solutions
		   Probabilistic structure
		   Hypothesis formulation
		   Information processing
		   Information evaluation
		   Planning development
		   Use of information Metacognitive behavior
		Implementation (jurisdiction)

The same group of researchers, arguably the most prominent and influential in the field, subsequently began to "[…] develop a set of prescriptive guidelines that can be utilized for training and selection" (Salas et al., 2000, for further information see Table 2). These categories were further condensed for a specific healthcare context in a review by Manser (2009, see Table 2).

Table 2: Overview of aspects of teamwork relevant to the quality and safety of patient care in dynamical domains of healthcare (Manser, 2009).

Aspects of teamwork	Examples of safety-relevant characteristics
Quality of collaboration	Mutual respect Trust
Shared mental models	Strength of shared goals Shared perception of a situation Shared understanding of team structure, team task, team roles, etc.
Coordination	Adaptive coordination (e.g. dynamic task allocation when new members join the team; shift between explicit and implicit forms of coordination; increased information exchange and planning in critical situations)
Communication	Openness of communication Quality of communication (e.g. shared frames of reference) Specific communication practices (e.g. team briefing)
Leadership	Leadership style (value contributions from staff, encourage participation in decision- making, etc.) Adaptive leadership behavior (e.g. increased explicit leadership behavior in critical situations)

Same, same but different: cultural influences

Klampfer et al. (2001) stress the need to consider cultural differences in teamwork research, pertaining to both national but also organizational and departmental cultures. Salas et al. (2008) address the salient need to understand the role of culture in team performance in light of progressing globalization: "To date, the bulk of team performance research involves U.S. or Western populations. [This] raises the possibility that the extant models are insufficient for teams with a heterogeneous cultural composition." (p.545). In fact, one could describe a certain cultural hegemony in medical teamwork research. While we could identify some management literature concerned with the topic, insight into the influence of national culture on teamwork in healthcare remains scarce. In addition to questioning the validity and applicability of a certain framework in a specific cultural context, the fundamental assumptions underlying that framework have to be re-examined before considering its implementation.

Training Teamwork

Although healthcare is more and more coming to the realization that merely adopting training concepts that have proven successful in other domains does little to improve patient safety (Neuhaus et al., 2016; Vincent & Amalberti, 2016, p. 7), there is widespread consensus that

teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care.

Many of the early safety efforts in medicine were modelled after experiences from the aviation industry, including the implementation of simulation to educate practitioners about human factors (Gaba, 1989; Howard, Gaba, Fish, Yang, & Sarnquist, 1992). These training programs usually address a number of cognitive and social competencies that are deemed relevant or essential for safety, sometimes dubbed 'non-technical skills' (NTS, Flin & Maran, 2015; Flin, Winter, & Cakil Sarac, 2009). Initially conceived as "Cockpit Resource Management" (CRM) programs in the aviation industry (Helmreich, Merritt, & Wilhelm, 1999), the evolution of these concepts and inclusion of a larger audience has led to various adaptations such as 'Crew Resource Management', "Anesthesia Crisis Resource Management" (Howard et al., 1992) or "Emergency Medicine Crisis Resource Management" (Reznek et al., 2003). Weaver et al. (2010) could demonstrate that most team training programs in healthcare are modelled on CRM principles (see Table 3 while incorporating both high- and low-fidelity simulation to enhance learning (Lorello, Cook, Johnson, & Brydges, 2014). One cannot help but notice a certain overlap between the terms NTS and CRM, to the point where the original authors talk about "NTS/CRM training" (Flin, O'Connor, & Crichton, 2008). The NTS framework, while targeting a variety of occupations, has also been adapted for special healthcare applications like Anaesthetists' Non-Technical Skills (ANTS; Flin, Patey, Glavin, & Maran, 2010, for further information see Table 3) and Non-Technical Skills for Surgeons (NOTSS; Yule, Flin, Paterson-Brown, & Maran, 2006).

Over the last 25 years, CRM training in healthcare has raised awareness about the influence of human factors in medicine, and generally contributed to positive attitudes towards patient safety and CRM training (Morey et al., 2002; Østergaard et al., 2011). Quite imprecisely, 'CRM' has been internalized by practitioners to the point where it has become an eponym for many different kinds of human factors-related interventions in healthcare.

In a critical review, Salas, Wilson, Burke, and Wightman (2006) point out a lack of standardization in CRM training:

> In addition, the various names associated with CRM training […] indicate the lack of consensus among domains as to how to label or define CRM. Furthermore, there is no standardization as to what competencies (i.e., knowledge, skills, and attitudes) are to be trained. (Salas et al., 2006)

Table 3: Illustrates the relationship between the elements in the Anaesthesia Non-Technical Skills (ANTS) system and the Crisis Resource Management (CRM) system (Østergaard et al., 2011)

ANTS	CRM
Cognitive and mental skills	
Planning and preparing	Anticipate and plan
	Know your environment
Prioritising	Exercise leadership
	Set priorities dynamically
Provide and maintain standards	Use cognitive aids
Identify and use resources	Distribute workload
	Mobilise all available resources
Gathering information	Use all available resources
Recognising and understanding	Allocate attention
Anticipating	Anticipate and plan
Identifying options	
Balancing risks and selecting options	Prevent and manage fixation errors
Re-evaluating	Re-evaluate repeatedly
Social and interpersonal skills	
Coordinating activities with team	Communicate effectively
	Teamwork
Exchanging information	Communicate effectively
Using authority and assertiveness	Exercise leadership and followership
Assessing capabilities	
Supporting others	Exercise followership

Although wholeheartedly embraced by the medical community, a review on the impact of CRM training by Salas et al. (2006) could only find partial support for its effectiveness: There seems to be a limited influence on teamwork attitudes as well as demonstrated behaviors (Morey et al., 2002), as well as a certain "ceiling effect" related to trainees' experience (Howard et al., 1992). Also, there is little to no standard for the qualification of CRM instructors in healthcare. In a review of 48 studies on team training in healthcare, Weaver et al. (2010) report that "[n]one of the studies provided meaningful details regarding how trainers themselves were prepared to train teamwork skills or explicated the skills sets important for trainer effectiveness." Moreover, the evidence for so-called 'train the trainer' activities is very limited. The literature suggests that with various training concepts readily available, individual needs are only rarely established for training development and implementation, thereby supporting a 'one-size-fits-all' approach to team training (Weaver et al., 2010).

Measuring Teamwork

In line with a general trend towards quantitative research in healthcare (Vincent, 2009), a variety of frameworks exist to measure various aspects of teamwork. In an effort "to consolidate the statistical evidence for the effects of team processes on clinical performance", Schmutz and Manser (2013) identified 28 studies that generally indicated that team processes significantly influence clinical performance. They nevertheless note the lack of a common conceptual framework and vague definitions. While models exist that reflect the complexity of teamwork, they are usually too complex for isolated research questions in healthcare. The two observation systems most often used are the observation method of Manser, Howard, and Gaba (2008) and the behavioral marker system NOTECHS (Catchpole et al., 2007, see Table 4). While the former is descriptive and records actions without evaluation, in the latter target behaviors are rated on a numeric scale for a defined episode. "This evaluative component may artificially increase the relationship with performance ratings, while descriptive observation systems provide more objective data on the team process." (Schmutz & Manser, 2013). Lemieux-Charles and McGuire (2006) reach a similar conclusion by reinforcing the need for "[…] rigorous conceptualization of team dimensions, processes and traits, and outcomes" in teamwork effectiveness research after identifying corresponding gaps in the literature.

In a critical review, Jepsen, Østergaard, and Dieckmann (2015) examined 23 different frameworks for assessing non-technical skills in healthcare. Overarching categories included cognitive and social skills, subdivided into cognitive categories such as: 'situational awareness', 'decision making' and 'empathy and sensitivity' and social categories like: 'Communication', 'teamwork', (shared) 'leadership', 'task management', 'organization' and 'working under pressure'. The same categories in different instruments were found to encompass different concepts and also overlap with different categories in other instruments. However, this overall lack of concept validity is not unique to healthcare, but has been described for teamwork assessment in other domains (Weber & Dekker, 2017)

Table 4: Surgical NOTECHS measurement framework (Catchpole et al., 2007)

LEADERSHIP & MANAGEMENT	
Leadership	Involves / Reflects on suggestions / Visible / Accessible / Inspires / Motivates / coaches
Maintenance of standards	Subscribes to standards / Monitors compliance to standards / Intervenes if deviation / Deviates with team approval / Demonstrates desire to achieve high standards
Planning & Preparation	Team participation in planning / Plan is shared / Understanding confirmed / projects / changes in consultation
Workload management	Distributes tasks / monitors / reviews / prioritises tasks / Allots adequate time / responds to stress
Authority & assertiveness	Advocates position / Values team input / Takes control / persistent / Appropriate assertiveness

TEAMWORK & CO-OPERATION	
Team building/ maintaining	Relaxed / Supportive / Open / Inclusive / Polite / Friendly / Use of humour / Does not compete
Support of others	Helps others / Offers assistance / gives feedback
Understanding team needs	Listens to others / Recognises abilities of team / Condition of others considered / Gives personal feedback
Conflict solving	Keeps calm in conflicts / Suggests conflict solutions / Concentrates on what is right

PROBLEM SOLVING & DECISION MAKING	
Definition & Diagnosis	Uses all resources / Analytical decision making / Reviews factors with team
Option Generation	Suggests options / Asks for options / Reviews outcomes / Confirms opinions
Risk Assessment	Estimates risks / Considers risks in terms of team capabilities / Estimates outcome
Outcome Review	Reviews outcome / Reviews new options / Objective, constructive and timely reviews / Makes time for review / Seeks feedback from others / Conducts post treatment review

SITUATION AWARENESS	
Notice	Considers all elements / Monitors vital signs & progress of operation / Asks for or shares information / Encourages vigilance / Checks and reports changes / Requests reports and updates
Understand	Cross-checks above / Shares mental models / Speaks up when unsure / Updates other team members
Think ahead	Identifies future problems / Discusses contingencies / Plans for future patient states / Anticipates high workload / Discusses constraints / Uses low workload periods

Below Standard = 1	Basic Standard = 2	Standard = 3	Exceed = 4
Behaviour directly compromises patient safety and effective teamwork	Behaviour in other conditions could directly compromise patient safety and effective teamwork	Behaviour maintains an effective level of patient safety and teamwork	Behaviour enhances patient safety and teamwork. A model for all other teams

Further adding to the complexity and difficulty of standardized measurements are that team-compositions constantly change, the lack of rater training, and difficulty defining specific context where the instrument should be used. There is no "gold standard" for ratings of NTS, and it is acknowledged that this is difficult to achieve, especially in light of constantly changing criteria for the development of behavioral markers as healthcare organizations evolve (Jepsen et al., 2015). Considering these aspects, it seems wise to be sensitive to consequences of implementing measurement tools:

> One challenge that underlies each assessment instrument is that its values might be taken for the real thing. It is important to note that each of the instruments contains constructs that aim to describe complex socio-technical systems. They do so by reducing complexity, by levelling fine-grained differences and by forcing raters into perceiving and thinking in a standardised way, what could be perceived as the downside of bringing the topics into the discussion by using standardised terms (Jepsen et al., 2015)

Additionally, if a specific framework is used throughout a professional education or in post-graduate evaluation, those being rated may adapt the framework as the "only" aspects of NTS that are important. Other crucial aspects of real work in the complex adaptive system, not described in the preferred framework, will be lost or ignored, because the healthcare professionals have been nurtured, evaluated and only given feedback solely on aspects included in the specific framework. Even if one argues that it is 'just' a measurement tool, not intended to reflect the whole, complex reality, over time it is likely to make healthcare professionals focus on the specific aspects they are being evaluated on.

> "You get an idea and you begin to look for it and you suddenly see it everywhere, and that is when you have to be a bit cautious because it shouldn't take over. Because it is just an idea, it is not a psychological mechanism, it's just a convenient way of describing things, and any convenient way of describing things will capture something that's essential and throw away things that also potentially could be essential, that's why you have to be very careful all the time about how you describe things" (Erik Hollnagel in Conklin, 2018)

As Jepsen et al. (2015) caution, real human and professional capabilities could ultimately be replaced by those from the assessment instrument. In summary, if categories of a framework constitute the 'dominant' truth of a professional's narrative, it might render them blind to other, equally important, aspects.

Normative concerns, scientific disconnect and blind spots

Ilgen (1999) first voiced concerns toward what he called a "normative bias" in teamwork research to address the trend of researchers more focused on increasing than simply understanding team performance:

> Normative models, in contrast to descriptive ones, usually start with a purpose to develop ways to improve teams so that behavior in them will meet some objective. […]. Once the model is constructed, the task of evaluating its normative value follows. (Ilgen, 1999)

Taken one step further, and quite contrary to the humanistic title of the IOM report, there is an abundance of teamwork literature that reads both judgmental and biased with hindsight while pointing at the individual operator, or 'sharp end' of a system. Talk about 'failures' or 'breakdowns', be it of teamwork or communication, and attributes such as 'good', 'bad' and 'poor' in combination with any 'non-technical skill' is plentiful (Flin & Maran, 2015; Flin et al., 2010), yet little effort seems to be taken to neutralize contextual language. Flin et al. (2008) go so far as to state that "[…] it has long been appreciated that the majority of accidents could have been prevented if better non-technical skills had been demonstrated by personnel operating and maintaining the system". In an exemplary fashion, this demonstrates little or no willingness to see team performance as configured in a wider system of constrained adaptive capacities, resource scarcities and system ambiguities.

Combined with what could almost be understood as an obsession with rating and measuring teamwork in healthcare, one has to ponder whether this trend supports self-fulfilling prophecies or actually contributes to improved patient safety – namely, has the objective in teamwork become to perform satisfactory according to a certain rating system, or to understand teamwork in the hope of ultimately improving patient safety? Fransen et al. (2017) state that "[validated assessment tools] support two purposes; on the one hand they provide *objective feedback*, on the other they enable *reliable comparison* between different types of team training" (emphasis added). Dekker (2014), on the other hand, argues that "[…] categories into which we put human and social features are infinitely negotiable". While these views certainly constitute two of the possible extremes, what often seems to be overlooked in teamwork research is the need to consciously address the trade-offs required to apply and interpret any taxonomy:

A model that is cumbersome and costly to use will from the very start be at disadvantage, even if it from an academic point of view provides a better explanation. The trick is therefore to find a model that at the same time is so simple that it can be used without engendering problems or requiring too much specialised knowledge, yet powerful enough to go beneath the often deceptive surface descriptions […] The consequence is rather that we should acknowledge the simplifications that the model brings, and carefully weigh advantages against disadvantages so that a choice of model is made knowingly (Hollnagel & Woods, 2006, p. 353)

A predominant focus on individual behaviors, both in training and as the unit of analysis, is oftentimes observed, justified by the fact that teams are comprised of individuals and by their dynamic composition (Flin et al., 2008; Østergaard et al., 2011). Combined with the explicit aim of minimizing, trapping and mitigating 'human error', such reductionist team training endeavors in healthcare seem to become increasingly disconnected from relevant developments in safety science of the last 30 years. Although the concept of 'human error' has been questioned, if not abandoned, in contemporary safety thinking (Cook & Nemeth, 2010; Woods & Cook, 2002; Woods et al., 2010), most of the team training efforts in health care seem to be centered on and build around it. In a sense, the patient safety agenda is being hijacked to serve a more hidden, managerial one: organizational distancing, a defense against entanglement with accidents, and the illusion of control (Cook & Nemeth, 2010). Accidents are not attributed to limited resources, an organization "going solid" (Cook & Rasmussen, 2005), overloaded wards, a history of underfinancing, or subtle "drift to failure" (Dekker, 2011; Hollnagel et al., 2013), but instead to the breakdown of teamwork (often at the level of the individual team member) skills. In this way the notion of teamwork becomes both a promise that managing a complex system is practically possible, and a moral commitment to prevent failure by engaging in the teamwork principles at the 'sharp end' of the system.

It is worth noting that, in the current discourse on teamwork in healthcare, a substantial body of research is largely being ignored (Finn, Learmonth, & Reedy, 2010; Iedema, 2009). Contributions from social sciences are rarely mentioned; instead a more simplistic narrative seems to be accepted that provides more convenient but scientifically impoverished explanations (Vincent, 2009).

[C]linicians reduce practical complexity to (technical or moral) abstraction. In doing so, they deny themselves and their colleagues the opportunity to engage with and learn from the actual messiness that characterises their everyday work: divergent understandings, ongoing tensions and pervasive uncertainties. (Iedema, 2009)

The relationship between medicine and social sciences is not an easy one, and is beautifully captured by Jackson (1999): "Medicine is the most humanistic of the sciences while also qualifying as the most scientific of the humanities." Vincent (2009) notes that while generally, measurement and data are trusted over opinion in medicine, oftentimes unfamiliarity with qualitative research is mistaken for hostility, impeding open-minded research and a study of wider organizational and cultural factors in the patient safety discourse.

As far as teamwork is concerned, there is a tendency that normative, formal dimensions have been privileged over social and affective ones. Research drawing on both organizational theory and the sociology of healthcare is scarce (Finn, 2008; Finn et al., 2010). Its result, however, is a more diversified, critical, and maybe somber view. In healthcare, teamwork as part of the professional identity superimposes the ideal of normative integration over individual interests, thereby overriding identities and aligning them with those of the team (Findlay, McKinlay, Marks, & Thompson, 1999; as cited by Finn et al., 2010). What mainstream teamwork literature rarely mentions, or glosses over, is what Finn et al. (2010) call 'micro-political struggles': "Social relations in teamwork, and associated issues of power, conflict and resistance are key, as roles and status need continual negotiation". Ethnographic, descriptive research seems much more sensitive in capturing the intricate web of historically woven relations between different actors, professions and specialties and their ongoing conflicts and struggles than any quantitative approach. Far from the "normative, evangelistic promotion of teamwork within much management and health policy writing" (Finn et al., 2010), it seems almost naïve to ignore the issue of power.

Teamwork and power

"We miss a great deal when we substitute culture for power" (Perrow, 1999)

While the issue of power with all its organizational facets has been at the heart of Charles Perrow's Normal Accident Theory (1999) for several decades, safety literature has recently started to acknowledge, and even embrace, power on a broader scale (Antonsen, 2009; Silbey, 2009). Obviously, power relations are omnipresent in daily organizational life.

Antonsen (2009) introduces a three-dimensional view on power based on Lukes' (2005) classification of power, supplemented by descriptions on possible sources of power in organizations (see Figure 1):

1. In its most obvious and observable form, the first dimension of power is visible in behavior and overt conflict. Polsby defines:

   > [O]ne can conceive of 'power' - 'influence' and 'control' are serviceable synonyms - as the capacity of one actor to do something affecting another actor, which changes the probable pattern of specified future events. This can be envisaged most easily in a decision-making situation. (Polsby 1963, pp. 3-4, as cited by Lukes, 2005, pp. 17-18)

   This type of power, also characterized as 'power over', may be rooted in position, knowledge and expertise, control of rewards and resources, coercive power, or individual attributes like charisma, energy or political skills.

Figure 1: The three-dimensional model of power (Antonsen, 2009)

	Three-dimensional view		
	Two-dimensional view		
	One-dimensional view		
Key elements	**First dimension**	**Second dimension**	**Third dimension**
Object of analysis	- Behaviour - Concrete decisions - Issues	Interpretive understanding of intentional action Non-decisions Potential issues	Evaluative theorization of interests in action Political agenda Issues and potential issues
Indicators	Overt conflict	Covert conflict	Latent conflict

2. The second dimension of power, summarized as covert conflict, is expressed through non-decisions and the ability to control decision-making processes in organizations. It often concerns *potential issues*, which are prevented from becoming overt issues through non-decision making:

> The sources of this form of power derive from differences in actors' access to and control of agendas. When organizational decisions are made, the decision processes are always preceded by selection processes that singles out which alternatives are worth considering as viable. This tends to give preferential treatment to the interests of those with a seat at the table, while the concerns of absentees are likely to be ignored. (Antonsen, 2009)

It is important to note that both dimensions are not contradictory, but represent complementary dimensions of power.

3. According to Antonsen (2009), "[…] social systems tend to be biased in reflecting the values of a few groups at the expense of other groups." The third dimension of power is concerned with political agendas and latent conflict, and examines how meaning is constructed in social life. Lukes (2005) notes that "[…] power is at its most effective when least observable" (p.1). Consequently, the third dimension of power describes a more systemic way of how power is exercised by one entity over another without being noticed, often through mechanisms of socialization and obfuscation. "Influencing the frameworks through which organizational members view on [sic!] reality can be a way to avoid conflict and resistance by obscuring conflicts of interests." (Antonsen, 2009). Although a certain

overlap exists between the three dimensions, power as exercised in the third dimension expands our understanding to include strategic considerations that enable sociological rather than merely personalized explanations.

When exploring the notion of power as embedded in obstetric teamwork, it is important to base this on the understanding that there are never-ending disagreements about how the concept of power is to be defined, employed, and studied. According to the author, "[…] how much power you see in the social world and where you locate it depends on how you conceive of it, and these disagreements are in part moral and political, and inescapably so." (Lukes, 2005, p. 12).

Power and teamwork

In the teamwork literature, issues of power implicitly or explicitly permeate all levels of the discourse. When viewed through the power lens[4], teamwork "[…] reproduces and maintains various forms of occupational inequality, as well as obscur[es] the need for more fundamental change in the work and social context" (Finn et al., 2010). This not only applies to inter- and intraprofessional relations (e.g. nurses vs. doctors, residents vs. attendings), but also on a broader organizational scale ('blunt' vs. 'sharp', management vs. staff) (Finn, 2008; Finn et al., 2010; Liberati, Gorli, & Scaratti, 2016). This coercive function, however, is oftentimes effectively masked with ideology and language. By framing problems as issues of teamwork, the focus is shifted from other, usually more profound organizational solutions, preventing robust and fundamental change. Within the teams, the egalitarian rhetoric rarely manages to break open encrustet strucures and effect sustained change. "Any appeals to egalitarianism these groups make could only be in terms of esteem, equal recognition and the emotional dimensions of work, rather than more fundamental redistribution of material reward and power at the structural level." (Finn et al., 2010).

Dekker and Nyce (2014) introduce a Foucauldian perspective to power in that "[…] power is everywhere we do safety work or safety research—embodied in discourse, knowledge, agency, structure and procedure". One has to be careful, however, not to see this as purely negative, but to acknowledge positive and enabling aspects of power. The potential to shape organizations through empowerment, regardless of its distribution, has to be recognized[5].

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[4] It is important to note that there is not one, but many 'power lenses' to choose from. We adopted the three-dimensional view as described above; beyond the scope of this thesis it might be interesting to contrast this with, and explore, other concepts of power (e.g. Foucault, Morriss, etc…).
[5] This is a central idea of positivist views on safety, and a role responsibility of leadership in HRO theory (Roberts, 1990) or in the design of safety culture (Westrum, 2004).

Towards a research question: Teamwork in Obstetrics

Why obstetrics?

"There is a continuous drama going on worldwide, where women are fighting for their lives on the battlefield of childbirth." (Egenberg, 2017)

In medicine, several fields stand out in terms of their dynamic nature, risks involved, and the need for constant adaptation and resilience on part of the care providers, amongst them Emergency Medicine, Surgery, and Obstetrics. After careful consideration, we concluded that Obstetrics seems best suited for a closer look at team processes, especially when comparing different countries and cultures.

The physiological event of giving birth is similar all over the world. Therefore, the demands for medical knowledge and skills on part of physicians and midwives are comparable. There is very little technology involved, and the surgical techniques are basic and the same everywhere. It is probably due to this 'common physiologic ground' that different traditions, myths, taboos and practices are socially constructed around childbirth all over the world (MacKenzie Bryers & van Teijlingen, 2010). This is captured in the "medical/social-model of childbirth" as described by Van Teijlingen (2005) that can be used to conceptualize different approaches to fetomaternal care. While often the medical and social model is dichotomized as the contrast between obstetrical and midwifery practice, reality usually resembles a much more nuanced negotiation in between: A complex web of interpersonal, inter-professional and hierarchical relationships presents in obstetric care (Dekker, Bergström, Amer-Wåhlin, & Cilliers, 2013), and success and resilience as a result of this diversity can be considered a 'petri dish' for further examination of team processes.

Current approaches

Teamwork research in obstetrics resembles the general approach previously described in this review, both regarding the scientific basis used for the argument and the discursive language. "The consequences of deficient communication and a lack of leadership are far reaching, and the stakes are high. Poor teamwork can result in huge physical, psychological and financial costs to those involved." (Cornthwaite, Alvarez, & Siassakos, 2015). The aforementioned trend of simplification

can be traced, albeit often disguised by professional pragmatism. As an example, one can consider the use of the concept of Situational Awareness (Endsley, 1995): "Situational awareness is a concept that was first defined in aviation. In obstetrics, it has been difficult to define and reliably measure […]; *however, put simply, it refers to knowing what is going on*" (Cornthwaite et al., 2015). This is in stark contrast to ongoing debates about the viability of the concept in human factors research (Dekker & Hollnagel, 2004; Flach, 2015; Parasuraman, Sheridan, & Wickens, 2008). Moreover, simplicity is explicitly desired: "In order to achieve better outcomes […], it is essential that team-training interventions are *simple and relevant* to the maternity care setting" (Cornthwaite et al., 2015, emphasis added). Nonetheless, one can also find a critical discourse around team training in obstetrics, where CRM-like interventions have failed to demonstrate the desired improvements (Nielsen et al., 2007). In a review of teamwork performance measurement tools in obstetrics, Fransen et al. (2017) evaluated six different frameworks available for simulated settings and noted both limited evidence for their psychometric properties as well as the general lack of a "gold standard" for teamwork performance. This mimics other critical reviews on performance measurements in healthcare (Jepsen et al., 2015; Rehim, DeMoor, Olmsted, Dent, & Parker-Raley, 2017).

In an exemplary fashion, we will describe two different programs currently implemented on a larger scale in obstetric team training.

simparteam®

In Germany, following an evaluation of peripartum fetomaternal outcomes, a working group of researchers, insurers, hospitals and universities was formed to design an interprofessional training program to increase perinatal patient safety. The simparteam® program incorporates 12h of both technical and non-technical skill-training, including "a lecture on human error in medicine and principles of crew resource management (CRM)." (Zech et al., 2017). Content is derived using "recurring root causes" from "approximately 800 cases of birth-related harm to either mother or child" from different claims registries in Germany. Training is conducted by an interdisciplinary instructor team of midwives, nurses, gynecologists, anesthesiologists, and neonatologists. The main instructors participate in a formal 4-day instructor course based on CRM principles. (Zech et al., 2017)

Helping Babies Breathe / Helping Mothers Survive

In recent years, big international programs have focused on improving peripartum care on a global scale, most notably among them "Helping Babies Breathe" (HBB) and "Helping Mothers Survive"

(HMS) (Ersdal et al., 2017; Kak, Johnson, McPherson, Keenan, & Schoen, 2015; Nelissen et al., 2014). While the main focus of these programs is on medical skills training, follow-up- and complementary simulation programs are starting to be implemented in different places in Africa (Egenberg, 2017; Nelissen et al., 2017). Among these is the "Sim for Life project" out of Mbarara, Uganda, with the aim of sustainable introduction and gradual increase of (medical) simulation activities in Uganda and East Africa (Sim for life proposal, unpublished). Included in these programs are non-technical skills training according to frameworks of how teamwork should be conducted.

What is "good" teamwork in obstetrics?

In summary, the knowledge about teamwork in obstetrics, as well as other domains in healthcare, remains ambiguous and conflicted. 'First, do no harm' remains the guiding moral imperative for frontline staff to constantly reflect upon and improve their work practices in an effort to increase fetomaternal safety in the perinatal setting. We have described other, more hidden agendas in the teamwork discourse, and the number of conflicting interests surfacing in a differentiated debate around modern medicine will be a far cry from idealized, compassionate patient care. However, to side with Vincent (2009), the possible contribution of a more social-scientific approach to teamwork is certainly more important to 'the sharp end' than mere academic critique.

In that spirit, the relevant question, and the one directly related to the aforementioned idea of safety as emergent property of collaborative work, then becomes what constitutes good (read: successful) teamwork, and what factors influence the caregiver's perception of 'good teamwork'? Moreover, is it conceivable that teamwork in the hospital is the result of a balancing act on the boundary of acceptable performance, or "flirting with the margin" (Cook & Rasmussen, 2005) rather than the product of CRM training and awareness of non-technical skills? All this becomes especially interesting when culture, in the anthropological sense of the word, is added to the mix. Does our western understanding of teamwork apply to care given in other cultures? And moreover, does our current approach to teach and "improve" teamwork address the needs of practitioners in dynamic, resource-constrained and goal-conflicted work environments?

3. Research methodology

Study objectives

Primary objective

In today's delivery of healthcare in obstetrics, teams much more than individuals have to cope with the complexity of the real world. Many existing frameworks that categorize teamwork apply a normative approach but overlook concepts derived from complexity thinking (e.g. emergence, shared and/or distributed cognition) situated in a joint system. By examining teams that manage peripartum emergencies in different settings and cultures, this study aimed to explore how successful teamwork is constructed and understood by those directly involved in patient care and contrast these findings with traditional normative approaches.

Secondary objective

Considering safety as an emergent property, this study aimed to highlight differences in the delivery of safe peripartum care between East Africa and Western Europe.

Literature review

To approach the question of teamwork in healthcare, establish the current state of the science and expose areas of controversy as well as dominant views in the field, a literature review was performed following the hermeneutic circle framework as described by Boell and Cecez-Kecmanovic (2010). In this iterative approach, literature searches are viewed as "continuing, open-ended process through which increased understanding of the research area and better understanding of the research problem inform each other".

The search for this project began by examining key articles (e.g. Cannon-Bowers et al., 1995; Salas et al., 2000; Salas et al., 2008; Weaver et al., 2010). Based on this foundation, subsequent articles

were located using the electronic citation functions in PubMed and Scopus. Additional queries using various combinations of the terms 'patient safety', 'healthcare', 'team' and 'teamwork' were conducted on PubMed, Scopus and the Lund University Library system. Snowballing and identification of studies through personal knowledge were also used. Moreover, select journals were searched for additional sources, and serendipitous discovery yielded relevant articles.

The results from our literature review were critically appraised to contrast prevailing approaches to teamwork in healthcare with current concepts in safety science. This was meant to provide a basis for further triangulation and interpretation of the results of our study. The literature review was subsequently published following peer-review in *Cognition, Technology & Work* (Neuhaus, Lutnæs, & Bergström, 2019).

Data collection

Study design

To answer the questions stated in the study objectives, we conducted a qualitative, exploratory case-study (Yin, 2015, p. 68) at two study sites. Research was conducted at the Heidelberg University Hospital, Heidelberg, Germany, and the Mbarara Medical Simulation Centre/Regional Referral Hospital, Mbarara, Uganda.

Heidelberg University Hospital

Heidelberg University Hospital is one of the largest medical centers in Germany, affiliated with the Medical Faculty of the Ruprecht-Karls-University Heidelberg. It serves approximately 2.5 million people in the immediate Rhine-Neckar Metropolitan Region, as well as patients from all across Germany and Europe.

Mbarara Regional Referral Hospital

Mbarara Regional Referral Hospital, commonly known as Mbarara Hospital, is a government owned referral hospital in western Uganda. It is affiliated with the Medical School of Mbarara University of Science and Technology (MUST) as primary teaching hospital. The hospital serves a population of over four million people in the area comprising the districts of Mbarara, Bushenyi,

Ntungamo, Kiruhura, Ibanda, Buhweju, Rubirizi, Mitooma and Isingiro. The hospital also receives patients from Kabale, Masaka, Fort Portal and neighboring countries like Rwanda and Tanzania.

Mbarara Medical Simulation Centre

The Mbarara University of Science and Technology (MUST), the University of Calgary (U of C), the Stavanger Acute Medicine Foundation for Education and Research (SAFER) and the Consortium for Affordable Medical Technologies in Uganda (CAMTech Uganda) have partnered to build a Medical Simulation Centre with the aim of improving maternal, new born and child outcomes in Uganda as part of the 'Sim for Life' project.

Interviews

Cross-cultural considerations

The researchers are aware of the huge impact of a cross-cultural study design, considering that "[…] local knowledge can be critical to understanding cultural traditions and customs, possible limitations, and the feasibility of the research" (Survey Research Center, 2016). The study protocol was therefore designed in close consideration of recommendations made in the 2016 'Guidelines for Best Practice in Cross-Cultural Surveys' by the University of Michigan Institute for Social Research.

Heidelberg

Research in Heidelberg was carried out by Dr. Christopher Neuhaus. Dr. Neuhaus is a German national and has been working as anesthesiologist at the Department of Anaesthesiology, Heidelberg University Hospital, since 2010. He is intimately familiar with local norms and customs.

Mbarara

Research in Mbarara was carried out by Dag Erik Lutnæs, a Norwegian national, via videoconference. He was aided by the regional coordinators, Drs. Santorino Data and Lenard Abesiga, both Ugandan nationals. As Course Developer, Project Manager and Senior Facilitator for SAFER, Mr. Lutnæs has been actively involved in the 'Sim for Life' project. This included working at Mbarara together with Dr. Data, where he spent weeks training instructors and medical staff at the Medical Simulation Center. Building on this background, he is sensitive to local norms and customs, and was able to apply this knowledge in the interview process.

Recruitment

Participants were recruited by Dr. Neuhaus in Heidelberg and Dr. Abesiga in Mbarara using convenience sampling as a type of non-probabilistic sampling (Elliot, Fairweather, Olsen, & Pampaka, 2016). Following a three-step procedure for sampling, first the target population was determined by the inclusion criteria specified in the study protocol (see Appendix I) as follows:

1. Belonging to one of the following professions: Board-certified obstetrician or anesthesiologist, certified or registered nurse or midwife
2. 18 years or older

In a second step, the sample frame was defined by the two predetermined study sites that this project was designed around. Third, individual enrolment was based on subject availability and accessibility, with a target sample size of 10-15 participants per study site. The sample size was in part based on an estimated degree of data saturation, but also based on pragmatic considerations regarding the researchers' time for as well as the scope of this project. All potential participants were issued the same study information (see Appendix I) and given time for voluntary consent. To minimize confounding factors, no further selection criteria or restrictions in the number of participants were applied. Nobody who wanted to participate and met the inclusion criteria was excluded.

Sample and setting

Participants engaged in a semi-structured interview with one of the primary investigators. The interviews were conducted face-to-face in Heidelberg, or via videoconference in Mbarara using a Virtual Meeting Room (Kinly/Skype for Business, Microsoft Inc., Redmond, WA, USA). At the Mbarara site, a private room with videoconference equipment was set up for this purpose at MUST. Interview language was German (Heidelberg) or English (Mbarara).

Interview questions

To enhance overall data quality, interviews were conducted according to an interview guide that was pre-approved by both Ethics committees (see "Ethical Considerations" below). In addition to general demographic information, participants were asked the following main questions (for a complete description, please see Appendix II):

- "First, try to think of a time (the last time?) where you experienced a peripartum emergency where the work was successful. Using your own words, please tell me about it?"

- "What, in your mind, made it successful?"

- "What makes work successful in general?"

- "Consider a colleague that you perceive as good and successful in working together with others, which qualities makes you put them in high regard?"

- "In your opinion, is there a correlation between good work and good outcome for mother and child?"

Transcription and translation

The interviews were audio-recorded, and recordings were later transcribed using f4transcript for Mac® (dr. dresing & pehl GmbH, Marburg, Germany) and Express Scribe® (NCH Software Inc., Greenwood Village, CO, USA). Interviews from Heidelberg were translated into English by the primary site investigator, who has lived, studied and worked in the United States of America and is fluent in both general and medical English. All personal or identifying information was removed during the transcription process.

Data analysis

Methodology for qualitative data analysis

As our study is only partly confirmatory and mostly exploratory in nature, data was analyzed using Applied Thematic Analysis (ATA). The ATA approach is "[…] a rigorous, yet inductive, set of procedures designed to identify and examine themes from textual data in a way that is transparent and credible" (Guest, MacQueen, & Namey, 2012). Drawing from a multitude of theoretical and methodological perspectives, its "[…] primary concern is with presenting the stories and experiences voiced by study participants as accurately and comprehensively as possible" (Guest et al., 2012).

Analytic strategy and process

Guest et al. (2012) describe data analysis in applied thematic analysis as "locating meaning in the data". Distinct to the often-encountered idea of sensemaking in qualitative research, this reinforces a measured approach that is cautious of highly imaginative over-interpretation of problematic data. Our analytic strategy was therefore designed according to recommendations by Guest et al. (2012) with the main goal of providing an "audit trail" of the process rather than an analytic "black box" that leaves many questions up to the reader's imagination. More precisely, this audit trail starts at the description of how we arrived and chose a research question, follows all through the methods section and ends with our analysis and conclusions. It is supported by the appendices, which we invite the reader to explore to answer any remaining questions. While we hope to illustrate the process for the sake of validity and transparency, there will always be complex workings of the researcher's mind at play that defy simple description. Especially in the later stages of coding, when faint traces of meaning are located and analytic choices are made, codes, definitions and analytic barriers sometimes need to be revisited and changed in light of new findings. We rely on our audit trail to tell the story. All qualitative data analysis, as well as data visualization, note taking, recording of memos and analysis ideas was performed using NVIVO 12 for Mac ® (QSR International, Melbourne, Australia).

In our study, the iterative process of data analysis consisted of the following phases:

1. *Establishing clear analytic objectives*: The main purpose of our study was to harness the narratives of practitioners and develop an understanding for their conceptualization of teamwork. This is highly exploratory in nature, and due to logistical and organizational constraints limited to a comparative case-study of two independent sites.

2. *Data quality control and enhancement during data collection*: During the interview process, the two researchers frequently exchanged experiences and compared notes regarding the interviews. This served two important functions: First, to control the quality of data gathered and ensure the reliability between the two interviewers, and second to already familiarize oneself with the data and develop a 'feel' for recurring themes and ideas voiced by the participants.

3. *Text segmentation and quality control:* After transcription, interview data was segmented by questions as specified in the interview guide. This was later used to assess and compare the consistency of the questions asked and to provide a foundation for comparability. This segmentation was purely structural in nature and meant to support our methodological approach. We were especially conscious of the ongoing controversy regarding text

segmentation and its potential for distorting context and meaning (Gibson & Brown, 2009), therefore the original interview dialogue was preserved and used for all coding and analysis of content.

4. *Development of initial themes and codes*: As the stated primary objective of our study is to "explore how successful teamwork is constructed and understood by those directly involved in patient care and contrast these findings with traditional normative approaches", we applied different strategies in the initial mapping of our data: Both researchers together looked for representations of teamwork aspects as described by Manser (2009, see Table 2) in the participant's narratives, while at the same time generating emergent themes and defining vague boundaries around them.

5. *Development of a codebook and content coding*: In the next iteration, themes were more closely defined, restructured, and a codebook developed for definite coding of the text (see Appendix III). Subsequently, all interviews were coded for content by both researchers together. This process was repeated twice, where the codebook was further refined, and analysis notes, ideas and memos were recorded for later analysis. It is important to note at this point that steps 3 – 5, while easily broken down into a logical sequence of events, can hardly represent distinct processes. Guest et al. (2012) note that "[…] the act of identifying a meaningful segment of text calls for some minimal representation of that meaning as a code, a note, a query, or a tag". Subsequently, coding ideas come to mind even during the initial reading and structural segmentation of the text. On the other hand, codes that were conceived and hardly ever applied were later changed, or redefined, as the process (r)evolved.

6. *First-order data analysis and comparison:* Subsequently, we analyzed data by location to provide a description of how teamwork was constructed by our participants. Moreover, comparisons between Heidelberg and Mbarara were made by extracting different codes and looking at the content in greater detail. Also, quantification methods were used, mostly to visualize code frequencies and aid the researchers in pattern recognition.

7. *Second-order analysis:* During the second-order analysis, the sometimes incomplete, sketchy or contradictory data is connected with theoretical literature with the aim of constructing theoretical explanations. According to Shkedi (2004), the purpose of these explanations is not necessarily the construction of "grand theory", but rather a conversion and organization of the content and the connection with the researcher, as it is impossible to separate the inquirer from the inquired from a constructivist epistemological perspective.

For us, this not only meant making sense of the analysis, but aligning the results with our own experience and understanding of the delivery of peripartum care.

8. *Writing the report:* Rather than a mere form of representation, writing "[…] plays an active part in the process of organizing, working with and analyzing data" (Gibson & Brown, 2009). It is also a way of crystallizing vague conceptions and connecting loosely formulated ideas, and presenting them to the reader through sound reasoning and exemplification. But above all, the cardinal rule of writing according to Guest et al. (2012) is to avoid annoying your audience without becoming polemic. You be the judge.

Quantification

As previously noted, some quantification of qualitative data was performed in order to aid in pattern recognition and visualization of data. This type of mixed-method approach is sometimes questioned, if not frowned upon, in classical qualitative research, as it is seen as dichotomous to qualitative approaches. We exercised extreme caution so as not to create new data without meaning, or infer any statistical calculations or significances. However, quantifiable measures like code frequencies or word counts can be understood as supplemental analytic techniques that enhance a thematic analysis (Guest et al., 2012, pp. 107-128)

Statistical analysis

Quantitative data analysis is restricted to descriptive analysis of the participants (occupation, experience) and the interview process (number of interviews, average length). Analysis was performed using Microsoft Excel for Mac 2011 ® (Microsoft, Redmond, WA, USA).

Validity & Reliability

A myriad of definitions try to capture the essence of validity in research, always revolving around issues of accuracy of measurement, approximation of reality and trustworthiness of the results. "An account is valid or true if it represents accurately those features of the phenomena that it is intended to describe, explain or theorize" (Hammersley, 1987, p.69, as cited by Guest et al., 2012). Reliability, also oftentimes referred to as consistency or dependability, on the other hand, is a conditio sine qua non for validity. "Since there can be no validity without reliability (and thus no

credibility without dependability), a demonstration of the former is sufficient to establish the latter." (Guba & Lincoln, 1985, p. 316). The more pressing question becomes how validity can be demonstrated for a particular type of research. The usual solution in quantitative inquiry is the comparison of one's own variables to pre-established standards while assuming their "credibility", thereby creating an inescapable tautology. In qualitative inquiry, validity is much more reliant on research and analysis procedures, reinforcing the need for transparency to "[…] making a convincing case for the validity of one's findings and interpretations" (Miles & Huberman, 1994, p. 278, as cited by Guest et al., 2012).

In addition to the aforementioned audit trail, we took the following steps to increase the validity of our research during various stages of the project:

- The study design, including the format and questions of the semi-structured interview, was developed by both principal researchers together. This ensured familiarity with the research objectives and the envisioned methods for data acquisition.

- The interviews were conducted by the same researchers that designed the study, therefore the purpose of each question was known as prerequisite for further inductive probing. During the interview phase, we constantly monitored and compared data as it was collected, so probing techniques could be aligned and overall data consistency enhanced.

- Transcriptions were made to provide verbatim accounts of the data collection event, including the captioning of reactions (thought phases, pauses, laughs, sighs, etc.). In addition to providing more precise accounts of the interviews than mere field notes, we were able to capture and document rich, powerful and sometimes very emotional quotes that convey much more meaning than any analysis ever will. In light of our multi-site research, transcripts form the necessary basis for reliable data comparison.

- A codebook was developed through multiple iterations. Also, coding was conducted together, so that ambiguities and reliability problems due to different interpretations could be immediately resolved.

- Where possible, we tried to employ triangulation techniques by using supplemental data sources to build our argument.

Biases and limitations

Our study, of course, has several limitations. For starters, the overall scope of the project, and the decision to pick two study sites, establish clear boundaries in terms of generalizability of our findings. We were always aware that it is an exploratory case-study that might prove to be hypothesis-generating at best, and descriptive of local, insulated and circumstantial phenomena at least. However, through the use of additional data sources and triangulation, we try to provide some frame of reference for the reader to put our findings into perspective. This is also the reason why we try to harness another source of potential bias, our own domain knowledge in healthcare and medical simulation, and for one of us (CN), our continuing involvement in the active management of peripartum emergencies as part of our professional duties. As stated in the introduction, we are very much aware of this lack of independence; however, our underlying motivation should go a long way of reinforcing our efforts at dealing with this bias and its potential influence on the results.

Interviewing study participants, no matter how well scripted, will elicit biased responses, based on a multitude of factors. Each study site brought with it its own peculiarities:

- In Mbarara, the use of videoconferencing, paired with sometimes subpar audio quality and language issues, might have influenced results. Also, the investigator had visited and worked there on two occasions, and was therefore vaguely acquainted with some of the participants.
- In Heidelberg, all study participants were at least vaguely acquainted with the investigator, and some had previously worked with him on several occasions.

When reading through the interviews, however, the honest, critical and open responses to our questions can be seen as testament to the participant's professionalism, and to the atmosphere and setting the interviews were conducted in. We like to believe that our questions "struck a nerve", and gave participants a chance to tell stories they felt worth telling.

In this regard, it was helpful for the process of reflexivity that in both cases, the other researcher was impartial, and the joint analysis and coding could help reveal and deal with biased interpretation. This is also one reason why we chose to do all the coding and analysis work together, thereby accepting the fact that we would not be able to calculate a Cohen's Kappa as formal inter-rater reliability score, but had to revert to a mere subjective assessment. Also, our analysis work

was not subject to external review. Our literature review, however, which lays the theoretical groundwork for all further analysis, was published in a peer-reviewed journal (Neuhaus et al., 2019).

Ethical considerations

Declaration of Helsinki

The study was conducted in accordance with the Declaration of Helsinki. The declaration delineates ethical principles for medical research involving human subjects, among those dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects. It also demands proper scientific conduct, the use of protocols, and review and approval by independent ethics review committees. In regard to this thesis, these aspects will be addressed in the following paragraphs.

Ethics review committee

Before commencing the study, approval of the study protocol (see Appendix I) has been granted from both the Ethics Review Committee of the Medical Faculty of the Ruprecht-Karls-University Heidelberg (Ref: S-110/2018) and the Mbarara University of Science and Technology – Research Ethics Committee (Ref: MUREC 1/7).

Data protection and privacy

Numerical codes and pseudonyms were assigned to each participant to maintain confidentiality. All identifying information were removed from the transcripts. Information linking participants to pseudonyms are kept in a locked file on encrypted USB drives that can only be accessed by the two principal investigators. Interview recordings were destroyed at the completion of the study. Consent forms were stored on encrypted USB drives (electronic) or in proprietary folders (paper) and kept in locked file cabinets in the offices of both primary investigators. Data collection was conducted in private settings as described above. The names of the informants and all other confidential information is subject to medical confidentiality. In Germany, federal and state laws

and regulations regarding the use of such data apply (Landesdatenschutzgesetz Baden-Württemberg LDSG BW und Bundesdatenschutzgesetz BDSG).

Voluntary participation and consent

Participants' involvement in this study, as well as the permission to collect, use and share data was strictly voluntary. Participants were thoroughly educated both verbally and with written information about the planned study and its effects, with special emphasis on the risks associated with participation. This took place before scheduling the interview. Written consent was obtained from participants prior to their involvement in the study (see Appendix A).

Withdrawal of consent

Participants could decide to withdraw their consent at any given time. At the request of the individual, all existing interview recordings, transcripts and written notes would be exempt from the analysis and destroyed. None of the participants chose to withdraw consent.

Reimbursement

Participants were not reimbursed and were offered no incentives for participation in this study. In Mbarara, in keeping with local customs, a small token of appreciation of an educational nature with a value not exceeding 5 USD was offered to the participants.

Sponsorship

The primary investigators did not receive any funding for the research proposed in this study protocol.

Conflicts of interest

This project work is in partial fulfilment of the requirements for the MSc in Human Factors and Systems Safety at Lund University for both principal investigators, who are students in the program.

Interviews and demographics

Interviews were conducted between June and November 2018. A total of 13 healthcare professionals in Heidelberg and 14 in Mbarara chose to participate in our study. Table 5 provides an overview of participants' roles and experience.

Table 5: Participants' roles and experience

		Heidelberg	Mbarara
No. of participants		13	14
Roles	Obstetrician	5	3
	Midwife	6	10
	Anesthesiologist	2	0
	Pediatrician (w/ OB experience)	0	1
Experience	0 - 2 years	1	0
	3 - 5 years	3	6
	6 - 10 years	7	5
	11 – 20 years	2	3

In Heidelberg, 8 individual interviews and two group interviews were conducted, as 2 and 3 midwives, respectively, preferred to be interviewed as a group. In Mbarara, 14 individual interviews were conducted. Mean interview duration was 30.4 minutes (Heidelberg 29.6 minutes, Mbarara 31.0 minutes, SD 6.8 minutes). Regarding adherence to the interview guide, during two interviews in Mbarara the last question could not be asked/answered due to connectivity issues. All other 25 interviews followed the interview script. As the interview questions #1-3 built on one another, on three occasions participants already intuitively gave answers to subsequent questions during the conversation, which led the interviewer to not explicitly ask these questions again. This happened twice in Heidelberg with question #2 and once in Mbarara with question #3. All instances were reviewed by the research team, which concluded that the interview content followed the logic of the pre-structured script and that structural reliability was not compromised. Overall, 93% of the interviews showed the structure specified in the interview guide.

4. Results & Analysis

Introduction and overview

In this chapter, we will present the findings and analysis of our study. We begin with some general demographic information, followed by separate analyses of the two study sites. Subsequently, we compare and contrast these findings, both with each other and the published literature.

Early on in the analysis it became apparent that predominant themes in the understanding of good teamwork varied greatly between the study sites: Hierarchy and Quality of collaboration in Heidelberg, Resources and Personality in Mbarara. Rather than being themes represented in current teamwork literature, Hierarchy and Resources thematically emerged from our conversations. Moreover, in Heidelberg, different professions expressed vastly different priorities and agendas.

Quotes are referenced by profession (OB – obstetrician, MW – midwife, PED – pediatrician, ANA – anesthesiologist), study site (H – Heidelberg, M – Mbarara), and participant number. In the transcriptions, […] denotes that a part of the quote was left out or changed to preserve context or anonymity, while … signifies a pause on the recording.

Figures 2 and 3 provide graphical representations of code frequencies and distribution.

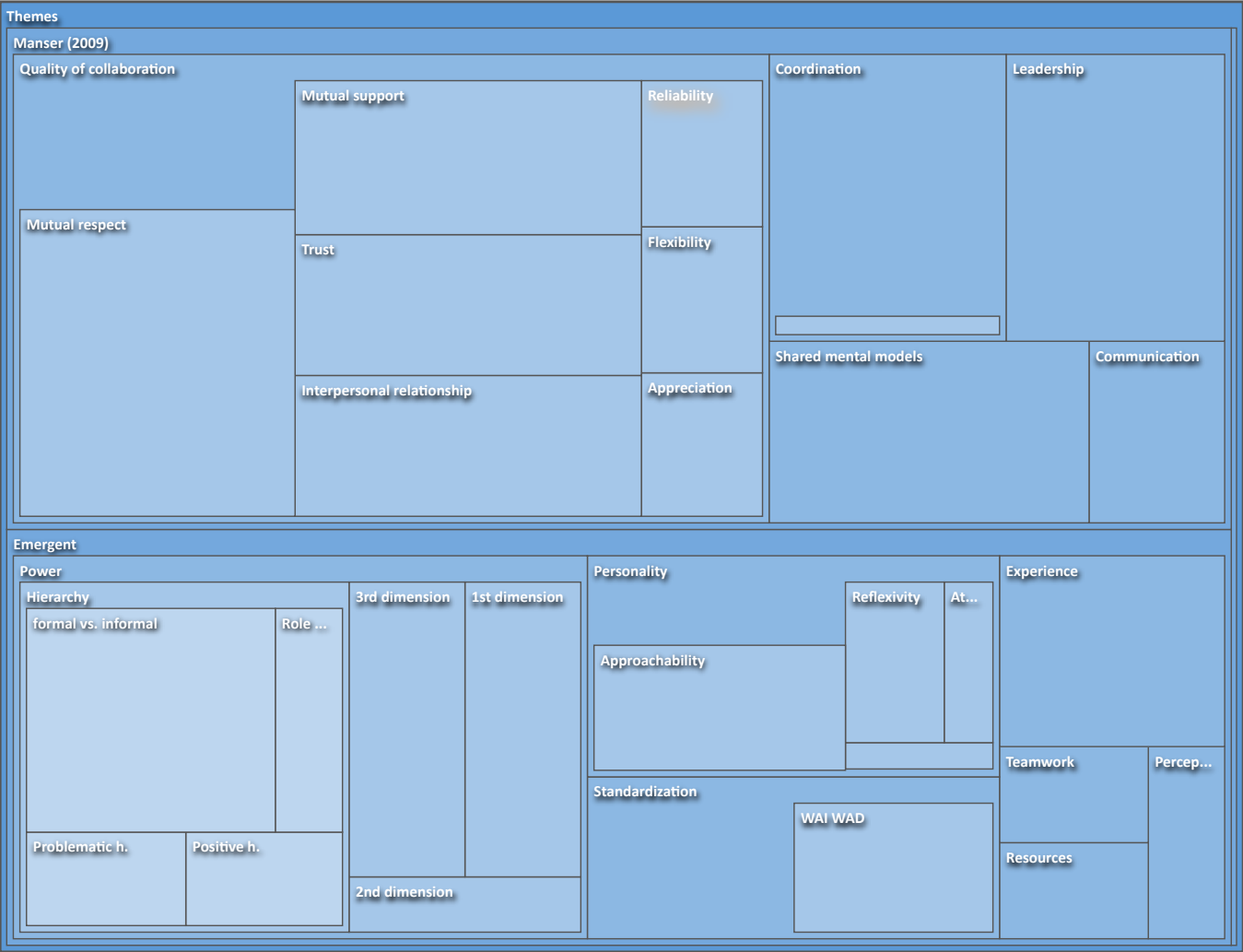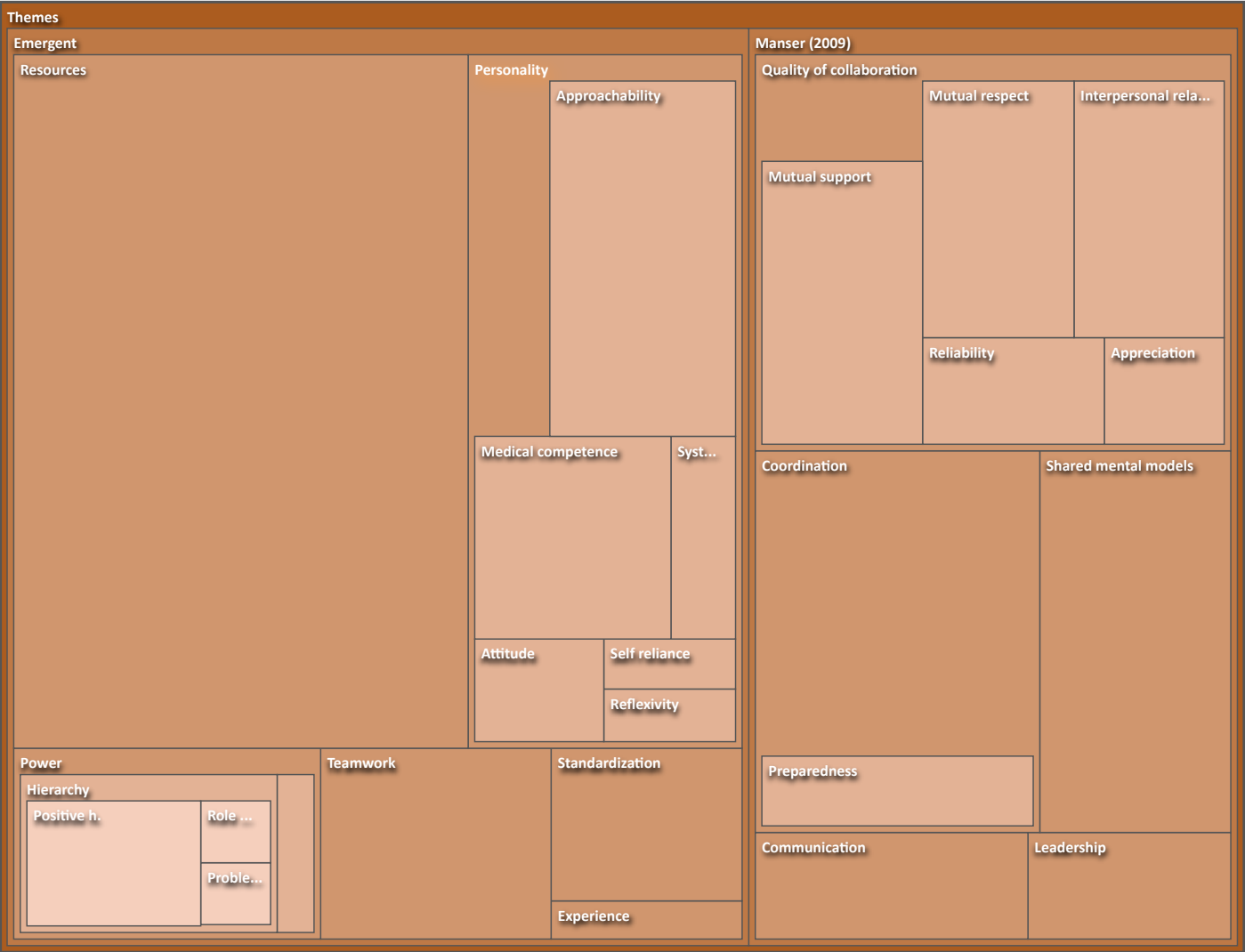**Figure 2:** Code frequency and distribution in interviews from Heidelberg

Figure 3: Code frequency and distribution in interviews from Mbarara

Heidelberg

Initial findings: what makes work successful, and what is good teamwork?

When analyzed by existing frameworks that describe relevant aspects of teamwork in healthcare (Manser, 2009, see Table 2), the most frequently addressed theme by participants in Heidelberg concerned the Quality of collaboration. For them, this aggregate construct is defined by the degree of mutual respect and support, trust, and reliability. This was especially relevant for midwives when describing their daily collaboration on the ward:

> *Well in my case it's like uhm…if [the colleague] uhm…if she doesn't have blinders on, but simply thinks for herself and is able to assess the situation and knows that if I am doing a delivery she can answer my bell. It's not as much about "mine" and "yours", but about teamwork, right? (MWH4)*

In that regard, mutual respect was described as prerequisite for the clear definition of boundaries. The concepts of "teamwork" and "team play" appeared heavily interwoven for the participants:

> *If you notice that the other one doesn't have time for something you take over. But… you also know your limits, how far you can go […] For example among midwives that's the case with vaginal examinations, that's up to the midwife that…well that takes care of that woman. And if I do a CTG and I see that it doesn't look good I won't simply examine her and just do it but notify her midwife […]. Don't just do it. It's about communication and team play. (MWH5)*

Interestingly, midwives often reflected on their work in regard to a set of standard operating procedures, referred to as the "Heidelberg Way", although we noticed many references to the difference between work as imagined and work as done.

> *[…] you help out the doctor because you know he's got so much to do, so you'll just do some things that are really not your jobs, according to this brilliant "Heidelberg Way", but you do it so he's got a little less to carry. (MWH5)*

> *Basically, we can decide to sit at our desk and not [do something] because it's not written in the "Heidelberg Way", or we can help the doctors a little bit. The problem is that there are some doctors that don't handle it really well […]. (MWH6)*

An important factor mentioned by participants, apart from a professional collaboration, was the quality of interpersonal relationships as basis for all further teamwork considerations.

I think, generally speaking everybody has more fun and things work better if you get along, and it's like you feel that if you get along and treat each other nicely you tend to take over jobs that are primarily not your own, I can certainly say that [the midwives] put in IVs for me and draw blood if it is stressful and they see me running around and uhm…of course there are those where you don't get along, and they really stick to where they simply don't do things. […] I think uhm in reality it's important that you see everything as a team, that you make progress as a team, what you can do even if it's theoretically not your job, you can still do it. (OBH4)

Of course it depends a little bit on yourself, on how much you play out the 'doctor card' I mean, like saying "I am the doctor here" or…I think it depends on interpersonal relations really, and not the time spent on the delivery ward. (OBH1)

I think in fact a lot really depends on interpersonal relations. I mean, I assume that everybody who was trained here has the medical competency, I would think…but like I said [it] really depends on how you get along…yeah and not so much on competency. (OBH1)

This directly influences not only the quality of collaboration, but also how team members communicate:

Well if the atmosphere is bad, everybody tries to avoid each other somehow, and then that gets to be a time issue I believe, uhm or time gets to be a relevant issue because something is communicated only if it's really bad at the end somehow, like an extremely bad CTG uhm…and the threshold to call somebody at night, if everybody is pissed off, is of course…is higher than if you have a more or less collegial relationship. (OBH2)

Furthermore, interwoven with aspects of interpersonal relations and the quality of collaboration are shared experiences as common ground for collaboration:

You don't need to be on a cordial first name basis and always super friendly, but you need to be able to judge each other's abilities, what can they do, how experienced are they, where are maybe uncertainties and

weaknesses. That makes a difference, depending on what midwife I'm working with…like in how I take up their suggestions. If she's older an experienced and I've known her for years, and I know what we've been through together, if she makes eye contact to tell me "be careful that's critical", it has a different meaning than when it's a young one that's been around for half a year and has only seen a few deliveries. (OBH5)

The participants' descriptions on how teamwork is affected based on trust and knowledge of others in dynamic situations show how their experiences defy behavioristic approaches from CRM-like training concepts:

I guess you can train the basics, where you actively try to listen to the other, but for that to be really fruitful it depends on how well you can judge the other person. I'm sure there were a few things that I did at night, where I spontaneously delivered kids together with experienced midwifes, that probably wouldn't have worked at a different time with maybe young inexperienced midwifes and inexperienced residents, simply because…well you know that you can get involved in a riskier situation together. (OBH5)

On the surface, good teamwork is constructed as a combination of the quality of collaboration, defined by respect and appreciation, open communication, role distribution, and shared experiences.

Its' important that…there's good atmosphere, interpersonally, in a way that people like to work there, that they communicate openly, and see eye to eye, that you value what the other profession does, but on the other hand that responsibilities are clearly distributed. Everyone needs to know "what is my job, what do I need to decide, and what do I need to do in what situation". On the other hand, what's always decisive, the longer you work together, the longer you know the midwives, the better it is. The biggest catastrophes, or stuff, always happen if you're new somewhere or if colleagues are new on the maternity ward. (OBH2).

Emergent phenomena

Over the course of our interviews, different themes began to emerge that, on closer consideration, seem to greatly influence and model teamwork in obstetrics. Most notably, these concerned individual personality, role perception, and hierarchy. We began to form an understanding of teamwork as an emergent property of how work is organized, structured and performed by individual actors, as opposed to a mere set of behavioral properties that are learned and applied.

Individual traits that were repeatedly mentioned as relevant included approachability and reflexivity.

What I really value among colleagues is if you can talk again afterwards, I mean after the event, and those that maybe also spontaneously address that and […] indeed afterwards it may be helpful to think about what went well, what went badly, what could you do differently… uhm I think that doesn't happen enough. (OBH1)

[…] if we feel as midwives that we can talk to [the resident] openly, that helps a lot, if you don't feel that you can say something but that's not accepted even if we think it is the right thing to do. (MWH1)

With those that overestimate their capabilities, […] I experience more problems or critical situations and sometimes even complications that don't happen to others, because there is a kind of blind ambition and hubris, like "I need to handle this alone". (OBH5)

These are also identified as sources for incohesion and conflict:

Most of the time we want to talk to the doctors, about the CTGs or cases we had, also because we want to explain why things were not pathologic from our point of view, or suspicious, why everything went okay in our opinion, and they don't even want to talk about it. (MWH6)

I actually had two or three debriefings in the doctors' office, I went there after the delivery and said "listen, I reacted in that particular way because for me it wasn't pathologic, we could wait another five minutes" or "I called you immediately because for me it was extremely pathologic, for me it was an emergency C-section, and you reacted totally relaxed, I don't understand how you could be so relaxed". Most of them have no answer. (MWH6)

As we learned how everyday work is organized on the maternity ward, it became increasingly apparent that separate realms existed for midwives and obstetricians, based on role perception, organizational structures and hierarchy. In the midwives' narratives, their primary area of responsibility concerned taking care of "their" women during the process of giving birth, sometimes for hours, forming a deep personal bond in the process. References to teamwork primarily related to collaboration with fellow midwives, and only in a secondary step involved

obstetricians, or physicians from other disciplines. As one midwife explains her collaboration with an anesthesiologist:

It's a little bit like we're doing our routine stuff, and as stupid as it may sound, somebody from the outside comes in and we're doing things differently. Sure, like I said that may help sometimes, but sometimes you're thinking…(rolls eyes, laughs). (MWH1)

This is partly caused by the organizational structure of a physician-led maternity ward. As one obstetrician explains:

[We're included in the process] pretty late. I mean of course, during admission we see the woman once, she gets an IV and we talk briefly and then [we come back] when the child is almost there, I mean when the head is visible. If everything goes as planned in between, we're not there at all […] Of course for young colleagues, if you're learning then it's better you see more, how the delivery progresses, how things work, what the mother does, what the midwife does […] I don't know if that would be accepted by all, but it would be good. Most of the time that wouldn't work, because you have too much other stuff to take care of, because there are too many ambulatory patients, or some stuff on the ward, and you can't manage to spend more time taking part in the delivery. (OBH1)

Moreover, there's a clear distinction between physiologic and pathologic deliveries, depending on the degree of medical intervention required:

Everyone agrees as long as the delivery is physiological it's in the midwife's hands, and if the delivery or the postpartum phase turns pathologic it is the doctor's job. (OBH5)

This distinction turned out to have far-reaching consequences for the concept of teamwork. Rather than constituting a shared understanding of how work is organized and enacted together, team composition, properties, and roles depend on this classification, and fundamentally shift once it is changed.

For me it works well that I stay in the background, that I initially observe the situation and watch, and if I don't see any danger for the child or for the mother, don't do much and watch and…the midwife knows the mother, she does that with the mother, and the…uhm yeah it works that I keep in the background and

let the midwife do it and…in most cases the babies are delivered without problems, the body knows…the women know how that works. (OBH1)

You know an epidural is an intervention to us, and, well, I feel happy for [the mother] but when I was in training, I always saw the epidural as a competition, because I felt that I hadn't taken good care of the woman if she needed an epidural. Now I see the epidural as a relief, because I somehow get to the point where I say "okay I can't do this anymore, it's important to get an epidural now". (MWH1)

Uhm the doctors mostly join us if there is an emergency or if the child is born. (MWH1)

Subsequently, responsibility as a property of taking care of the delivery, is usually not shared, but passed on between groups in a process that can be explicit or implicit. This is further complicated by the fact that, oftentimes, young inexperienced residents work together with experienced midwives.

Well it's like this: The doctor uhm well uhm you get to the delivery ward, the midwife has been taking care of the mother but as soon as you enter, you're supposed to sign your name to the CTG slip an then…the formal authority sort of flows over to the doctor but actually in the situation, depending on the experience of the doctor, it's only a formal hierarchy but uhm ultimately…sure, you try to manage it all but uhm (sighs) yeah in the end you need to…you need to make decisions as a doctor although, in terms of experience you would certainly benefit from listening to the midwife. (OBH2)

As one resident summarized, all this results in a complex work environment where formal and informal hierarchies need to be constantly negotiated by those working together:

Well the immediate partner of the obstetrician is the midwife, in a way that…it's the bigger challenge to handle that together. And on the other hand, and some midwifes say that openly, of course it's like they don't need us at all, and it's true. That's how it's always portrayed…it's something natural, in 95% of cases it's not a risky situation, and that's true, but in the end it comes down to formalities, if the maternity ward is led by physicians the doctor has to be present at the end of the delivery, but some of course spin it in a way where they say "we really don't need you, don't do anything, just stand there, we'll do the delivery, and you can do the suturing afterwards". And that's a little bit…you get the feeling that some have a wrong understanding of one's role. But well, that's how it is. It's surely dependent on how you see your role as a midwife, or on the setting. […] Of course, in most cases there's nothing, you just stand there as a doctor

and watch and in the end all is well. And in my experience, it's good if you don't…involve yourself unnecessarily, because the midwife is the primary contact person for the mother, and she knows how…she's known her for hours, and I, well…with most mothers I haven't even shaken their hand, I just join them, say hello and then the child is delivered, therefore it's always like…the midwife has been there for maybe even 12 or 8 hours and knows about the situation and…but of course, if something's wrong in the end the responsibility is transferred to the physician, and well…you have to see that clearly, the midwives tend to forget that the doctor ultimately carries the responsibility, and he's the one who faces the heat if something's wrong, they like to forget that. (OBH2)

As our curiosity was sparked, further inquiry into 'facing the heat' revealed a culture of outcome-based accountability among obstetricians that would later prove pivotal to our understanding of how teamwork is constructed in Heidelberg.

[G]enerally you have to explain the pH in the morning, then the CTG is looked at and…it's a shame, because the CTG doesn't reflect the situation, you know, there's so much going on, [the mother] is screaming, you can't talk to the patient, uhm, back and forth, uhm, she's in pain uhm and the CTG is recording permanently and the only thing that's communicated in the morning is that CTG and two pH values…it's a little bit like we condense everything down to those values, it has to be quantifiable, but it's like…a little bit like…(sighs) that's the reason why everybody is so fixated on formalities, that everything looks good on the outside, you know, uhm, that everything is kept below the surface, and then…and that we don't get problems in the morning. (OBH2)

It's like, if the pH is below 7.0 then you need to write a report about what happened or what could've been better…the background is that if the child has any developmental or intellectual defects, that we did a workup, just in case there is a lawsuit. That's what we have to do if the pH is below 7.0 […] normally it is like that at the morning meeting, there's everybody, the boss, the attendings, all the residents, and you present all the pH values, and if it's bad they take out the CTG look at it and ask "why didn't you" and "why at that point" and "here you should have" but…and then you really have to [justify] that in front the whole team, and if you're really lucky there are also 20 med students present (sighs). (OBH3)

(sighs) and it's always this pH focus […] The pH is what you have to justify later if it is bad, I think they also look at it from a legal perspective. So, I think if the CTG doesn't look that good but the pH is good, nothing much can happen to you. If the pH is bad and the CTG is good, still everybody asks questions. (OBH4)

This aspect of accountability, which is not shared by the team, turned out to be a major factor in obstetric decision making, especially when considering prolonged natural birth versus elective caesarean section, a source of much disagreement between obstetricians and midwives. Young residents, when faced with difficult decisions, tend to 'play it safe', not wanting to end up on the wrong end of an inquiry, while midwives focusing more on the experience of giving birth, perceive parts of the process as unjustified medical intervention.

> *I think that we pathologize a lot, I can't deny that. That's normal. Because [the doctors] are lacking the basics, the understanding of what's normal. Like…evaluating CTGs is difficult, you don't know how to do that because you saw 5 CTGs. You have to have seen many. (MWH3)*

From the midwives' point of view, the lack of accountability is not only acknowledged, but even sometimes welcome.

> *And like I said I am glad that I can say here's the point where I am allowed to hand things off […] Where I can say "this is not my job anymore, that's over now and I don't want to be responsible for this". (MWH1)*

> *Sure, if you work at the university or at a physician-led maternity ward, as a midwife you're out pretty fast, because there are always […] doctors or hierarchies above you that are ultimately responsible. (MWH2)*

> *As a midwife, you only have to face the music if you overstep your boundaries. Like do a vacuum extraction because the resident standing next to you has never done it before. Then you have to go see the boss. (MWH4)*

The aspect of accountability, while partly acknowledged by the midwives, turns into questions of trust within the team.

> *And that's what they're afraid of, I think. To trust the midwife if they know that [if it goes wrong] the next morning their boss will give them hell. (MWH3)*

> *[In training] we sat in on 100 deliveries and just watched and observed what happened. That's the only way you can learn […] it's about experience that you have as midwife, even if you ultimately don't have to stick your head out, from a legal perspective, if something goes wrong the end. But [the doctors] need to have a little faith. (MWH2)*

In summary, pursuing questions of accountability proved revelatory of more profound ontological differences. As a midwife explains:

> *Look, we learn differently. In our case, well I don't know but I'm guessing in med school you learn maybe…*
> *during all of med school there's maybe four semesters of physiology, max, and the rest is just pathologies.*
> *Maybe I'm exaggerating, but physiology plays a smaller part I would say, and you'll learn everything that*
> *is pathologic and what you have to do. In our case it's the complete opposite, there's two years of physiology*
> *and they only talk about pathologies in your final year. What you need to do if it doesn't work the way you*
> *imagined. So, you know in our case the design is different, and that's why we approach things more positively,*
> *because first we see the natural, and we get to know the natural better […]. (MWH2)*

Analysis: Paradox, Power, or Both?

Emerging paradoxes

When viewed from a more meta perspective, many aspects of our participants' narratives that seemed confusing and contradictory at first revealed logical paradoxes. First, it is important to remember the extraordinarily dynamic nature of obstetric work. The process of giving birth can turn from wonder to life-threatening emergency in a matter of seconds, a fact that is not only seldomly acknowledged, but conveniently neglected by many. The challenge for modern obstetrics in our western society is the balancing act of providing a positive and natural birthing experience without undue medical interference into a physiological process, while at the same time providing reliable, safe peripartum care to a society where pregnancy is considered a blessing, not a disease, and that therefore cannot, or will not, accept the harsh reality of peripartum mortality. This leads us to what could be considered the Catch-22 of obstetrics: As peripartum medicine becomes increasingly safe through medical involvement, the demand for fewer and fewer medical involvement increases as risk perception changes, consequently decreasing safety. Obstetricians and midwives, while expected to perform as a team, both knowingly and unknowingly represent different factions. Residents with only limited exposure to obstetrics are formally responsible, and held accountable, for a safe delivery, and subsequently represent an outcome-oriented mentality. Midwives, oftentimes presupposing a positive outcome due to their training, are representative of a more process-oriented approach. They do, thereby, hold and execute a large degree of informal control over this process: With obstetricians being occupied with a multitude of tasks, they have the critical role of triaging, and hold the power to decide about when and how to involve those

formally (and legally) accountable. Two main paradoxes emerge from the way obstetric work is organized:

1. Although glad to be able to hand off responsibility, midwives often voice notions of not feeling valued or appreciated, especially if those responsible disagree with a proposed assessment or treatment option. They feel conflicted about the involvement of additional medical professionals in the delivery process; while generally perceived as outsiders, they might also represent the required resource to avoid adverse outcomes and increase the systems' overall adaptive capacity.

2. Clinical work is organized in a way that physicians, while formally responsible, are occupied with a multitude of tasks, and can therefore only be superficially involved in the delivery process. At the same time, their performance is not judged with considerations of local rationality, but measured according to outcome-based quality indicators. To deal with these idiosyncrasies, obstetricians not seldomly revert to a "play-it-safe" approach to decision making that defeats any advantages from an integrative, interprofessional, team-based approach. In an exemplary fashion, this shows how the quality agenda is effectively able to hijack safety efforts. This is effectively obfuscated by an accompanying rhetoric constantly appealing to the individual actors' belief that "good teamwork" will benefit the patient and solve any potential problems.

Consequently, teamwork becomes the framework within which many conflicts are negotiated that, in reality, originated elsewhere. The implications for teamwork under these circumstances become increasingly visible when the notion of power is considered.

Returning to power

It has been previously noted that a representation of organizational life without the consideration of power may result in serious shortcomings (Antonsen, 2009). Power, in its various dimensions as described above, was the core theme that emerged in the analysis of our participants' narratives in Heidelberg, which is in stark contrast to the otherwise promoted egalitarian rhetoric of team training. While our participants generally reverted to explanations based on different professional identities, traditions or cultures, interesting dynamics become visible when their work is viewed through the power lens.

Power, in its most obvious form, is easily identified in our participant's narratives: Obstetricians have the authority, and thus power, to direct the course of a delivery by indicating medical interventions, e.g. a Caesarean section. Coercive power is executed by superiors when residents have to justify their decisions in hindsight during morning rounds. In more general terms, this dimension of power is perceived as a positive, or driving, force behind successful teamwork.

> *It is known from various other domains, […] if the employee or whoever uhm…get resources, leg room, power to make decisions, then it'll work. Most of the time. (ANAH1)*

However, it is not tied to hierarchical status. Midwives have the power to involve physicians from a variety of domains, and transfer authority, thus shedding themselves of formal responsibility.

Subtler, the second and third dimensions of power are represented in covert and latent conflict between obstetricians and midwives. This is not only reinforced, but created in the first place by a system that differentiates between formal hierarchy and experience, and places the former in the hands of junior obstetricians on the journey of acquiring the latter. It becomes apparent whenever decisions have to be made by residents against the will of midwives, which hold much informal power through their knowledge and obstetric experience. One resident explains the situation where a caesarean section was delayed, against his better medical judgement, due to this covert power struggle, resulting in an unwanted fetal outcome:

> *It's been a few years ago, uhm, during one of my first shifts on call…I probably, well formally I surely…would have had to insist, […] and I, well I simply didn't exude the authority, and didn't reinforce that in communication, I have to admit, I didn't go in the team room and crash the handover and say come on guys […] we are going NOW. And of course, that's what the boss was all over me for the next morning. (OBH2)*

He also offers a glimpse into the complexity of social interactions taking place at the workplace. Interestingly, these processes rarely fit into frameworks and formal descriptions of how work should best be performed, or organized:

[Y]ou want to live up to everybody's expectations, you know if [the midwives] say "we're doing handover" you want to meet their needs, in a way where you don't want to be the idiot that somehow uhm thinks he's the big dog although formally you have no, or only marginal experience. (OBH2)

Another source of much informal power lies in information about the course of the delivery, and the power to decide on when to involve the obstetricians on part of the midwives. Although this interaction has been targeted through a multitude of approaches, be it "best practice", guidelines, or team training, it is at the heart of what Dekker et al. (2013) characterize as essentially meaningless normative rhetorical commitments, belonging to a complicated system that is fundamentally different from the complexity found in obstetrics.

> If the problems associated with obstetric intervention were merely complicated, the solution would lie in optimizing, through best practice guidelines, the intervention criteria, and sensitivity to evidence of those closest to the obstetric process. But a complex system cannot be reduced to the behavior or compliance of individual components. It is about understanding the intricate web of relationships they weave, their interconnections and cross-dependencies, and the constantly changing nature of these as people come and go and technologies get adapted in use. (Dekker et al., 2013)

To connect the aspect of complexity to power and teamwork, it is important to remember the high emphasis our participants placed on relationships and personal knowledge when describing successful teamwork, a factor where proponents of standardization and team training would strongly disagree as to its importance. Again, teamwork rhetoric provides the framework for much organizational negotiation, while more dormant issues like resident training and workload, or discussions about suitable quality indicators and their connection to departmental funding remain below the surface.

Culture or power?

A puzzling aspect of the interviews in Heidelberg was how readily participants talked about culture and used the concept in an explanatory fashion, yet never explicitly mentioned power. Power did not seem to surface but lurk in the shadows, glossed over by a more neutral and maybe politically correct rhetoric about culture. From a sociological perspective, Perrow (1999) was certainly among the more prominent scholars to caution against a one-sided approach[6] focused on culture in the

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[6] Although, to be fair, Perrow is rather one-sided himself, just leaning the other way towards power

explanation of organizational dynamics. Le Coze (2015) reminds us of the analytical choice that is inevitably associated with the debate of power vs. culture:

> Whether one favours a critical, power view of organizations or prefers a seemingly more neutral approach emphasizing the weight of uncertainties, cultural and institutional influences, one's understanding of managerial, executive and regulatory implications and their degree of failure (and of responsibility) will differ. (Le Coze, 2015)

When our participants reflect on the different ways they are brought up and taught according to their professional identities, evoking a common 'culture' provides the basis for what Lukes (2005) describes as "recognitional domination", where a "dominant group or nation, in control of the means of interpretation and communication, project their own experience and culture as the norm, rendering invisible the perspective of those they dominate" (p. 120). Culture becomes the connecting element that elicits the desire for inclusion on part of young doctors and midwives at the cost of accepting a certain identity and view on their respective (professional) worlds. As this process happens slowly over time, the power that is subtly being exercised is not noticed. Therefore, it logically follows that power, especially when relating to the higher dimensions, is not part of our participants' conscious vocabulary.

Quality vs. safety: a tightly-coupled hijacking?

As we mentioned previously, in an exemplary fashion our study into teamwork revealed how the quality-management agenda can effectively influence clinical work in unforeseen ways. In 2015, Germany founded the Institute for Quality Assurance and Transparency in Healthcare (IQTiG) with the aim of evaluating, overseeing and assuring healthcare quality. Although an independent, academic institution, it has a federal mandate to develop instruments that measure healthcare quality and enable the transparent comparison of different hospitals (Gemeinsamer Bundesausschuss, 2018). A standard of care is defined through a set of quality indicators, and hospitals are required to provide associated data that are compared using statistical instruments. Deviations from the norm result in official inquiries with possible implications for future hospital certification and funding (IQTIG, 2018).

For obstetrics, the quality indicators include the APGAR score after 5 minutes, as well as Base Excess (BE) and pH-values of the umbilical cord as surrogates for fetal depression and distress. Multiple times, our participants described how clinical decision making was influenced by the requirement to monitor, report and justify these parameters. Midwives not seldomly scoff at

doctors' decisions to perform caesarean sections, writing them off as pre-emptive, based on an exaggerated need for safety and indication of a lack of traditional obstetric experience. Furthermore, in a classic example of tight coupling, even the quality of teamwork is affected, as midwives often see their own competency undervalued and questioned when their suggestions to continue a natural delivery are overruled in favor of a caesarean section. On the other hand, the reasoning of junior doctors having to "face the heat" in the morning is equally understandable, especially with the consideration of organizational and federal peculiarities.

While these repercussions were certainly not intended when federal requirement for quality reporting were announced, it shows in an exemplary fashion how the safety agenda is hijacked by quality management in an effort to standardize and quantify, thereby ignoring qualitative, interpersonal and social intricacies of a complex workplace. The delivery of care ultimately comes down to the one-on-one interaction of humans that will always require a degree of compassion and dedication that cannot be automated or standardized. It would almost amount to cynicism to state that the system that relies on these properties being exerted by its practitioners, is unable to extend to them the same amount of individual consideration in return. It also reinforces the intractable quality of healthcare as a complex adaptive system (Braithwaite et al., 2013).

Mbarara

Initial findings: what makes work successful, and what is good teamwork?

Same as in Heidelberg, when analyzed by existing frameworks that describe relevant aspects of teamwork in healthcare (Manser, 2009, see Table 2), the most frequently expressed theme by participants in Mbarara was "Quality of collaboration". More precisely, participants explicitly stressed the importance of personal traits, in what they mainly described as being "approachable".

> *Let's say you are calling…let's say if you have an emergency. If you call that person and he or she are able to participate or to intervene in a cool way, without talking roughly or what, then you feel like this person is very easy to approach. But if you find that someone is very hard and you want like call when you have an emergency, you feel like this person will not be able to receive my call, or when he receives me he talk much, so you find that this person is not good to be approachable. But if someone is very easy to approach, you call and you talk about your problem and it is easy. And you find it is very easy to be direct, than this person that is very rough and is hard to approach. (MWM6)*

The influence of those personal attributes on practitioners and their everyday work was so strong that participants explained how approachability could affect both patients and the quality of care:

> *When the specialist is not approachable, maybe…we may take long to contact them when we have a problem. Yeah, you know when somebody is not easy to talk to. Like, you talk to that person as the last option. If the patient may have been going in a worse condition, then the time we decide to call. And of course, when it take longer to take action, the repercussions…it is the patients that experience the repercussions (MWM2)*

Another facet of the Quality of collaboration, as expressed by the participants, is how co-workers are valued. Directly connected to the idea of approachability, different traits were mentioned, such as respect, mutual support and appreciation:

> *Then also I think working with someone who has some respect for the people around them right from the cleaner to the midwife to the doctors, makes a huge difference. If people know that you appreciate their place in the team, it makes a whole big difference. (OBM3)*

[T]hey also need the right attitude. If you say you have an emergency and you are calling people for help and the specialist give the instruction on phone, whereas might work, it might be successful, but it makes a big difference if the specialist came in person. The other people they are appreciative. (OBM3)

He is a young doctor, but when you tell him something he listens. And we discuss and reach good solutions together. That makes the work for the midwives much better. It makes us successful. (MWM10)

Teamwork was also constructed around coordination and collaboration. This type of coordination was often described as coordination between different units in the hospital, such as between the labor ward and the operating room:

It is a whole lot about teamwork. Making the work a continuation whether you are around or not around. Because that from [labor ward] to theatre it is long process. Whether who is supposed to take the patient there or…so you all have to be adept, or very at the same pace. (MWM2)

You know when the teamwork is good, when people are prepare a team, in the work. They need the work to be successful. Teamwork means good work. So if there is not teamwork, then to me the work will not be successful. The patient would have died because of lack of cooperation and not by the team a hand. So ideally the patient recovered because of the teamwork of the team. (MWM6)

Other aspects of teamwork in healthcare (Manser, 2009, see Table 2) were less frequent and not dominant in the interviews.

Emergent phenomena

Interestingly, participants from Mbarara primarily talked about teamwork not in a conceptual, but more structural way. For many midwives, teamwork described the luxury of actually being more than one person.

Teamwork is finding someone who can help at the time of need. (MWM7)

I mean teamwork is not a challenge. Because we have already established that in case you get an emergency you ring the bell so that they all come. Teamwork is not a challenge, but manpower. (MWM8)

> *Teamwork is all about working together to achieve something. (MWM6)*

Many midwives described that it was not uncommon to find oneself alone, attending to 50 patients on the labor ward, a situation that would petrify most western healthcare professionals. This also explains the enthusiasm expressed by the participants about instances where work was shared by more than one person.

Consequently, an interesting aspect of teamwork in Mbarara is the scale of involvement of relatives in the treatment. Referred to as "attending"[7], it is the norm that every patient has his or her own family members present to help. The use of and cooperation with these attendings is crucial for healthcare professionals to get work done.

> *Because if you have like fifty mothers. Can you do 'all' for fifty mothers? Of course, you cannot. So, these attendants. You capitalize them, you tell them what to do. How to bathe this patient and actually, in a normal sense, it is a nurse who should do that, who should bathe the mother and everything. So, we do not do those things, the attendants help us to do them. (MWM3)*

> *The person that I can say like "get me that glove" or "get me that bottle of [XY]" would be an attendant actually. We use an attendant. "Please help with that suture", "please help with that glove", "I want that cannula, bring me…". And we have to explain because it is not in their vocabulary. (MWM3)*

Despite this involvement, participants were critical of the circumstances, and reflected on the state of their system:

> *And you do not have to remind the patient that you are few in number, because it is not their problem. They came to get healthcare and delivering healthcare. So it is a bad thing in that the system might not wake up to the reality of the challenge. (OBM3)*

Early on in the interview process, narratives about the availability and/or lack of resources emerged as the most dominant factor in the construction of successful work by the interviewees. A seemingly ubiquitous scarcity of resources, regarding both personnel and life-saving medication and equipment, pervaded the stories:

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[7] This is also a source of misunderstanding, as "attending" refers to senior doctors in the US medical system

We talked about the shortages, and I was saying that because we have a centralized system of supply, the government the ones that makes the supplies which…it is not in our hands; one, to control when we need the supply and to determine whether it will come when we need it, but also when the quantities. But for specifically Obs and Gyn (obstetrics and gynecology), one of the most important drugs is oxytocin. And of course, fluids and the for safety you need gloves and some sundries to use. (OBM3)

So it was specifically on that day actually the downside was that we had…the good side, we had oxytocin, we had the fluids, but we did not have gloves. And we had to set a catheter without gloves. (OBM3)

Furthermore, the narratives unsparingly demonstrate the immediate effects these shortages have on patients' conditions.

I needed a catheter to catheterize this mother because one of the causes that I was suspecting that this mother had a full bladder that could have prevented the uterus from contracting. So I had to capitalize. I did not have a catheter. So I had to send this [family member] to go to the outside pharmacy, a private, to go and buy a catheter and bring it to me so I could catheterize the mother. So you find an emergency which you should handle within like 3-4 minutes but because of lack of sundries and being alone, you do not have other people to help you immediately. You find it have taken like one hour. And this delay, it also put the mother into big risk (MWM3)

Stories of how this lack of resources actually caused critical situations, where chances to save lives were subsequently missed, were frequently provided:

[S]ometimes you do not find any usable blood in the blood bank. Maybe you get a mother who is Rhesus negative, they are not…so when you get such a case, the mother is bleeding, you need the blood so fast it is the only thing that can save her, so you run into the blood bank to find…you do not find any rhesus negative, now you go to look around, and remember it is night, you look around for someone who is having negative. And it is sometimes not possible to get one. Then you have to…to go…to move far away. Actually such mothers, we lose them. The ones that does not have common blood types. With blood group O rhesus negative, getting that blood group is not easy. So, you look around and you put on the…to get blood and by the time refer like to the national referral hospital, it is too late and you lose a mother, it is quite sad. (MWM3)

And in some cases, like getting things, we do not have them, and we send a relative to go and buy it from a nearby pharmacy, we find the patient, the mother, is not being well, we have to wait and find our hands are tied up. We have nothing to use. I feel very bad. When the mother's condition is deteriorating, is going down, and you are waiting for the person who is going to buy a catheter to use. And you are tied up and you can do nothing, and you see a mother die. It makes me feel very bad. (MWM8)

Also, a high degree of individual resilience on part of the healthcare providers becomes evident. Success stories of how midwives adapted to overcome, work around, or cope with situations where they were lacking certain things were numerous:

Because we don't necessarily have phones. If it is a table-phone or maybe mobile phone…it means you have to use your own airtime, your own phone. So we normally get prepared for the night duty or, like, have to save …on your own phone…so if anything happens, any emergency, I use my own phone to call. (MWM3)

There is a time we got an eclamptic mother. We had no magnesium-sulphate, we had no hydralazine, they were all out of store. So we had to write for the [family member] to go and buy them from town. But the [family member] was of course saying "we do not have money, we do not have this". But finally, we went to the private wing, we presented with our file, they helped us. (MWM9)

Consequently, participants usually invoked their individual competence, in combination with the required compliance, as the decisive criterion for success and "good work":

I do think that the first reason the case was successful is identifying the risks. Identified even in the health center and there where identified on time. So when they bring the patient to us we also do an…I also did an assessment and I think this is a valid reason for the referral and immediate attention. The basic reason why this emergency was so successful is identifying the bleed and taking quick action. (MWM2)

I think in my clinical life what makes work successful is when I can assess my patients and make the correct diagnosis, provide the treatment and see my patients improve. I think that is a successful day. [S]o many times I am responsible for assessing the patient and making the decisions, and then the treatment is not something that I usually do. So after prescribing the treatment I send it over…hand the patient over to the nurse who then provides the treatment. So, the part of the success has followed the instructions that are provided and executed properly because otherwise if I prescribe the correct treatment and the nurse does not do her role then we may not be able to achieve he target that…we intend. (PEDM1)

Analysis: Resilience, teamwork and the viscerality of obstetrics

Individualism, resilience, or individual resilience?

Different aspects surface when we reflect on, and try to explain, the tendency towards individualist explanations as reasons for success. When compared to the narratives from Heidelberg, it becomes evident that all healthcare professionals, but especially the midwives, are required to work much more independently in an organization whose properties are not so much a result of choice than they are forced onto the 'sharp end': Resource scarcity, and the lack of personnel and equipment were the defining conditions constraining the discretionary space for practitioners. Without a doubt, these factors that dominate all areas of peripartum care in Mbarara help shape a professional identity that is centered on self-reliance, which is reflected in the way that success is attributed and created.

It remains unclear, however, to what extend these narratives are also influenced by the education provided through programs like Helping Babies Breathe or Helping Mothers Survive (Ersdal et al., 2017; Kak et al., 2015; Nelissen et al., 2014, see Chapter 2). If individual skills constitute the principal content of educational programs designed for resource-deprived 'areas of need', it is not surprising to see them evoked in an explanatory capacity, because they are the only thing that participants have been taught. It is not uncommon to see certain frameworks become the dominant truth in a professionals' identity (Jepsen et al., 2015, see Chapter 2).

What at first glance appears to represent an extraordinary amount of individual resilience in the face of adversity, when local workarounds help practitioners to overcome resource constraints by e.g. using personal phones, or employing family members, may on further reflection have more systemic roots. Although we are not familiar with the educational process of becoming a midwife in Mbarara (and it is unfortunately outside the scope of this research), it is conceivable that the tactics employed to provide successful peripartum care in Mbarara, while performed individually, are taught, spread and preserved within the organization. The aspect of safety as a social construct is not unheard of, but has been extensively studied in the HRO community (Rochlin, 1999; Rochlin et al., 1987). In this regard, the embrace of individual heroism, as expressed through participants' stories and explanations, can be seen as the organizational response to provide some measure of reliability under intrinsically unstable and unpredictable circumstances (Schulman, 1996).

Teamwork without a team

Teamwork, as in referring to a concept of "a set of two or more individuals interacting adaptively, interdependently and dynamically towards a common and valued goal" (Salas et al., 2000), is a word that was hardly used by Mbarara professionals at all. Again, various explanations can be pursued. First and foremost, in the reality of peripartum work in Mbarara, most of the time there simply is no team to work with. This again reinforces the notions of individual resilience, resulting in the creation of what we like to call 'communities of praxis' between healthcare professionals and family members in the attempt to render the dynamic process of multiple childbirths happening at the same time manageable. It is also conceivable that on the rare occasions that teamwork is actually possible with multiple healthcare providers present, the associated advantages far outweigh the difficulties that we encountered in an environment like Heidelberg, where teams constitute an inevitable organizational property. Consequently, it is not perceived as problematic, as evidenced by the fact that not one of the Mbarara healthcare professionals had any negative remarks on topics like the handover of responsibility or questions of hierarchy. Again, it could be argued that the dominant aspect of resource scarcity results in a notion of shared responsibility in the face of adversity, whereas responsibility is consciously and explicitly transferred in Heidelberg.

The dark side of obstetrics

Undoubtedly, the narratives from Mbarara unveil aspects of obstetrics that, while constituting reality in that part of the world, have been all but forgotten in our western conception of giving birth. As healthcare professionals, we are no strangers to human tragedy and suffering. Yet, hearing the stories of dying mothers and babies for what amounts to almost mundane reasons in our world, was both heart-wrenching and revelatory at the same time, and made us realize just how much more of a visceral quality peripartum medicine has in lesser privileged parts of the world. The mixture of distanced empathy, pragmatism, resignation but also stoic determination that is expressed in the stories, together with accounts of how they affected those telling them, go a long way of delineating their local rationality.

According to the World Health Organization (WHO), in 2015 the maternal mortality ratio in Uganda was 343 per 100.000 live births (0.34%), compared to 6 per 100.000 (0.06‰) in Germany, a factor of over 50. The neonatal mortality ratio was 19 per 1.000 live births (1.9%), compared to 2.3 (0.23%) in Germany (World Health Organisation, 2019). Thus, it becomes evident that properties that are taken for granted in our environment, e.g. transfusion logistics as an ultra-safe aspect of western healthcare, become invalid assumptions when applied to other parts of the world.

In medicine and public health, it is an often observed, and culturally rather insensitive, reflex on part of first-world countries to imply that tools or solutions from our environment might provide the same level of support when transferred to less wealthy, developing countries. We need to reinforce the fact that healthcare professionals in Mbarara did not once paint a picture of helplessness, or in any way express self-pity. Quite the contrary, they go to great lengths to provide the best possible level of peripartum care, given their discretional space, and hearing their narratives left the impression of incredible resilience and determination while working under conditions that from our understanding constitute great adversity. While in this context, resilience should most likely be understood as "an optimist approach towards the human ability to manage the risks inherent in complex systems (thrive despite risk)", oftentimes it remains elusive how exactly it is conceptualized in regard to the individual (Bergström, van Winsen, & Henriqson, 2015). Although based on a small number of narratives, their homogeneity in this regards points toward a location at the functional level of the system, rather than a mere collection of individual traits. Fetomaternal mortality, which is so rare it is hardly considered in our western societies, simply stands out in narratives from Mbarara as part of the everyday reality, as a facet of healthcare that needs to be dealt with. It should serve as a stark reminder that we need to pay tribute to local rationality, and go to great lengths in adapting ideas, tools and frameworks before trying to implement them in setting so fundamentally different from ours. To paraphrase Jens Rasmussen, if we do not understand (or rather 'try to understand') behaviors we study, it says something about us, not about them.

5. Discussion

Generalizability

The question that is inescapably raised by research such as ours is: Did we contribute to theory, or are the findings generalizable? While we would definitely refrain from claiming either of those, simply based on the scale of our project, we would like to highlight some aspects that were nevertheless deeply revelatory.

In Chapter 4, we tried to convey and analyze our participants' stories. Although we were not completely new to the domain, the interview process offered us a glimpse into their world, their realities, their goal conflicts and everyday challenges, and made us privy to the intimate process of peripartum care. Yet, instead of providing easy answers to our research question, their narratives paint the convoluted picture of a work environment with all its intricacies, constraints, interpersonal relations and hierarchical struggles that are much more representative of a complex system rather than the easily tractable environment that so many stakeholders would like us (and our participants!) to believe in. So, in order to answer our research question, we have to detour via other questions that emerged during the interview and analysis process, just like the unexpected patterns found in the data about power relations in Heidelberg and what in our western understanding amounts to an almost paralyzing resource scarcity in Mbarara.

On this study's objectives

Reaching the primary objective

Just to recapitulate the primary objective, this study aimed to "explore how successful teamwork is constructed and understood by those directly involved in patient care and contrast these findings with traditional normative approaches". Chapter 4 reflects our participants' views on good, satisfying work and teamwork. We also decided early in the analysis process to use both a pre-existing framework (Manser, 2009), as well as to look for emergent phenomena in the interviews. As the previous chapter points out, while some of the 'traditional' dimensions of teamwork could

be identified in our data, our participants placed much more emphasis on interpersonal relations as a foundation for all ensuing ideas around communication, collaboration or leadership. When probed for more detail, their narratives revealed individual intricacies, local customs or regulatory subtleties that will most certainly be beyond the reach and capability of any framework or model. Regarding this subject, Dekker (2011) reminds us:

> Granted, models are models for a reason: they are abstractions, simplifications, or perhaps no more than hopes, projections. Were a perfect model possible, one that completely and accurately represented the dynamics and complexity of its object, then it's very specificity would defeat the purpose of modeling. (Dekker, 2011, p. xi)

The question therefore becomes not whether existing frameworks provide a true representation of the environment we are striving to study, but what purpose they serve, and how they are applied. As we explored in Chapter 2, there seems to be a tendency that descriptive models of teamwork are abandoned in favor of normative rating systems, and efforts to improve and train introduce behavioristic, normative aspects into an otherwise sociologic endeavor. Our theoretic explorations are more than reinforced by this study's findings: None of our participants had been recently exposed to any form of teamwork training, and their answers to our questions were evidently not influenced by any specific framework or rating/training instrument. Quite to the contrary, they offered individual pieces of a greater puzzle that is much harder, if not impossible to assemble.

Teamwork: just another folk model?

In the analytic, post-hoc sense, the concept of teamwork might be suffering from the same fate as "human error" by providing a category that is both vague and intuitive enough to be readily accepted as satisfactory explanation by a wide variety of audiences[8]. In essence, this is the definition of a folk model: "[C]oncepts that are intuitively meaningful in the sense that everyone associates something with them, so they feel that they understand them." (Dekker & Hollnagel, 2004). Especially when concepts are no longer used descriptively, but in an explanatory capacity, they are at great risk of becoming arbitrary stopping points on the search for causality "after-the-fact". For "human error", the dangers of oversimplification and implications for ambiguous causality associated with the term were not only recognized (Rasmussen, 1990; Rasmussen et al., 1990), but

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[8] As in "teamwork failure", "bad teamwork", "breakdown of communication" or equal attributions.

gave rise to new theoretic approaches in systems safety, like complexity thinking and Resilience Engineering. The way we talk about, think about and apply teamwork will decide the fate of this concept that is an easy victim, especially when normativity and efforts to rate "teamwork skills" are pursued.

In an exemplary fashion, this also forces us to address the question of how readily "we put more faith in some of our own ideas and models than is warranted" (van Winsen & Dekker, 2015). As we have shown in Chapter 2 and reinforced with the results of our study, we are far from reaching a consensus when trying to academically define teamwork. Yet the connection between the ivory tower of academia and the messiness of everyday work is impossible to sever. Research cannot be self-serving and will be operationalized, as there is an operational community that is quick to adopt academic constructs:

> An interdependency exists between the research and operational communities, as at various points in the incremental evolution of human factors knowledge, we each consume the other's products. In the operational community, we are looking to the research community to provide insights into human performance […] and in return, the operational community will help to demonstrate the relevance of research […]. (Byrne, 2015)

However, this may come at the price of "overgeneralization" (Dekker & Hollnagel, 2004). And while many constructs, just like teamwork, seem "intuitive and intrinsically satisfying" (Byrne, 2015), this associative ease may be mistaken for understanding and foster implicit agreement, leading to a broader definition "by consensus rather than by reference to a model" (Dekker & Hollnagel, 2004). Moreover, constructs can evolve into requirements, measurements of questionable validity[9], and/or become normative standards with judicial implications (van Winsen & Dekker, 2015). According to van Winsen and Dekker (2015), "[a]s a human factors community, it is imperative that we engage in ethical discussions, asking questions about the consequences of the explanations, classifications, and practices we propose". This ultimately results in an important analytical choice: Given the inconsistencies associated with the use of the term, we should be cautious when exploiting "teamwork" in any explanatory capacity. On the contrary, through the nuanced use of language, combined with conscientious (and open-minded) scientific practice,

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[9] Dekker and Hollnagel (2004) remind us that "[w]hile it clearly is easier to propose a measurement for some of these concepts than for others, the ease by which measurement tools can be developed does not necessarily reflect the significance or validity of that measurement."

teamwork can provide a meaningful framework in which to embed further observations on social processes and dynamics in the workplace.

Secondary objective: more questions than answers

The stated secondary objective of our study was to "highlight differences in the delivery of safe peripartum care between East Africa and Western Europe" with special regard to emergent phenomena. All formal academic rhetoric aside, the implicit question behind this objective was: Can you compare teamwork in Heidelberg and Mbarara, and subsequently, is team training able to connect these two different worlds of obstetrics?

The previous chapter presented these profound differences, thereby implicitly providing the seemingly easy and unequivocal answer: No. While practitioners in Heidelberg and Mbarara share ideas about interpersonal relations, collaboration and coordination, the emerging aspects around hierarchy, power relations and the organization of work in Heidelberg, embedded in a system where the availability of resources is so abundant it is not even considered, will prove impossible to match with the obstetric reality of Mbarara, where work is overarchingly dominated by a constant lack of basic supplies, and where teamwork becomes a factor only when you are lucky enough not to be working alone[10]. Being healthcare practitioners ourselves, on self-critical reflection we have to ask whether the question, or the search for a common denominator, even made sense, or if it is also an expression of how ideas about standardization and homogeneity have become a subconscious and unquestioned part of how we ourselves construct, understand and conceptualize work?

Training: Think global, respect local

Our study provides a more somber outlook on the obvious question of whether it is theoretically feasible, or sensible, to transfer our experience with team training programs for peripartum care to developing countries, where global health efforts are surging. While the work we presented does not encompass enough data to generalize our findings, the results should arouse our suspicions in regard to expected successes and results when CRM-inspired frameworks, such as simparteam®,

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10 Interestingly, this was also expressed by an obstetrician in Heidelberg, who had been to Mbarara during medical school and experienced obstetric work there firsthand. When asked about how she would compare the two worlds, she didn't even know where to start, stating that we "couldn't imagine the differences".

are applied in a context different from our western provision of peripartum care. More likely than not, any "one-size-fits-all" approach will fall short in addressing local nuances and requirements, introduce biases, and also fail to fulfil moral obligations and responsibilities that inevitably connect us to our own frameworks and constructs (Breakey, van Winsen, & Dekker, 2015).

This is not to say that the transfer of certain aspects of team training to Mbarara might not be beneficial, given careful consideration of local requirements. Especially when considering the importance of family members and how much of a resource they can be, any kind of team-training, or non-technical skills training in general, should reflect this aspect of work in Mbarara. Strategies to enhance collaboration with the "attendings" might enhance capabilities of Mbarara healthcare professionals. While we are reluctant to propose any concrete framework, this is exemplary for aspects unique to the environment in this study that were not represented by any of the NTS or teamwork frameworks we have encountered so far. On more general terms, it is representative of the emergent nature of work, and the constant need for sensible, local adaptation.

On Teamwork

The way ahead

While we set out to learn what 'sharp end' obstetric practitioners perceive as good teamwork, after tapping into their powerful narratives and listening to compelling accounts, we would rephrase the question to: What kind of support do obstetric teams require to perform their everyday jobs of providing safe peripartum care, despite sometimes adversarial structural, organizational, logistical or political conditions? Above, we illustrated from various angles how teamwork is described, understood, enacted and trained in healthcare, both practically and theoretically. Nevertheless, in order to conceptualize a way ahead for team training in healthcare, we must first try to gain a meta-perspective of the current state. At present, we can only speculate about reasons for why the existing, diverse body of safety knowledge is not readily harnessed in its entirety in medicine. However, based on our own experience we would suggest far more trivial, if somewhat pragmatic, explanations that are rooted in traditions of academic medical discourse, rather than suspecting wider epistemological schemes. Traditionally, medical research is built on a strong Newtonian understanding of cause and effect. Over centuries, complex issues have been broken down to the smallest accessible denominator, from macroscopic to microscopic to molecular levels, each adding

small fragments to an expanding science that has progressively replaced ambiguities and guesswork of the past with new discoveries: From drugs and microorganisms, to signaling pathways, cellular receptors and, increasingly our very own DNA as building blocks of life itself. Oftentimes, the most fundamental advances were based on the empirical identification of treatment strategies, and the randomized controlled trial (RCT) has become the "de facto evidential gold standard" (Catchpole & Alfred, 2018). While viewing RCTs as the ideal methodology for causal inference, the quest for 'evidence-based medicine' has created an increased dependency on ostensibly objective data, and controversies about where to position medicine in the scientific landscape of 'hard' and 'soft' sciences are ongoing (Deaton & Cartwright, 2018; Falzer, 2018; Feinstein & Horwitz, 1997; Klein, Woods, Klein, & Perry, 2016). It is also important to consider how this discourse takes place in a society that is increasingly reluctant to accept gaps in knowledge, attribute circumstance to fate or higher religious powers, or accept physicians that simply cannot explain disease, suffering and death. Challenges arise as patient safety issues that were of no concern in this data-driven world of medicine only decades ago now increasingly become visible (Kohn et al., 2000; Makary & Daniel, 2016) and aspects like teamwork, hierarchy or interpersonal relations need to be addressed. This represents one approach to explain the predominant, reductionist understanding of the concept of teamwork in medicine: It is based on how the associated complexities appear manageable amongst an onslaught of new challenges, while appealing solutions in the form of normative rating and training instruments are readily available and confirm to the sought-after standards of measurability and comparability. And while expanding the discourse into the social sciences would be the primary responsibility of academic medical institutions, faculty there often not only lack the time and liberty to do so while juggling the more traditional responsibilities of medical education, resident training and patient care, but also lack the necessary education and exposure to scientific fields other than medicine. While it is next to impossible to know how contributions of the social sciences are used by healthcare practitioners trying to be 'jacks-of-all-trades", it seems plausible that opening up to a diverse and more complicated narrative is far more difficult than a somewhat protectionist stance where one stays firmly within its own ontology. Additionally, this is likely influenced by whether the social sciences are perceived as mere critics or collaborative contributors (Vincent, 2009).

The field would certainly benefit from a more interdisciplinary approach towards the topic that could help combine research traditions from both medicine and the social sciences, while at the same time taking a more expanded, or 'macro' view on how health care is delivered, and how socioeconomic factors that seemingly concern only the much larger system actually 'trickle down'

and influence individual healthcare practitioners. And while ongoing efforts of team training should continue, it might be wise to position these in a wider organizational context, rather than applying indiscriminate normative frameworks. Careful evaluation of the composition, scope and purpose of a given team, combined with individualized content reflective of prevailing culture and organizational needs might yield more sustainable results than current "one-size-fits-all" approaches. Although an intimidating prospect at first, some of these points might be taken care of by emergent phenomena: presently we can only speculate about the effects that allocation of resources, most notably time, might have on teamwork and team training. It has been repeatedly mentioned how time, or rather the lack thereof, shapes and constraints everyday work in healthcare and reinforces constant fluidity of personnel (Allen, 2002; Lewin & Reeves, 2011). Ad-hoc, informal activity, meetings and communication, sometimes called "backstage" activity (Lewin & Reeves, 2011) are oftentimes much more important in organizing daily work than planned, visible structures, however these 'hidden' mechanisms are rarely considered in current team training concepts. While indiscriminate 'CRM'-type training of normative behavior might create the outward appearance of interprofessional collaboration, its effects on everyday work will likely remain superficial at best if not properly complemented by organizational reflection and mindfulness towards social processes and dynamics at the workplace. Organizational efforts concentrated on teamwork training underscore not only the prevailing desire to believe in a reductionist model, but also the illusion that local control is possible regardless of more macro system features and behavior. It reinforces the concept of institutional safety as the product of individual virtues despite organizational hysteresis, an approach that is consistent with the technical and pragmatic, problem-solving origins of safety science (Dekker & Nyce, 2014). However, this operationally convenient but conceptually simplistic approach is bound to continue the responsibilization of local, frontline staff in yet another exercise of power. The way ahead might lie in efforts to increase awareness and strategically change power dynamics; this would represent a far more profound rethinking of organizational processes, but will require the allocation of resources and a willingness to fundamentally remodel parts of systems rather than mere teamwork strategies.

6. Conclusion

Based on our literature review, it appears that currently, medicine has settled for a reductionist and moral approach towards teamwork to manage the associated complexities, thereby accepting a simplistic but intellectually impoverished and ethically questionable understanding of the concept. This is not only confusing for practitioners, but in disregard of their needs and in stark contrast to the way their professional identities are otherwise constructed and understood. Compared to the sophisticated professional standards set for practitioners, one has to challenge what it takes to teach, train and evaluate teamwork in healthcare. It appears that healthcare would be well served to scrutinize questions of legislation, content and accountability in team training.

In our study, the issue of power emerged as a decisive factor in our western provision of peripartum care. We could show how ultimately, local team processes can become influenced by the pursuit of system-wide quality agendas in a tightly-coupled, complex system. Moreover, we highlighted different obstetric realities in Europe and Africa that defy any attempt at homogenization for the sake of quick, "one-size-fits-all" solutions to questions of teamwork. We would contest that, despite the need for measurements and evaluation, the continuous integration of social and cultural aspects in teamwork research will most likely enrich the current discourse for a more humanistic and complete understanding of what happens in healthcare teams. Recognizing power dynamics at the workplace, as well as exploring local conditions influencing practitioners' discretional space in an effort to understand team processes and guide the serious allocation of resources will certainly address current challenges faced by frontline medical staff more thoroughly than the application of normative frameworks. It is important to remember that, once we 'unleash' them from the intellectual protection of academia, frameworks will become operationalized, and eventually may start to constitute empirical reality – in short, they become (ab)used in the real world.

Our study has helped highlight aspects that influence teamwork beyond the scope of those normative frameworks readily applied in current efforts at team training. More often than not, egalitarian rhetoric glosses over more profound issues embedded in the organization, thereby ultimately encouraging the responsibilization of frontline staff. Maybe it's time we start considering new, alternative approaches to team training: Before rating people's 'sharpness', we should harness their narratives and listen to their current needs.

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Appendix I: Study protocol

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Study protocol

Teamwork as emergent property of obstetric work: a qualitative, exploratory case study

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Version 1.3

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Summary

Study title: *Teamwork as emergent property of obstetric work: a qualitative, exploratory case study*
Version: 1.3
Date: 14.02.2018

Much of the early safety efforts in medicine was modelled after experiences from the aviation industry, including the implementation of simulation to educate practitioners about human factors. These training programs, so-called 'crew-resource-management' (CRM) programs, usually address a number of cognitive and social competencies that are deemed relevant or essential for safety, sometimes dubbed 'non-technical skills'. Although healthcare is more and more coming to the realization that merely adopting concepts that have proven successful in other domains does little to improve patient safety, there is widespread consensus that teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care. Many existing frameworks that categorize teamwork apply a normative approach but overlook concepts derived from complexity thinking (e.g. emergence, shared cognition) situated in a joint system. By examining teams that manage peripartum emergencies in different settings and cultures, this study aims to explore how successful teamwork is constructed and perceived by those directly involved in patient care and contrast these findings with traditional normative approaches. Considering safety as an emergent property, this study also aims to highlight cultural differences in the perception of teamwork while delivering peripartum care between Africa and Western Europe.

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Scientific background

Patient safety: traditional linear approaches

If one had to choose the predominant theoretical lineage of widespread safety efforts in healthcare, it would most likely lead to James Reason and a predominantly Newtonian worldview: In order to design a safe system, much emphasis is placed on a good blueprint, proper rules, procedures and compliance therewith, all in order to establish barriers for error detection and prevention. This claim is supported by ample evidence of widespread efforts in healthcare e.g. to implement procedures and checklists (Allard, Bleakley, Hobbs, & Coombes, 2011; Arriaga et al., 2013; Haynes et al., 2009; Neuhaus, Spies, Wilk, Weigand, & Lichtenstern, 2017; Ornato & Peberdy, 2014; Russ et al., 2013; Rydenfalt, Johansson, Odenrick, Akerman, & Larsson, 2013). It is also representative of an often encountered, and rarely questioned, one-size-fits-all approach that is prevalent in a domain increasingly susceptible to quick fixes. On an individual level, much emphasis is placed on proper behaviour, to the extent that it can be categorized, rated, and trained:

> [Non-technical-skills] can be defined as "the cognitive, social and personal resource skills that complement technical skills, and *contribute to safe and efficient* task performance" [...] *Poor NTS can increase the chance of error*, which in turn can increase the chance of an adverse event. Good NTS (e.g., high vigilance, clear communication and team coordination) can reduce the likelihood of error and consequently of accidents. Analysis of incidents, as well as studies of behaviour during routine work (task analysis), can reveal which workplace behaviours positively or negatively influence job performance and adverse events. (Flin & Maran, 2015, emphasis added)

Still heavily based on 'Old-View' linear thinking (Dekker, 2014) and clear-cut cause-effect relationships, healthcare has done little so far to embrace alternative approaches to safety (Levitt, 2014).

Patient safety: High Reliability Theory and Resilience Engineering

The overarching idea of more recent approaches to safety that has so far been inadequately addressed in healthcare is as follows: How can we harness the capacity of individuals to successfully collaborate and produce safety as an emergent property of normal work, given the multi-professional and dynamic nature of modern medicine? Many approaches to this question have been described, mostly using examples from other domains: High-reliability theorists (HRT) have made various cases for "large, formal organizations that perform complex, inherently hazardous, and highly technical tasks under conditions of tight coupling and severe time pressure" (Rochlin, La Porte, & Roberts, 1987). What follows is a theory that is much more reliant on a social construction of safety, emphasizing implicit norms, myths and on-the-job training than merely devising SOPs and guidelines (Rochlin, 1999). All these properties invite a transfer to healthcare, of which we have seen little so far (Roberts, Madsen, Desai, & Van Stralen, 2005). Moreover, Rochlin et al. (1987) describe the culture among US Navy officers as follows: "The potential risk of attempting to operate at present levels under increasing budgetary constraints arises because the Navy is a "can-do" organization, visibly reluctant to say "we're not ready" until the situation is far

into the red zone." (Rochlin et al., 1987). The same is found in healthcare, although underlying motivations might vary: One could argue that both in the military and in healthcare, there is a certain ethos to be found that extends beyond a mere financial interest, simply because economic profitability is not the organization's top priority.

Beyond HRT, many more ideas exist: Schulman (2004) nuances models of reliability in healthcare. One way to create reliability is by having well-formed rules applied to predictable settings. Reliability can then be achieved by mostly controlling or thoroughly knowing the "input". The other form of reliability described by Schulman (2004) is having such robust organizational mechanisms that it can cope with complexity, or manage variability. This approach is consistent with ideas from resilience engineering (Hollnagel, Woods, & Leveson, 2007; Woods, 2015), although some authors are reluctant to use the term. Vincent and Amalberti (2016) choose to not use the term resilience in their book, however they equal resilience with the capacity to adapt and recover without using the exact word. In short, complexity scholars add some distinctive vocabulary to supplement their theoretical approach: Ideas like discretional, or operational, space add their own dimension to understanding safety in healthcare. According to Rasmussen (1997):

> Human behaviour in any work system is shaped by objectives and constraints which must be respected by the actors for work performance to be successful. Aiming at such productive targets, however, many degrees of freedom are left open which will have to be closed by the individual actor by an adaptive search guided by process criteria such as work load, cost effectiveness, risk of failure, joy of exploration, etc. (Rasmussen, 1997)

This applies to both the individual and the organizational level. Although an organization will try to shape individual behaviour by defining this operational space (e.g. through the use of SOPs or guidelines), Rasmussen, Nixon, & Warner note that "[…] the structuring of work processes […] by an individual will be a self-organizing, evolutionary process, simply because an optimizing search is the only way in which the large number of degrees of freedom in a complex situation can be resolved" (1990). This becomes increasingly problematic in the dynamic environment of everyday work:

> [A]ll work situations leave many degrees of freedom to the actors for choice of means and time for action even when the objectives of work are fulfilled and a task instruction or standard operating procedure in terms of sequence of acts cannot be used as a reference of judging behaviour […] In consequence, rules, laws, and instructions practically speaking are never followed to the letter. (Rasmussen, 1997)

Constructing a 'discretional space' out of degrees of freedom paves the way for understanding the aforementioned emergent phenomena: Drawing on complexity theory and systems thinking, they are the result of relationships and interactions of constituent components performing (mostly) normal work. No single component can mirror the behaviour of the system as a whole (Dekker, Cilliers, & Hofmeyr, 2011; Rasmussen, 1997), and system behaviour cannot be predicted on the basis of the individual components that comprise it (Dekker et al., 2011). This directly leads to a new understanding of the role of humans in these complex systems: They represent the crucial, and maybe most vulnerable, link between theory and practice, as they are the ones that have to "finish the design" (Dekker, 2014). So instead of a problem to control, they become the resource to harness.

Teamwork in obstetrics

"There is a continuous drama going on worldwide, where women are fighting for their lives on the battlefield of childbirth" (Egenberg, 2017)

Much of the early safety efforts in medicine was modelled after experiences from the aviation industry, including the implementation of simulation to educate practitioners about human factors (Gaba, 1989; Howard, Gaba, Fish, Yang, & Sarnquist, 1992). These training programs, so-called 'crew-resource-management' (CRM) programs, usually address a number of cognitive and social competencies that are deemed relevant or essential for safety, sometimes dubbed 'non-technical skills' (Flin & Maran, 2015; Flin, Winter, & Cakil Sarac, 2009). Although healthcare is more and more coming to the realization that merely adopting concepts that have proven successful in other domains does little to improve patient safety (Neuhaus et al., 2016; Vincent & Amalberti, 2016, p. 7), there is widespread consensus that teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care. The more pressing question, however, and the one directly related to the aforementioned idea of safety as emergent property of collaborative work, then becomes what constitutes good (read: successful) teamwork, and what factors influence the caregiver's perception of 'good teamwork'? Moreover, in keeping with Rasmussen's model, is it conceivable that teamwork in the hospital is the result of a balancing act on the boundary of acceptable performance, or "flirting with the margin" (Cook & Rasmussen, 2005) rather than the product of CRM training and awareness of non-technical skills? All this becomes especially interesting when culture, in the anthropological sense of the word, is added to the mix. Does our western understanding of teamwork apply to care given in other cultures? And moreover, does our current approach to teach and "improve" teamwork hit the target?

Many difficulties arise in the approach to these questions. Most notably, in terms of safety, healthcare is far from being a homogenous domain; it has been described as "20 different industries under one banner" (Vincent & Amalberti, 2016, p. 7). These run from 'high risk' like emergency surgery, through 'high-reliability' like routine daily work on wards to 'ultra-safe' such as transfusion logistics. Both the patient and the healthcare professional constantly transition between different categories. For example, a trauma patient in the ER, with life-threatening injuries, is in the domain of 'high-risk' because of his condition, thereby establishing the same category for the trauma-team. However, the procedure for inserting a bladder catheter to monitor his urine output will be within the 'high-reliability' domain while the type O negative blood that is given has an ultra-safe property. Moreover, the same personnel that treated this trauma patient may treat an elective patient next, a situation where the 'high-risk' categorization would be unacceptable. However, while this might almost fall into the category of 'ultra-safe' (Vincent & Amalberti, 2016), there is no guarantee that the situation will stay that way due to the dynamic nature of healthcare.

Several fields stand out in terms of their dynamic nature, risks involved, and the need for constant adaptation and resilience on part of the care providers, amongst them Emergency Medicine, Surgery, and Obstetrics. Of those, Obstetrics seems best suited for a closer look at team processes, especially when comparing different countries and culture: Physiologically, giving birth is the same all over the world, the demands for knowledge and skills on part of doctors and midwives are comparable, there is comparatively little technology involved, the surgical techniques are basic and similar everywhere. While surgery and emergency medicine are heavily influenced by technology

and available resources, focusing on obstetrics eliminates many confounding factors that further complicate any cross-cultural study and comparison of teamwork.

In recent years, big international programs have focused on improving peripartum care on a global scale, most notably among them "Helping Babies Breathe" (HBB) and "Helping Mothers Survive" (HMS). While the main focus of these programs is on medical skill training, additionally, simulation programs are starting to be implemented in different places in Africa. One of these is the Sim for Life project as collaboration of the Mbarara University of Science and Technology (MUST), the University of Calgary (U of C), the Stavanger Acute Medicine Foundation for Education and Research (SAFER) and the Consortium for Affordable Medical Technologies in Uganda (CAMTech Uganda). They have partnered to build a Medical Simulation Centre in Mbarara with the aim of improving maternal, new born and child outcomes in Uganda. With such initiatives follow emphasis on different teamwork an CRM aspects.

This raises many challenging questions for our research about differences and commonalities of attitudes and perceptions between Mbarara and Heidelberg.

Study objectives

Primary objective

In today's delivery of healthcare in obstetrics, teams much more than individuals have to cope with the complexity of the real world. Many existing frameworks that categorize teamwork apply a normative approach but overlook concepts derived from complexity thinking (e.g. emergence, shared cognition) situated in a joint system. By examining teams that manage peripartum emergencies in different settings and cultures, this study aims to explore how successful teamwork is constructed and understood by those directly involved in patient care, and contrast these findings with traditional normative approaches.

Secondary objective

Considering safety as an emergent property, this study aims to highlight cultural differences in the delivery of safe peripartum care between Africa and Western Europe.

Study design

Study sites

Research will be conducted at the Heidelberg University Hospital, Heidelberg, Germany, and the Mbarara Medical Simulation Centre/Regional Referral Hospital, Mbarara, Uganda.

Heidelberg University Hospital

Heidelberg University Hospital is one of the largest medical centers in Germany, affiliated with the Medical Faculty of the Ruprecht-Karls-University Heidelberg. It serves approximately 2.5 million people in the immediate Rhine-Neckar Metropolitan Region, as well as patients from all across Germany and Europe.

Mbarara Regional Referral Hospital

Mbarara Regional Referral Hospital, commonly known as Mbarara Hospital, is a government owned referral hospital in western Uganda. It is affiliated with the Medical School of Mbarara University of Science and Technology (MUST) as primary teaching hospital. The hospital serves a population of over four million people in the area comprising the districts of Mbarara, Bushenyi, Ntungamo, Kiruhura, Ibanda, Buhweju, Rubirizi, Mitooma and Isingiro. The hospital also receives patients from Kabale, Masaka, Fort Portal and neighboring countries like Rwanda and Tanzania.

Mbarara Medical Simulation Centre

The Mbarara University of Science and Technology (MUST), the University of Calgary (U of C), the Stavanger Acute Medicine Foundation for Education and Research (SAFER) and the Consortium for Affordable Medical Technologies in Uganda (CAMTech Uganda) have partnered to build a Medical Simulation Centre with the aim of improving maternal, new born and child outcomes in Uganda as part of the 'Sim for Life' project.

Procedures related to the research

To answer the questions stated in the study objectives, data will be collected using semi-structured interviews with participants from both study sites.

Interviews

Participants will engage in a 45-60 minute semi-structured interview with one of the primary investigators. The interviews will be conducted face-to-face (Heidelberg) or via videoconference (Mbarara) in a private setting. At the Mbarara site, a private room with videoconference equipment will be set up for this purpose at the Medical Simulation Centre at MUST. Interview language is German (Heidelberg) or English (Mbarara). The interviews are audio-recorded, and recordings are

later transcribed and translated into English (where applicable). All personal/identifying information will be removed during the transcription process.

Recruitment

Members of multi-professional teams managing peripartum emergencies will be recruited at both study sites

Inclusion criteria
- Belonging to one of the following professions: Board-certified obstetrician/anesthesiologist, certified or registered nurse/midwife
- 18 years or older
- Voluntary participation
- Signed consent form

Exclusion criteria
- Profession other than those stated in the inclusion criteria
- Medical/nursing/midwifery students
- Age under 18

Cross-cultural considerations

The researchers are aware of the huge impact of a cross-cultural study design, considering that "[…] local knowledge can be critical to understanding cultural traditions and customs, possible limitations, and the feasibility of the research" (Survey Research Center, 2016). The study protocol is therefore designed in close consideration of recommendations made in the 2016 'Guidelines for Best Practice in Cross-Cultural Surveys' by the University of Michigan Institute for Social Research.

Heidelberg
Research in Heidelberg will be carried out by Dr. Christopher Neuhaus. Dr. Neuhaus is a German national and has been working as anesthesiologist at the Department of Anesthesiology since 2010. He is intimately familiar with local norms and customs.

Mbarara
Research in Mbarara will be carried out by Dag Erik Lutnæs, a Norwegian national, via videoconference. He is aided by the regional coordinator, Dr. Santorino Data, a Ugandan national. As Course Developer, Project Manager and Senior Facilitator for SAFER, Mr. Lutnæs has been actively involved in the 'Sim for Life' project. This included working at Mbarara together with Dr. Data, where he spent several weeks training instructors and medical staff at the Medical Simulation Center. Building on this background, he is sensitive to local norms and customs, and can apply this knowledge in the interview process.

Timeframe

The study will be conducted in 2018, data collection is estimated to be finished by the end of August 2018.

Data protection

Numerical codes and pseudonyms will be assigned to each participant to maintain confidentiality. All identifying information will be removed from the transcripts. Information linking participants to pseudonyms will be kept in a locked file on encrypted USB drives that can only be accessed by the two principal investigators. Data will be destroyed at the completion of the study. Consent forms will be stored on encrypted USB drives (electronic) or in proprietary folders (paper) and kept in locked file cabinets in the offices of both primary investigators.

Risks of participation

There is a potential risk for loss of confidentiality either through observation of participation by a third party or self-disclosure.

Benefits of participation

Participants will not benefit individually from participation in the study. Certain beneficial effects on the profession or future patients might be possible.

Randomization

There is no need for randomization due to the study design

Dissemination plan

The results of this study will be published in form of a Master Thesis in partial fulfilment of the requirements for the MSc in Human Factors and Systems Safety at Lund University, Lund, Sweden. The planned time for submission is January 2019.

Moreover, relevant findings for the medical simulation and/or safety community may be published in scientific journals. Copies of these publications will be made accessible to all participants.

Termination criteria

Individual termination criteria

Participants can decide to terminate their participation in the study at any given time. At the request of the individual, all existing interview recordings, transcripts and written notes will be exempt from the analysis and destroyed.

Study termination criteria

The study will be terminated when the planned sample size is reached, or when the principal investigators agree that data saturation has been reached.

Statistical design

Study design

Qualitative, exploratory case-study

Qualitative data

As our study is only partly confirmatory and mostly exploratory in nature, data will be analyzed using Applied Thematic Analysis (ATA). The ATA approach is "[…] a rigorous, yet inductive, set of procedures designed to identify and examine themes from textual data in a way that is transparent and credible" (Guest, MacQueen, & Namey, 2012). Drawing from a multitude of theoretical and methodological perspectives, its "[…] primary concern is with presenting the stories and experiences voiced by study participants as accurately and comprehensively as possible" (Guest et al., 2012).

Quantitative data

Quantitative data analysis is restricted to descriptive analysis of the participants (age, sex, experience) and the interview process (number of interviews, average length).

Sample size

Sample size for the study is 10-15 participants at each study location (20 total). The sample size can be extended if both primary investigators agree on the need for supplemental data.

Ethical considerations

Declaration of Helsinki

The study will be conducted in accordance with the Declaration of Helsinki.

Ethics review committee

Before commencing the study, approval of the study protocol will be sought from both the Ethics Review Committee of the Medical Faculty of the Ruprecht-Karls-University Heidelberg and the Mbarara University of Science and Technology – Research Ethics Committee (MUST - REC).

Data protection and privacy

Numerical codes and pseudonyms will be assigned to each participant to maintain confidentiality. All identifying information will be removed from the transcripts. Information linking participants to pseudonyms will be kept in a locked file on encrypted USB drives that can only be accessed by the two principal investigators. Data will be destroyed at the completion of the study. Consent forms will be stored on encrypted USB drives (electronic) or in proprietary folders (paper) and kept in locked file cabinets in the offices of both primary investigators. Data collection will be conducted in private settings as described above. The names of the informants and all other confidential information is subject to medical confidentiality. In Germany, federal and state laws and regulations regarding the use of such data apply (Landesdatenschutzgesetz Baden-Württemberg LDSG BW und Bundesdatenschutzgesetz BDSG).

Voluntary participation and consent

Participants' involvement in this study, as well as the permission to collect, use and share data is strictly voluntary. Participants will be thoroughly educated both verbally and with written information about the planned study and its effects, with special emphasis on the risks associated with participation. This will take place before scheduling the interview. Written consent will be obtained from participants prior to their involvement in the study (see Appendix A).

Withdrawal of consent

Participants can decide to withdraw their consent at any given time. At the request of the individual, all existing interview recordings, transcripts and written notes will be exempt from the analysis and destroyed.

Reimbursement

Participants will not be reimbursed and will be offered no incentives for participation in this study. In Mbarara, in keeping with local customs, a small token of appreciation of an educational nature with a value not exceeding 5 USD will be offered to the participants (e.g. pen, paper).

Sponsorship

The primary investigators have not received any funding for the research proposed in this study protocol

Conflicts of interest

This project work is in partial fulfillment of the requirements for the MSc in Human Factors and Systems Safety at Lund University for both principal investigators, who are students in the program.

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Part I: Participant Information

Informed Consent Form for Obstetricians, Anesthesiologists, Nurses and Midwives (V1.3 18.03.2018)

<div style="border:1px solid black">

Study title: Teamwork as emergent property of obstetric work: a qualitative, exploratory case study

Principle Investigators:

    Heidelberg: Dr. Christopher Neuhaus, Heidelberg University Faculty of Medicine, Heidelberg, Germany

    Mbarara: Dag Erik Lutnæs, SAFER, Stavanger, Norway

Sponsor: Lund University, Lund, Sweden

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This Informed Consent Form has two parts:
- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form

Dear participant!

Introduction

We are doing research on how teams work together to manage difficult situations around childbirth. We are going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask us to stop as we go through the information and we will take time to explain. If you have questions later, you can ask them any time.

Purpose of the research

In today's delivery of healthcare in obstetrics, teams much more than individuals have to cope with the complexity of the real world. Many existing frameworks that categorize teamwork apply a normative approach, that is how people *should act* when working in a team in an ideal world, but fall short in explaining what constitutes good teamwork given the everyday difficulties of normal work. By examining teams that manage peripartum emergencies in different settings and cultures,

this study aims to explore how successful teamwork is understood by those directly involved in patient care.

Type of Research Intervention
This research will involve your participation in a 30-60 minute interview.

Participant Selection
You are being invited to take part in this research because we feel that your experience as a member of multi-disciplinary teams that manage childbirth can contribute much to our understanding and knowledge of good teamwork.

Voluntary Participation
Your involvement in this study, as well as the permission to collect, use and share data is strictly voluntary. It is your choice whether to participate or not. The choice that you will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier. You can decide to withdraw your consent at any given time. In case of withdrawal, all interview recordings and written notes will be destroyed.

Procedures
You are consenting to participate in an interview using semi-structured questions about teamwork which will take about 30-60 minutes of your time. The interview will be audio recorded and hand-written notes will be taken. In Heidelberg, the interview will take place in a private room by Dr. Neuhaus. In Mbarara, the interview will be conducted in a private room via videoconference with Mr. Lutnæs. Also, Dr. Data is available as a local coordinator, and to answer any questions you might have about the study.

Risks of participation
There is a potential risk for loss of confidentiality should you choose to tell anyone about your participation in the study.

Benefits of participation
You will not benefit individually from participation in the study.

Data protection and privacy
We will not be sharing information about you to anyone outside of the research team. The information that we collect from this research project will be kept private. Numerical codes and pseudonyms will be assigned to each participant to maintain confidentiality. All identifying information will be removed from the transcripts. Information linking participants to pseudonyms will be kept in a locked file on encrypted USB drives that can only be accessed by the two principal investigators. Data will be destroyed at the completion of the study. Consent forms will be stored on encrypted USB drives (electronic) or in proprietary folders (paper) and kept in locked file cabinets in the offices of both primary investigators. The interviews will be conducted in a private setting. The names of the informants and all other confidential information is subject to medical confidentiality. In Germany, federal and state laws and regulations regarding the use of such data apply (Landesdatenschutzgesetz Baden-Württemberg LDSG BW und Bundesdatenschutzgesetz BDSG).

A copy of the consent form will be given to you upon signing and agreeing to be a part of the study. If you would like a copy of the study after completion then a copy will be given to you.

Reimbursement

You will not be reimbursed and will be offered no incentives for participation in this study.

Ethics committee review

This study has been approved by the Ethics Review Committee of the Medical Faculty of the Ruprecht-Karls-University Heidelberg and the Mbarara University of Science and Technology – Research Ethics Committee (MUST - REC). If you have any further questions regarding the process, please contact

In Heidelberg: Ethikkommission Heidelberg, +49 (0)6221 338220

In Mbarara: Mbarara University of Science and Technology Research Ethics Committee, +25 256-4854-33795

Additional information

If you have any questions, concerns or complaints before, during or after the research study, please contact

In Heidelberg: Dr. Christopher Neuhaus, +49 (0)6221 56 6351

In Mbarara: Dr. Santorino Data, +25 671 221 4458 or Dag Erik Lutnæs, +47 5191 1080

Part II: Certificate of Consent

If you sign this form, you are giving us permission to collect, use and share your interview information. You do not need to sign this form. If you decide not to sign this form, you cannot be in the research study. Whether or not you agree to the research project or give us permission to collect, use or share your interview is strictly voluntary. The results of this study may be published in scientific journals without identifying you by name. Please see the details on data protection and privacy highlighted below.

If you change your mind later and do not want us to collect or share your interview, you need to contact one of the following:

      In Heidelberg: Dr. Christopher Neuhaus, +49 (0)6221 56 6351

      In Mbarara: Dr. Santorino Data, +25 671 221 4458 or Dag Erik Lutnæs, +47 51911080

You need to say that you have changed your mind and do not want the researcher to collect and share your interview.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in the study titled: "**Teamwork as emergent property of obstetric work: a qualitative, exploratory case study**"

Print Name of Participant   _____

Signature of Participant   _____

Date   _____
               day/month/year

Print Name of Researcher   _____

Signature of Researcher   _____

Appendix II: Interview guide

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Summary

Study title: *Teamwork as emergent property of obstetric work: a qualitative, exploratory case study*

1. Context, premise and study rationale

Much of the early safety efforts in medicine was modelled after experiences from the aviation industry, including the implementation of simulation to educate practitioners about human factors. These training programs, so-called 'crew-resource-management' (CRM) programs, usually address a number of cognitive and social competencies that are deemed relevant or essential for safety, sometimes dubbed 'non-technical skills'. Although healthcare is more and more coming to the realization that merely adopting concepts that have proven successful in other domains does little to improve patient safety, there is widespread consensus that teamwork constitutes one of the key requirements in today's multidisciplinary and highly complex system of delivering care. Many existing frameworks that categorize teamwork apply a normative approach but overlook concepts derived from complexity thinking (e.g. emergence, shared cognition) situated in a joint system. By examining teams that manage peripartum emergencies in different settings and cultures, this study aims to explore how successful teamwork is constructed and perceived by those directly involved in patient care and contrast these findings with traditional normative approaches.

2. General question

Is what experienced healthcare providers dealing with peripartum emergencies perceive as good, successful work comparable to normative teamwork approaches communicated through CRM focused, often simulation based, education?

"What makes up 'good work' when dealing with peripartum emergencies? In your opinion, what are the factors that make your work successful?"

3. General strategy

In interviews, ask open questions and probe for the informant to tell more about how one perceives

a. collaboration

b. shared mental models

c. coordination

d. communication and

e. leadership

(in accordance with the framework by Manser (2009))

4. Refinement of the research question

There are two general issues to study:

    a. Explore how successful teamwork is constructed and understood by those directly involved in patient care, and contrast these findings with traditional normative approaches.
    b. Considering safety as an emergent property, to highlight cultural differences in the delivery of safe peripartum care between Mbarara (Africa) and Heidelberg (Western Europe)

We do not want to explicitly ask about teamwork because the term "teamwork" may be biased for the participant. Instead we want to ask about how participants perceive 'good work' or successful work. What are their thoughts on it, what is important for them?

Manser (2009) pans out the following as "aspects of teamwork relevant to the quality and safety of patient care in dynamical domains of healthcare". This provides a sufficient base of themes and qualities we would like to probe for.

Table 1

Overview of aspects of teamwork relevant to the quality and safety of patient care in dynamical domains of healthcare.

Aspects of teamwork	Examples of safety-relevant characteristics
Quality of collaboration	Mutual respect Trust
Shared mental models	Strength of shared goals Shared perception of a situation Shared understanding of team structure, team task, team roles, etc.
Coordination	Adaptive coordination (e.g. dynamic task allocation when new members join the team; shift between explicit and implicit forms of coordination; increased information exchange and planning in critical situations)
Communication	Openness of communication Quality of communication (e.g. shared frames of reference) Specific communication practices (e.g. team briefing)
Leadership	Leadership style (value contributions from staff, encourage participation in decision-making, etc.) Adaptive leadership behavior (e.g. increased explicit leadership behavior in critical situations)

(Manser, 2009, Table 1, p 148)

The aspects found during the interviews related to these themes will be further analysed, processed and compared.

5. Semi-structured script:

"Thank you for agreeing to participate in this study. Our goal is to understand more of how healthcare providers such as yourself perceive good, successful work when dealing with peripartum emergencies (such as postpartum haemorrhage (PPH) or still-births)."

"Later on, I may give you some examples of situations that you can respond to. But first, I'd like to learn more about you. My questions are designed to get a sense for how you think about successful work and will provide a context for understanding your responses."

0. *"Before we start, could you just remind me:*
- *What is your profession?*
- *What is your speciality (if any)?*
- *What is your current workplace?*
- *Have you always worked there?*
- *How much work-experience do you have?"*

1. *"First, try to think of a time (the last time?) where you experienced a peripartum emergency where the work people you worked with and you was successful.*
- *Using your own words, please tell me about it?"*

2. *"What, in your mind, made it successful?"*
Probe for aspects within categories:

a. Quality of Collaboration
b. Shared Mental Models
c. Coordination
d. Communication
e. Leadership

3. *"What, in our mind, makes work successful in general?"*
   Probe for aspects within categories:
   a. Quality of Collaboration
   b. Shared Mental Models
   c. Coordination
   d. Communication
   e. Leadership

4. *"Consider a colleague that you perceive as good and successful in working together with others, which qualities makes you put them in high regard?"*
   Probe for aspects within categories:
   a. Quality of Collaboration
   b. Shared Mental Models
   c. Coordination
   d. Communication
   e. Leadership

5. *"In your opinion, is there a correlation between good work and good outcome for mother and child? Please elaborate."*

References:

Manser, T. (2009). Teamwork and patient safety in dynamic domains of healthcare: a review of the literature. *Acta Anaesthesiol Scand, 53*(2), 143-151. doi:10.1111/j.1399-6576.2008.01717.x

Appendix III: Codebook

Name	Description
Themes	General themes recognized in the interviews
Emergent	
Experience	Overall work experience in the medical context. If only related to medical expertise, see medical competency
Perception	How work is perceived
Personality	Personality traits or attributes considered important for good teamwork
Approachability	generally referred to as „easy to talk to"
Attitude	attitude towards work, work ethic
Medical competence	Knowledge, skills, etc…
Reflexivity	Introspection, being critical of one's own actions
Self-reliance	Reference to one's own ability of coping with situations
Systems view	things like no-blame, new view attitudes as expressed by the interviewee
Power	
1st dimension	power as strategically exercised through intentional, rational calculation, e.g. position power, information, expertise, coercion
2nd dimension	more covert form of conflict, non-decisions, …
3rd dimension	hinges on the construction of meaning in social life, and enables the dominant to influence the dominated to adopt the goals, values and attitudes of the dominant.
Hierarchy	
formal vs. informal	how hierarchy is enacted in real-life situations, usually as opposed to formal definitions
Positive h.	Hierarchical aspects of work that are positively perceived by the interviewee
Problematic h.	Hierarchical aspects of work that are negatively perceived/perceived as problematic by the interviewee
Role transfer	Shifting relationships between formal roles and hierarchical positions
Resources	Reference to available resources (infrastructure, people, equipment, …)
Standardization	Using Guidelines, SOP, etc..

Name	Description
WAI WAD	Work descriptions where differences from WAI are expressed
Teamwork	Mentions/explanations of teamwork in the interviewee's own words
Manser (2009)	aspects of teamwork relevant to the quality and safety of patient care in dynamical domains of healthcare as defined by Manser (2009)
Communication	Openness of communication, Quality of communication (e.g. shared frames of reference), Specific communication practices (e.g. team briefing)
Coordination	Adaptive coordination (e.g. dynamic task allocation when new members join the team; shift between explicit and implicit forms of coordination; increased information exchange and planning in critical situations)
Preparedness	also planning ahead
Leadership	Leadership style (value contributions from staff, encourage participation in decision- making, etc.), Adaptive leadership behavior (e.g. increased explicit leadership behavior in critical situations)
Quality of collaboration	
Appreciation	a positive form of respect, can be interpersonal or professional
Flexibility	Openness, flexibility to change way of working, procedures etc.
Interpersonal relationship	Interpersonal as opposed to professional->see collaboration
Mutual respect	can be neutral/professional, respect for someone's qualifications, work, contribution etc.
Mutual support	Helping others by doing their jobs, supporting, etc.
Reliability	„true to one's word"
Trust	
Shared mental models	Strength of shared goals, Shared perception of a situation, Shared understanding of team structure, team task, team roles, etc.
System	systemic issues, like quality vs. safety etc.