Safety culture implementation in organizations through the lens of sensemaking

Martin Idoeta Fogelqvist
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Even though safety culture in health care has been on the agenda for more than a decade, the implementations have been difficult. The aim of this study was to out of the sensemaking perspective, examine the process behind implementing safety culture. The present study tested a hypothetical model where open communication, clear information and leader safety attitude predict reporting incidents (part of safety culture) which in turn mediate to safety performance. Survey data was obtained from 104 employees at a Swedish hospital which has tried to implement safety culture recently. To test the model, structural equation modeling was used. Results showed a strong model fit and all factors predicted reporting incidents. Reporting incidents predicted safety performance and mediated between the predictors and safety performance. Thus, in line with theoretical background all three predictors seem to be important in the implementation process of safety culture.

Patient safety and risks in healthcare has been an emerging field of interest and importance the last decades since the rather sensational report from the US Institute of Medicine (IOM) on patient safety (Kohn, Corrigan & Donaldson, 1999). The results in the report imply that perhaps as many as 98,000 people died in hospitals every year as a result of medical errors. The same patterns seem to be found in Swedish hospitals. A recent study (Soop, Fryksmark, Köster, & Haglund, 2009) revealed that 12% of the admissions had adverse events. These statistical estimates clearly point out that hospitals indeed are “high-risk organizations” for patients. As such, many researchers and stakeholders want to transform them into “high-reliable organizations” (HRO) (Bagnara, Pralangeli & Tartaglia, 2010). Reason (1997) has described HRO as organizations working with high risk with low incidents frequencies. Essential for an HRO is that the culture supports systems of learning from mistakes and near-incidents. Closely related to the construct of HRO is the concept of safety culture. Significant for a safety culture is that it encourages reporting systems with feedback and engaged employees. Incidents that almost occurred are reported and the system tries to focus on finding system error and not blaming individuals (Glendon, Clarke, & McKenna, 2006).

Even though there are similarities between health care and other high-risk organizations such as nuclear and aviation, there are also differences which are important to take into account (Lyndon, 2006). The organizational culture and the social structures are very strong in hospitals and here lays a challenge, when turning them into HRO (Bagnara et al, 2010). In general, there seems to be a strong resistance in health-care settings to abandon hierarchical structures which enhances risks. Professional experts want to make autonomous decisions and it is hard for them to reduce their status and put themselves in an equivalent level as other employees (Amalberti, Auroy, Berwick & Barach, 2005). Given this background, the implementation of safety culture in health care settings seems to be an important area for further investigation.

The report from IOM (Kohn et al, 1999) expressively emphasized the importance of changing the safety culture in hospitals. The US department of health and human services has tried to
encourage the development of patient safety organizations by the proclamation of the Patient safety act in 2005 (Department of Health and Human Services, 2005:109-41). Central in this is to promote changes of culture and structures so that they can facilitate learning. Since 2010, there is a new patient safety law in Sweden with the aim to promote safety by making the health-care providers more open to learning by mistakes (Patiensäkerhetslagen, 2010:659). Patient safety and the development of safety culture is one of the key issues in the last years guidelines for quality work, in one of Sweden’s major hospitals (KU-Riktlinjer för kvalitetsarbete, 2009). Thus, implementation of safety culture has been on the agenda for health care lately, global as well as national in Sweden.

Many high-risk organizations have tried to implement safety culture and even though the investigation of the area is quite sparse, it has been hard to establish long lasting, sustainable effects of patient safety implementations in hospitals (Chassin & Loeb, 2011; Woodward et al, 2010). In a safety culture it is crucial with active participation from employees and a shift to bottom-up control (Reason, 1997). This can be a rather difficult change through, in many cases the managers feel that they lose their position and in addition, the employees may also resist the change of the expanded responsibility (Hudson, 2007). The implementation can also be difficult if the higher management is not involved in a clear and visible way (Naevestad, 2010; Sackman, Eggenhofer-Rehart & Fries 2009; Schrover, 2008).

But even though safety culture seems to be an important area for patient safety, few researchers have put their attention to how safety culture is created (Antonsen, 2009). Some researchers have argued that an interpretive approach is needed to better understand emerge of safety culture (Glendon & Stanton, 2000; Richter & Koch, 2004), where the culture is created through negotiations of meaning in groups (Alvesson, 1993). The processes behind how general meaning (about for example safety) is created in organizations, is something given little attention in literature (Zohar, 2010). In a variety of safety research, the lens of sensemaking has been used as a framework to better understand and explain the complexity of risk and safety in high-risk organizations (Albolino, Cook & O’Connor, 2007; Battles, Borotkanics, Dixon, Kaplan & Rabin-Fastmen, 2006; Macrae, 2009). Some researchers argue that a more profound theoretical base is needed to understand the processes of patient safety implementation (Foy et al, 2011) and that the sense-making perspective can be part of such a base (Flitter, Riesenmy & Stralen, 2012). In line with this research the present study propose that the sensemaking perspective can be useful to better understand the implementation process of safety culture in health care.

Basic assumptions about sensemaking

An early influence for sensemaking was Mead (1934) who developed the concepts of “social behaviorism”. Blumer (1969) refined some of these concepts in the early construction of “symbolic interactionism”. In line with these perspectives, the socio-cognitive view was developed and refers to research that deals with the content and process of our thinking about other people (Taylor & Fiske 1981). A special interest for social cognition in organizations has been addressed in this perspective (Ericson, 1998), and some argue that social cognition lies in the heart of all organizational processes such as decision making, communication and interpersonal behavior (Gioia, 1986).

Central for the social construction of meaning in organizations is how the social cognition of the individual is transformed and transferred to a more collective meaning. There are many concepts which have tried to capture these phenomena (Ericson, 1998). Wiley (1984, referred to in Weick, 1995) refers to these processes as “intersubjectivity” and “generic subjectivity”.
The intersubjectivity can be understood as the different individual’s perception of meaning and this is then transformed to a more general mutual understanding which he describes as “generic subjectivity”.

These processes are important for the very basic assumptions of what an organization is, which is vital for the understanding of sensemaking in organizations. It is the actors who share beliefs, values and assumptions that encourage them to interpret actions in a mutually reinforcing way that are the organization (Alvesson, 2002). Czarniawska-Joerges (1992) talks about organizations as net of collective actions which content are meaning and artifacts. One way to see organizational forms according to Weick, (1995) is like bridging operations that link the intersubjective with the more general, shared understandings. The social forms consist of patterned activity developed and maintained through continuous communication. Weick (1995) argues that “if the communication activity stops, the organization disappears. If the communication activity becomes confused, the organization begins to malfunction. These outcomes are unsurprising because the communication activity is the organization” (p.75).

Another theory that discusses the importance of communication for construction of meaning is Deetz (1992) theory of productive communication. Essential for a productive communication is the genuine dialogue. The members have different opinions which they openly exchange and transform in the dialogue. A reproductive communication, on the other hand, is aiming at control and management. Meaning is then only transferred and information is only confirming the frames of references already existing. Sensemaking is then reproduced instead of mutually produced (Deetz, 1992). In a safety culture participative employees are important (Reason, 1997) and this seems logical out of Deetz reasoning. To get all employees to share the values and attitudes of a safety culture it might be important to have a productive communication. If you have a reproductive communication different meaning and attitudes are more likely to emerge.

Properties of sensemaking
Weick (1995) describes sensemaking as an ongoing innovative process in organizations where people create meaning to situations. To understand sensemaking, and how it is distinguished from other explanatory processes such as understanding, interpretation and attribution he unfolds seven characteristics of sensemaking. It is to be understood as a process grounded in identity construction, retrospective, enactive of sensible environments, social, ongoing, focused on and by extracted cues and driven by plausibility rather than accuracy.

Construction of identity is the first fundamental property for the sensemaking process. Identities are constituted out of the process of interaction. Different interactions give different definitions of the self. Depending on whom I am my definition of what is “out there” will also change. The meaning that is sustained socially from a situation tends to be one that reflects favorably on the organization and one that promotes, self—enhancement, efficacy and consistency.

The second property is that sensemaking are always view and reflected in a retrospective. To make sense of a situation is a cognitive retrospective process where you put attention of that which has already occurred. Thus, as meaning is always created from memory, what affects remembering will also affect the meaning that is made from these memories. A problem for the retrospective process can be confusion of too many meanings available and then the solution is not more information but instead priorities and clarity.
Third is the property of enactment of environment. In the contexts of organizations we are often part of creating the reality we then interpret and give meaning. People act, and by doing so they create materials that become constraints and opportunities they then face. The point is the ongoing interplay where people are enactors of the environment they are living in. The term enactment suggests that there is a higher level of engagement by the actor and that interpretation is more passive then the activity of sensemaking.

The fourth property, that is crucial for sensemaking is the social process. In the description of an organization out of this view, words such as network, intersubjectivity, shared meanings, and social interaction are common and those words strongly emphasize the social aspect of sensemaking. People who study sensemaking put a lot of attention to talk, discourse and conversation because that is how a great deal of social contact is mediated.

The fifth property is that sensemaking is an ongoing process. It never really starts because pure duration never stops. To understand sensemaking is to be sensitive to the ways in which people chop moments out of continuous flows and extract cues from those moments. Interruptions of the flow out of the ordinary are cues about important changes of the surroundings.

The sixth property is that it is focused on and by extracted cues. Extracted cues are simple, familiar structures that are seeds from which people develop a larger sense of what may be happening. The cue is extracted when something occurs that is out of the ordinary. Once extracted and interpreted the cues generates a cognitive structure of tied elements. These structures are tied more substantially when people act as if they are real.

Finally, it is driven by plausibility rather than accuracy. The criterion of accuracy is secondary in analyzes for two reasons. Firstly, information needs to be filtered not to be overwhelmed with data. Second, sensemaking is about embellishing extracted cues by linking them to a more general idea. With time pressure at hand, fast action is favored and then a point of reference which people believe in is needed. Most important is not that the meaning put to this reference is plausible, coherent and reasonable but socially acceptable and credible (Weick, 1995).

To summarize the process of sensemaking; When people act (enactment), real results are generated (cues) in a specific context (social) which help them to discover (retrospect) what is happening (ongoing), what needs to be explained (plausibility) and what needs to be done next (strengthening identity). Focus lies in action triggered by a cue out of the ordinary; this cue gives meaning in the frame represented by an interaction of social and material context, memory and the constructed identity.

Sensemaking unfolding in organizations
In general the sensemaking process can be understood as a combination of three parts. A past moment, a connection and a present moment of experience creates a meaningful definition of the present situation (Upton, 1961). Frames tend to be past moments of socialization and cues tend to be present moments of experience. If a person can construct a relation between these two, meaning is created. The substance of sensemaking, therefore, is found in either frames, cues or the connection between those (Weick, 1995).

Furthermore, four different approaches are proposed by Weick (1995) to explain how people impose frames on ongoing flows and link frames with cues of interest and meaning.
Sensemaking can begin with beliefs and take the form of arguing or expecting. It can also begin with action in the form of committing or manipulation. Action and beliefs are also interrelated and tied together in a mutually causality in the sensemaking process (Weick, 1995).

Sensemaking as arguing starts with belief because the starting point for an argument is an existing belief or discourse. The argumentation does not need to be aggressive though, rather the opposite (Weick 1995). In the sensemaking process of an argumentation an inferential leap is taken from the existing belief to either the adoption of a new one or the reinforcement of an old one. This belief also needs to be justified and discussed in an open way (Brockride, 1974). When something out of the ordinary occurs it can trigger a controlled form of information processing. Then differences become transparent in meetings and people argue their way into new sense of the events they are facing and it can bring about changes in attitudes, (Weick, 1995). Ericsson (2001) has studied strategic change processes in Swedish hospitals and the results imply that for the changes to be successful all members of the organization needs to be involved and diverse meanings discussed. This line of reasoning would have implications for how you understand the implementation of safety culture in hospitals.

Another belief-driven starting point for sensemaking is that of expectations. Compared to arguments, they are held more strongly and are more interested in confirmation than contradiction (Brunsson, 1992). When a cue is extracted from the flow of information and connected to expectancy, a unit of meaning is created (Klein, 1989). When the sensemaking process is belief driven through expectations, plausibility is more common than accuracy. In an unstable competitive organizational setting most people need stability. Stability is created through selective noticing and selective shaping which construct a social reality based on behavioral confirmed expectations (Weick, 1995). Thus, if you want to be in charge of the sensemaking processes in an organization and create for example a culture of safety it seems that the expectations and attitudes of employees are important to take into account.

The first action-driven process of sensemaking is that of commitment. Commitment focuses the construction of social reality on those actions that are high in choice, visibility and irrevocability. Organizations that create contexts which are high in these three dimensions should therefor generate stronger commitments and make more sense to members (Brickman, 1987). When we choose something we assemble reasons why it is good, we focus attention on it and we spend more time with it. In this way commitment effect sensemaking by focusing attention, uncovering unnoticed features and imposing values (Weick, 1995). Commitment is usually viewed for its motivational consequences (Ring & Van den Ven, 1989) but in this perspective it is emphasized that it also has epistemological consequences. You can say that it binds action to larger sets of cognitions (Salancik, 1977). Commitment from leaders is an important factor when implementing safety culture (e.g Naevestad, 2010; Sackman et al, 2009) and from the sensemaking perspective this could be explained by the proposal that committed actions from leaders can create frames of ideologies and values which enhance safety.

Manipulation as sensemaking is also action-driven, but here the focus is on the consequences of the action. Through the action, meaningful structures and environments are created (Lanzara, 1983). Huber and Glick (1993) describe top managers as manipulators of the organization’s environment. Manipulation is about making things happen and then try to get a better sense of what is happening by trying to explain those created things. A change in the
environment makes the underlying beliefs accommodate to these changes (Weick, 1995). In organizational changes symbols can put meaning to what is happening and create frames to interpret the changes (Gioia, 1986). Such symbols can be manipulation of the environment. It is important though that these manipulations are transparent and all employees can understand the new information (Johansson, 2003; Palus, Horth, Pulley & Sellvin, 2003). If you for example create new reporting systems with rules and prescription to enhance safety this is a manipulation of the environment which can have effect on the sensemaking process as well.

Because the concept of sensemaking can be complex to grasp a clarification of how the different parts are understood in the present study will be explained here (see Figure 1). The seven properties can be viewed as underlying characteristics of how sensemaking is functioning out of cognitive and social aspects. In the next part the process is described in more general terms as frames, cues and connections. The last part explains how the process unfolds in organizations. Different events like arguing, expectations, manipulation or commitment tries to grasp the different occasions for sensemaking in organizations.

Figure 1
Model of the different parts in the sensemaking process

The next step for the present study was to try to distinguish some key attributes of the sensemaking process. With the theoretical perspective of sensemaking as outlined above used as a frame of reference, the following part added empirical research to find some underlying attributes for the sensemaking process.

Open communication
The first attribute which seems to be of much importance for sensemaking is open communication. Weick (1995) suggests that communication is part of all the different properties and is what guides the sensemaking process and transform the individual feelings, thoughts and intention to something general (Weick, 1995). For example, three of the seven properties of sensemaking were that it is social, retrospective and extraction of cues. In the retrospective and social process where cues are related to frames, open discussions are important. Each member brings their unique knowledge based on experience and through the conversation, similar representations is created in the different individuals minds (Battles et al, 2006). Most obvious is the importance of open communication when the sensemaking process is belief driven through arguing. Then the justification is made through communication (Weick, 1995). Communication can be made in different ways and to address
the importance of openness for sensemaking it is useful to relate it to Deetz (1992) theories about participative communication and the genuine dialogue. If different opinions are to be brought together to a relatively homogenous opinion, different perspectives needs to turn transparent and discussed in an open way (Deetz, 1992). Because values and ideas can be abstract and hard to understand they need to be discussed openly between all members for the sensemaking process to reach all members in the organization (Ericson, 2001; Simonsson, 2002; Tourish & Robson, 2006). Communication is seen as a key element in organizational change reviews (Johansson & Heide, 2008) and several researchers stress the importance of participative communication and sense-making in organizational changes (Johansson, 2003; van Vuuren & Elving, 2008). This can be an important issue for the traditional hierarchical structures in hospitals which sometimes are barriers for constructive communication and cooperation (Lyndon, 2005).

**Clear information**

The second attribute the present study proposes is that of clear information. If you want employees to share the interpretation of what is important and have similar sense-making processes, it is fundamental that the information is salient and visible (Bowen & Ostroff, 2004). Decision are important for sensemaking and it needs to be communicated with clarity (Raupp & Hoffjann, 2012) and in organizational changes the use of distinct and clear symbols can put a meaning to the changes (Ericson, 2001; Gioia, 1986). These empirical results can be understood out of the sensemaking theory. Clarity can be particularly important for the action driven process of manipulation. Manipulation is about making visible changes in the environment. These changes can be material objects but also meaningful rules or structures. But to have an effect on sensemaking, these changes need to be visible and clear. Remember that two of the seven properties for sensemaking were to extract cues out of ongoing flow of information. If cues are not noticed there is nothing to make sense of and if frames are not transparent there is nothing to relate the cues to (Weick, 1995). With a clear dialogue about new information, leaders can be in charge of sensemaking and thereby make employees put their attention on the same cues in a complex context (Palus et al, 2003; Randall, deChurch & Resick, 2011). In an ongoing process of sensemaking, where it is common with information overload, it is important to have structures that help sorting out and clarify which information is important (Heide et al, 2008; Weick, 1995). As Weick (1995) describes it, with too much information it can be more important that the information is plausible then accurate (one of the properties). As action and beliefs are interrelated, visibility is also important for the belief-driven part of the process. Because values and attitudes can be hard to understand leaders of sensemaking processes must clarify those (Johansson, 2003; Werkman, 2010).

**Leader safety attitude**

The third attribute this study proposes is leader safety attitude. A leader in a safety culture clearly shows that safety is a priority and participates in actions (enactment as one of the properties) (Glendon et al. 2006). In the implementation process of a well-informed safety culture, clear and visible involvement and promoting the importance of safety from high management is important (e.g. Naevestad, 2010; Schrover, 2008). These findings seem logical in the light of the sensemaking theories in several ways. From the belief driven perspective, leaders represents culture and ideologies in the organizations, and as such has an important role when frames for sensemaking are created and maintained. But involvement and priorities can also be shown by action-driven sensemaking from leaders so that commitment creates meaning and frames. If you have leaders who promotes safety and identify themselves and the organization with safety behavior such as reporting culture it would likely have implications for the members as well. The frames connected to the cues in the retrospective process should
more likely be such as they enhance reporting. Because identity (one of the properties) is important for sensemaking, committed leaders might serve as role model and by that make safety attitudes more coherent with an identity that value safety. In the implementation of safety culture, different units and sub-groups can interpret the relevance of the changes in different ways. Leaders need to be involved in the processes where meaning is debated in, and between different groups (Naevestad, 2010). In an organizational change, new interpretations must be made and meaning put to ambiguous situations. In this sensemaking process, leaders work with symbols (Gioia & Chittipeddi, 1991), and a strong symbol can be leader’s commitment to safety (Gioia 1986).

Reporting incidents as an important aspect of safety culture
One common used definition of safety culture is suggested by the UK Health and Safety Commission (1993) and emphasizes values, attitudes, competencies and patterns of behavior that determine the competence of a organizations health and safety management. Guldenmund (2000) conceptualizes safety culture by proposing three levels. The first level consists of outer layer of artefacts. The middle level consists of espoused values concerning risks and contains areas like manuals, job descriptions, procedures and reporting of accidents and incidents. The third layer consists of basic assumptions. Reason (1997) describes a safety culture as an informed culture. Such a culture is characterized by collecting safety-related data and conducting proactive checks in order to all the time have a willingness to learn and implement solutions. To have an informed culture organizations need to have systems that support reporting of near incidents. These systems must encourage feedback and workforce participation by confidential reporting systems and protect against disciplinary sanctions so that individuals are not to blame.

This study will not try to include all the dimensions of safety culture but narrow it to the most essential parts of an informed culture as outlined above and focus on the middle level in Guldenmunds (2000) description. The core of an informed culture seems to be the possibilities for employees to report incidents and near misses. Therefore, reporting incidents will be one of the outcomes related to the proposed implementation process.

Reporting incidents as mediator for safety performance
As mentioned earlier there is a lack of understanding in how safety culture is created but there is also a lack of understanding into the nature of the relationships between safety culture and safety performance (Davies, Nutley & Mannion, 2000; Scott, Mannion, Marshall & Davies, 2003). Empirical findings from different contexts support a relationship where safety climate mediates the correlation between safety leadership and safety performance (Zohar 2002; Wu, Li & Chen, 2008; Wu, Chang, Shu, Chen, & Wang, 2011). One empirical finding support a mediating effect of reporting incidents between specialty of department and safety performance (Smits et al, 2012) but in the same study, other safety culture factors showed no significant mediating effects. Thus, due to lack of empirical findings we have in the present study found it interesting to try the mediating effect of reporting incidents between the factors open communication, leadership safety attitude, clear information, and safety performance.

Control variables
Hospitals tend to have strong social structures (Bagnara et al, 2010) were it is hard for individuals to abandon hierarchical norms (Amalberti et al, 2005). Such power structures are important to consider when you study safety culture (Antonsen, 2009) and gender can be a central aspect in these structures (Jensen et al, 2014). Sometimes the culture encourages masculine self-image goals such as not making mistakes or asking for help, and this can
prevent reporting systems (Ely & Meyerson, 2010). Age can also be of importance for social structures and empirical findings show that age can be of importance for different aspects of safety attitudes (Gallegio, Westbrook, Dunn & Braithwaite, 2012). Thus, to control for these variables we also included gender and age in our model.

**Aim of the study**
The aim of this study was to examine the processes of implementing safety culture in health care, which seems to be called for in the literature. The present study have done this in line with researchers using the *sensemaking* perspective as a frame of reference, believing that sensemaking can be a tool for understanding some of the difficulties the implementation put in action has revealed.

**Research questions**
Based on the sense-making theory and research in line with this perspective three factors were proposed which seemed to be important in an implementation process of safety culture. Open communication, leader safety attitude and clear information. The hypothetical model to examine these factors relations to each other and the outcome of reporting incidents and safety performance is outlined in Figure 2.

A first question was whether the three predictors were distinct empirical constructs. The second question was to test the model and if the variables open communication, clear information and leader safety attitudes were predictors of reporting incidents. We also controlled for age and gender in the model. Thirdly, we asked if reporting incidents had a mediating effect between the three predictors and safety performance. To clarify, the three antecedents were in our suggested model a part of the implementation *process* of a safety culture, not as part of an already existing culture.

![Figure 2](image-url)

**Figure 2**
Hypothetical latent variables model.
Method

Participants
This study made use of questionnaire data collected for the research project “Work environment, health and safety”, which is an ongoing cooperation between the Department of Psychology at Stockholm University and the occupational health care company Feelgood. The data collection was conducted in 2012. The study was carried out at a clinic for surgery in a large hospital in the region of Stockholm in Sweden. In this region, implementation of safety culture in hospitals has been on the agenda for some years. The final sample consisted of 104 participants from which 83 % were female. The response rate was 68%. The age of the participants ranged between 22-65 years ($M=46, SD= 11,8$). About a third (37%) were nurses, followed by 20 % nursing assistants and 19% administration staff, around 19% were doctors and senior doctors. Taken together, 17 participants or about 17 % answered that they had a management position. Several of the employees were part of different teams working in different departments such as urology, endoscopy or vascular. Organizational tenure in the clinic ranged between 0 and 41 years ($M=12,3, SD= 10,5$).

Measures
In the present study all psychological constructs were measured using multiple indicator scales. Participants reported their answers using a Likert scale format from 1 (strongly disagree) to 5 (strongly agree) on all scales, except the outcome of safety performance. For safety performance participants reported either “yes” or “no” and a specific amount of times. The amount of times for each participant were later categorized from 1 (few times) to 5 (many times), and then used in the model. All of the scales internal consistencies were satisfactory (using Cronbach’s alpha). The psychological constructs were taken from established safety inventories mainly using Pousette, Larsson and Törner, (2008) who have modified established international safety inventories (Neal et al, 2000; Zohar, 2000; 2008) for Swedish contexts. These inventories were shortened and slightly modified for the purpose of this study.

Open communication. Open communication was measured with a 3 item scale. An exemplary item was ”We have a very open climate where I work – it is easy to present opinions to everyone who work at the clinic”. Cronbach’s $\alpha$ was .69 in the present study.

Leader Safety Attitude. Leader safety attitude was measured with a 3 item scale. An exemplary item was ”My closest manager clearly communicate the importance of patient safety”. Cronbach’s $\alpha$ was .94 in the present study.

Clear information. Clear information was measured with a 3 item scale. An exemplary item was ”I know about the safety prescriptions in the clinic”. Cronbach’s $\alpha$ was .85 in the present study.

Reporting incidents. The outcome, reporting of incidents was measured with a 3 item scale. An exemplary item was ”Anomalies are always reported”. Cronbach’s $\alpha$ was .88 in the present study.

Safety performance. The outcome, safety behavior was measured with a 3 item scale. An exemplary item was ”Has it, during the last year, happened that you have seen a colleague acting in a way you don’t consider safe for the patient?”. Cronbach’s $\alpha$ was .91 in the present study.
Control variables. Gender and age were included as control variables. Age was measured in date of birth and then transformed into years in the analyses.

Table 1
Descriptive statistics for study variables

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<th>Construct</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
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<td>1.Age</td>
<td>45.61</td>
<td>11.82</td>
<td>-.15</td>
<td>.13</td>
<td>.11</td>
<td>.11</td>
<td>.06</td>
<td>.02</td>
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<tr>
<td>2.Gender (1=Fem)</td>
<td>1.17</td>
<td>.37</td>
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<td>3.Open Communication</td>
<td>3.17</td>
<td>1.01</td>
<td></td>
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<tr>
<td>4.Clear Information</td>
<td>3.14</td>
<td>1.09</td>
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<td>5.Leader Safety Attitude</td>
<td>3.24</td>
<td>1.23</td>
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<td>6.Reporting Incidents</td>
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<td>1.11</td>
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<td>7.Safety Performance</td>
<td>3.38</td>
<td>1.54</td>
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Note: n=104

* p<.05    ** p<.01

Procedure
The survey was web based and the invitations were sent out by e-mail to all employees at the clinic with a link to enter the survey. After about two weeks, a reminder was sent out. In the instructions it was emphasized that there were no right or wrong answers, it was the personal opinion that was asked for. The participants were informed that the survey was voluntary and the answers anonymous. As it was a large scale survey the items were randomly presented.

Data analyses
Structural equation modelling (SEM) was used in analyzing the essential part of data. SEM is an extension of the general linear model such as ANOVA, multiple regression and factor analyses, but it provides means of testing more complex relationships and specific hypothesis than can be tested by those methods. SEM can also test and estimate relations among latent variables (Hoyle, 1995). These advantages exist because it differs from the older generation of methods in some aspects. First, it takes on a confirmatory rather than an exploratory approach and demands the relations to be specified a priori. Second, SEM provides explicit estimates of measurement error variance parameters. To not calculate with such errors can lead to serious inaccuracies if the errors are sizeable. Third, SEM analyses can also incorporate both latent and observed variables in the model. The term structural equation modelling conveys two important aspects of the procedure. The causal processes are represented by structural equations and these relations can be modeled. The core idea is that the hypothesized model then can be tested statistically in a simultaneous analysis of the entire system of variables and determine to which extent this model is fitting the data. To determine the goodness of fit and whether the model should be rejected or argued to be plausible a number of indexes are used (Byrne, 2010). The indexes used in this study to determine goodness of fit were chi-square ($\chi^2$), CFI and RMSEA. The SEM analyses were conducted by the use of AMOS 21.0. The first and most important index to use when comparing models is the chi-square index (Bollen, 1989). But since chi-square statistic is rather sensible to sample size however, it is sometimes better to use other measures for model fit (MacCallum, Browne & Sugawara, 1996). For this reason the Comparative Fix Index (CFI) was developed. This index range from zero to 1.00 and well-fitting data is supposed to be >.95 (Bentler, 1990). A more recent and well established index is the Root Mean Square Errors of Approximation (RMSEA) were values <.05 have good fit and values <.08 have reasonable fit (Browne & Cudeck, 1993).
In the initial analyzing phase the three latent factors open communication, clarity of information and leader safety attitude were tried in a confirmatory factor analysis to identify them as three distinct empirical construct. In next phase the conceptual model was outlined and analyzed with AMOS 21.0.

Results

The focus of this study was to examine the model outlined in Figure 2 using SEM modeling with AMOS. The first step was to compare the three factors open communication, leader safety attitude and clarity of information in a confirmatory factor analysis. Table 2 shows that the 3 factor model fits data best when the p-value is not significant and the 1 factor model has significant p-value and the RMSEA value for the 3 factor model fits data better. Also the differences in chi-square (Δχ²) and degrees of freedom (Δdf) is significantly different between the two models. These results suggest that the 1 factor model is rejected in favor of the 3 factor model where each of the variables is distinct empirical constructs, as hypothesized.

Table 2
Chi square statistics and model fit for the 1 factor versus the 3 factor model of latent variables

<table>
<thead>
<tr>
<th>Modell</th>
<th>χ²</th>
<th>df</th>
<th>p-val</th>
<th>RMSEA</th>
<th>CFI</th>
<th>Δχ²</th>
<th>Δdf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Factor</td>
<td>190</td>
<td>44</td>
<td>.00</td>
<td>.18</td>
<td>.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3Factor</td>
<td>32</td>
<td>37</td>
<td>.70</td>
<td>.000</td>
<td>.00</td>
<td>158**</td>
<td>7</td>
</tr>
</tbody>
</table>

**p<.01

Secondly, the model fit for the entire conceptual model was tested as well as the different relationships between the variables (Figure 3). The manifest indicator for each latent variable as well as their factor loading were omitted from the figure, although all factor loadings were significant and above .40. The model showed a good fit in line with the theoretical argument. The overall χ² for the model was 131.6 with df= 108 and this was non significant which imply a god model fit (p>.05). The CFI was .97 and RMSEA .046 which imply a good model fit as well.

Furthermore the different relationships between the variables were tested. Open communication predicted reporting incidents (β = .32, p<.05), clear information predicted reporting incidents (β = .49, p<.05) and finally leader safety attitude predicted reporting incidents (β = .21, p<.05). In total the three predictor variables accounted for 61 % of the variance in reporting incident. Additionally, in the next step of the model, the factor reporting incidents predicted safety performance (β = .41, p<.05). In total, reporting incidents accounted for 17% of the variance in safety performance.

The relations with the control variables age and gender and the predictors were also tested. Age had a non significant relation to open communication (β = .11, p>.05) as well as to leader safety attitude (β = .14, p>.05), and significant relation to clear information (β = .42, p<.05). Gender had a non significant relation to open communication (β = .10, p>.05) as well as to clear information (β = .04, p>.05) and leader safety attitude (β = .13, p>.05). In total the control variables age and gender accounted for 2 % of the variance of open communication, 18 % of the variance of clear information and 4 % of the variance of leader safety attitude.
A comparison was also made between the direct model where the predictors and safety performance has direct connections and the mediating model where the connection goes through reporting incidents. Table 3 shows that the model with mediation has a non significant p-value which implies a better model fit than the model with direct connection as this model has a significant p-value (p<.05). This analyses is in line with Jöreskog’s (1993) discussion about alternative models where several competing models are analyzed and the one which fit data best are selected.

Table 3
Chi square statistics and model fit for the direct model with direct correlation with Safety behavior versus the mediating model with no direct correlations with Safety behavior.

<table>
<thead>
<tr>
<th>Model</th>
<th>x²</th>
<th>df</th>
<th>p-val</th>
<th>RMSEA</th>
<th>CFI</th>
<th>∆x²</th>
<th>∆df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Model</td>
<td>130</td>
<td>105</td>
<td>.047*</td>
<td>.49</td>
<td>.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mediating Model</td>
<td>132</td>
<td>108</td>
<td>.06ns</td>
<td>.046</td>
<td>.97</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

* p<.05

Discussion

The aim of this study was to examine the processes of implementing safety culture in health care. Out of the sensemaking perspective and empirical research a hypothetical model was created. A first question was if the three predictors were distinct empirical constructs. The second question was if the fit of the model was good and if the variables open communication, clear information and leader safety attitudes were predictors of reporting incidents.
incidents. Thirdly, the mediating effect of reporting incidents between the three predictors and safety performance was tested.

To answer the first research question, the results from the confirmatory factor analyses showed that the three predictors were three distinct empirical constructs. Secondly, the results showed a good model fit for the data and all three predictors had significant effect towards reporting incidents. Thirdly, reporting incidents had significant effect on safety performance and there was also support for the mediating effect of reporting incidents. The control variables age and gender were also tested for in the model.

The first part of the result from the model showed a significant effect from open communication on reporting incidents. This implies that open communication has an effect when trying to implement a safety culture where employees are encouraged to report incidents and near misses. These results are in line with several previous findings that stresses the importance of communication in organizational changes (e.g Johansson & Heide, 2008) and that open communication with tolerant dialogues is important when new meaning is created in an organization (e.g Ericson, 2001; Simonsson, 2002; Tourish & Robson, 2006). Secondly, clear information showed a significant effect on reporting incidents which consequently implies that clarity of information has an effect when trying to implement safety culture where reporting incidents are central. These results are similar to other studies which have found support for the importance of clarity of new information in order to direct attention in a complex context (Heide et al, 2008; Palus et al, 2003; Randall, et al, 2011) as well as clarification of values and attitudes in the sensemaking process (Johansson, 2003; Simonsson, 2002). Thirdly, leader safety attitude had a significant effect on reporting incidents and as in the previous two this implies that also leader safety attitude has an effect when trying to implement a safety culture with high frequency of reporting incidents. Other empirical studies have found results which in many ways are similar to our findings. Several studies have found support that the involvement and safety attitude from leaders is at least one of the important factors when trying to implement safety culture (e.g Naevestad, 2010; Sackman et al, 2009).

In the present study, gender did not have any significant relation to any of the three predictors. This did not confirm research which has found that gender in some aspects can have implications for the creation of reporting systems (Ely & Meyerson, 2010). Age did not have a significant relation to open communication and leader safety attitude, there was however a significant relation to clear information. That age did not have a significant effect open communication and leader safety attitudes indicates that it does not have an important role in the creation of safety culture in contrast to other research (Gallegio et al, 2012). The significant relation to clear information, though, indicates that age has some impact on safety attitudes in line with Gallegios et al (2012) findings. One possible explanation for this is that older employees might have had longer time to understand the different channels for information and thus have an advantage when it comes to processing new information.

Reporting incidents had in the present study a significant effect towards safety performance. When comparison was made between a model with no mediator between the predictors and safety performance and the other model where the connections went through reporting incidents, the second model fitted significantly to the data and the first did not. This implies that reporting incidents had a mediating effect between the predictors and safety performance. This is in line with the results of the study by Smits et al, (2012), which has investigated reporting incidents as a mediator for safety performance. In that study the predictors were specialty (comparing specific departments) though. As there is ambiguity of the role between
safety culture and safety performance (Davie et al, 2000; Scott et al, 2003), this can add valuable knowledge to the field.

The idea with the hypothetical model was to investigate a process of implementation. From this study’s approach, the process is ongoing and can therefore be investigated in a specific time where both process and outcome are measured at the same time. This has implications for the way the research was developed but also for the way in which the results were explained. Thus, what was explained when looking at the first part of the model was the implementation of reporting incidents as an important part of safety culture. For this process to work, sufficiently, our prediction was that open communication, clear information and leader safety attitudes were important predictors and interrelated. The results supported this prediction.

If the implementation process is considered to be an organizational change where new attitudes, values and practices are shaped, these results can be explained out of some of the theoretical framework of sensemaking outlined in this study. As sensemaking is a social process where the individual feelings, thoughts and intentions is transformed to something general through interaction, communication is vital. When sensemaking is made through arguing, open communication is of upmost importance. Communication is also what makes the bridging between action and beliefs (Weick, 1995) and openness is crucial for a constructive dialogue to take place (Deetz, 1992) where collective meaning is created (Gioia, 1986). If for example new directions are implemented in an organization about how to report incidents, leaders and employees might have different opinions about the importance and how this is going to work in practice. These different opinions need to be merged to a common understanding through conversations (Battles et al, 2006). Thus, the result from the study seems congruent with the theoretical approach that put open communication as an important factor for sensemaking processes.

Also the result where the second factor, clear information, has an effect of the implementation of reporting incidents was in line with the theoretical frame of sensemaking. When sensemaking is action driven through manipulation, the importance of clear information is most obvious. Manipulation is about making visible changes in the environment such as material objects or rules and structures. Cues need to be noticed and frames need to be transparent in order to have any effect (Weick, 1995). If new procedures for reporting incidents are introduced in an organization, employees need to get to know about these changes and understand the instructions. If they do, these manifested changes support the new values and the sensemaking process. Out of this argumentation, we find explanation for our results that clear information was important when implementing safety culture.

The third factor, leader safety attitudes effect on reporting incidents was in line with the theoretical frame of sensemaking. When sensemaking is belief driven leaders represents ideologies and culture and in this way they are important when frames are created and maintained. When sensemaking is action driven leader’s commitment can be important for creating meanings and frames (Weick, 1995). If for example something out of the ordinary happens in an organization, like an incident this is a cue employees can react to. If the leaders have commitment to safety this might be a symbol for the organizations attitude to safety. Then there might be a greater chance that the employee gives attention to the cue in the first place. It may also contribute to reporting the incident instead of ignoring it. Thus, meaning has been given to a situation and it has resulted in an action.
The results show that the three predictors, open communication, clear information and leader safety attitude were, indeed, three different constructs but interrelated. As no other study has investigated these factors in this way we have none to relate this one to. This result supported the theoretical approach of sensemaking when it suggests that even though sensemaking can be both action driven and belief driven these are always interrelated (Weick, 1995). The factors in this study are related to different parts of the sensemaking process; it therefore seemed plausible that the results showed this interrelation.

Several researchers have argued that an interpretive approach is needed to better understand emerge of safety culture (Glendon and Stanton, 2000; Richter & Koch, 2004) and little attention has been given to the processes how safety attitudes and values are created (Zohar, 2010). The results from this study suggest that the sensemaking perspective can be important and useful when trying to understand the mechanism of how safety culture is created. Organizational change is complex and comprehensive theories like sensemaking might be needed to better understand its functions.

**Strengths and weaknesses**

As mentioned above a short discussion will be given for the choice of method. An interplay between qualitative and quantitative methods can be fruitful were qualitative results can narrow complex fields and generalize theories but also bring new interesting questions for further qualitative research. The field of sensemaking has initially mostly been studied through qualitative methods for obvious reasons. The area is complex and many factors are interrelated. This study has argued, out of the theoretical background, that enough research has been made to be able to distinguish measurable variables of the sensemaking process and thereby be able to use a quantitative method. This approach has been able to generate new knowledge to the field. Because it is a complex field of research, and only few studies have tried to capture the sensemaking process in a quantitative way this can also in some aspects be problematic. The present study does not argue to have captured the whole phenomena but at least some important aspects of it. The construct validity needs to be further evaluated though. Another consideration is the construct of safety culture which in the present study was narrowed to include only reporting incidents.

The data collected were cross-sectional which influence the possibility to make causal conclusions. The causality might go in either direction and what we do is actually to study the ongoing process at a specific time. To be able to counteract this problem, longitudinal study needs to be conducted. Another limitation was that the sample size was rather small and the sample used was only selected from one organization. This might have an effect on the statistical power and also it can be harder to generalize the findings to other settings. The use of self-report measures can imply that estimates of the relationships between the measured variables may be confounded by common method variance (Podsakoff, MacKenzie, Jeong-Yeon & Podsakoff, 2003). The items were randomized and anonymity was emphasized, to counteract these problems. Objective measures of the outcomes reporting incidents and safety performance from a new sample would also be useful to validate these relations.

**Conclusions and future research**

Despite the limitations of this study, the results provide empirical support for the proposed hypothetical model. The study indicates that open communication, clear information and leader safety attitude are interrelated constructs which have an effect on implementation of a safety culture which promotes reporting of incidents. Reporting of incidents, in turn, mediates the effects to safety performance. These findings provide important knowledge for researchers
trying to grasp the mechanism behind implementation and creation of safety culture. This study suggests that the sensemaking perspective can contribute to the understanding of these mechanisms. It would be important to validate further the measurement of sensemaking processes in different contexts like nuclear and aviation. As it is a complex process more research is needed to understand the mechanisms. Another important issue would be to try the mediating effect of safety culture when including more dimensions of this construct.

**Practical implications**

Because adverse events are so common in health care with serious health problems for individuals and economic implications for society, successful implementations of safety culture is very important. The results from this study might contribute to better processes. As the results emphasizes the importance of open communication, practitioners have a huge challenge to overcome the obstacles of power structures (Bagnara et al, 2010) within the organizations of health care. Another challenge might be to engage managers early on in the process and make them representatives of the changes the organization want to make. Leaders are important for all different aspects investigated in this study; as symbols of safety, creating forums for open dialogues and also for distribution of clear information. The results imply that a lot of focus should be put on them. Besides being engaged early on maybe they also need education in safety as well as in managing the creation of meaning in organizations. Because clear and understandable information seems important it might also be fruitful to employ professional marketing personnel for this task. The mediating effect of reporting incidents also gives implications for practitioners. Interventions should focus on creating structures that supports reporting of incidents.

**References**


