

The Culture of Incident Reporting and Feedback: A Cross-Sectional Study in a Hospital Setting

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Abstract

A safety culture where incidents have been reported and feedback given is essential to detect and understand system failures. The aims of this study were to examine the culture of incident reporting and feedback (the incident culture) in a hospital setting, and the associations between the incident culture and other dimensions of the safety culture. A cross-sectional study was carried out with the instrument Hospital Survey on Patient Safety Culture (HSOPSC) within 16 units in six somatic hospitals at a Norwegian Hospital Trust. Units with identical specialities across the hospitals constitute a clinic. HSOPSC measures the health care personnel's perception of the safety culture, seven safety dimensions at the unit level, three at the hospital level and four outcome measures. The outcome measures "Frequency of event reporting" and the dimension "Feedback and communication about error" were combined into the variable "incident culture", score 1 - 5. A positive score was defined as ≥ 4.0 . This study included 631 health care personnel. The mean score for the incident culture was 3.10 (SD 0.65) with significant differences between the clinics, and the hospitals. The strongest predictors for the incident culture were the dimensions "Communication openness" (linear regression slope B 0.470; 95% CI 0.398 to 0.543; $p < 0.001$), "Manager expectations and actions promoting safety" (B 0.378; 95% CI 0.304 to 0.453; $p < 0.001$), "Organisational learning and continuous improvement" (B 0.374; 95% CI 0.293 to 0.455; $p < 0.001$) and "Teamwork across hospital units" (B 0.360; 95% CI 0.261 to 0.459; $p < 0.001$). In this study, the incident culture needed improvements. To improve the incident culture, the attention may be directed towards developing and maintaining a culture of open communication, management that promotes safety, and a learning organisation and teamwork between the units.

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Keywords

HSOPSC, Patient Safety Culture, Patient Safety Incident

1. Introduction

Patient safety incidents (later referred to as incidents) is a well-known challenge in health care, and is by the International Classification for Patient Safety, initiated by the World Health Organisation (2009), defined as *an event or circumstance that could have resulted, or did result, in unnecessary harm to a patient* ([1], p. 15). Reporting of incidents is one method for identifying errors, detecting system failures and improving the system [2] [3]. Despite this, underreporting of incidents has been suggested [4]. Previously reported barriers towards incident reporting have among others been fear of blame and legal consequences, an uncertainty of which incidents should be reported, consuming time and inadequate feedback [5]. To learn from failures, a culture of safety where the employees feel free to communicate about safety concerns without fear of blame is recommended [6].

The European Society for Quality in Health Care (2006) defines the culture of safety as *an integrated pattern of individual and organisational behaviour, based upon shared beliefs and values that continuously seeks to minimise patient harm, which may result from the processes of care delivery* ([7], p. 4). In this study, the term “culture” describes the results from a survey of the safety culture. Several instruments have been developed to measure the safety culture in health care organisations [8] [9]. The instrument Hospital Survey on Patient Safety Culture (HSOPSC) [10] has been frequently used to measure the safety culture in hospital settings in Northern Europe [11]-[20]. The assessments of the safety culture can identify areas where improvements are needed [21]. Several other studies have shown a score that can be improved for the safety culture dimensions “Frequency of event reporting” [11] [13] [16] and “Feedback and communication about error” [11]-[13]. The culture dimension “Frequency of event reporting” considers the reporting of mistakes that do not harm the patient [10]. In this study, the two culture dimensions “Frequency of event reporting” and “Feedback and communication about error” were defined as the “incident culture”. Previously, in other studies “Feedback and communication about error” and “Feedback about error and communication openness” have been relevant predictors for “Frequency of event reporting” [13] [19]. To improve the incident culture, a broader understanding of which dimensions of the safety culture that is most relevant for the incident culture is of interest to study.

The aims of this study were (i) to examine the incident culture in a hospital setting, and (ii) to investigate the association between the incident culture and other dimensions of the safety culture.

2. Methods

2.1. Study Design

A cross-sectional survey was carried out in 2008/2009 in units within a Norwegian Hospital Trust. The top management in The Hospital Trust initiated the survey of the safety culture to identify areas for improvements. Anonymous self-reporting surveys were used, where some units replied by an electronic version distributed by email, and other units filled in a paper version of the questionnaire.

2.2. Hospital Structure

The Hospital Trust consisted of six somatic hospitals (hospital 1, 2, 3, 4, 5 and 6) spread over a wide geographical area all with medical, surgical and emergency units and one or more other units. Sixteen out of 38 units participated, one to five units per hospital. In this study, units with identical specialities (internal medicine, surgery, etc.) across the hospitals were defined as a clinic (clinic a, b, c, d, e and f).

2.3. Inclusion and Exclusion Criteria

Registered nurses, auxiliary nurses and physicians were included in this study. Participants with incompletely filled in questionnaires according to the scoring procedure for the HSOPSC [10], and/or had filled in less than

two items in one of the dimensions that were used as the measure of the “incident culture” in this study, were excluded.

2.4. Variables

2.4.1. The Safety Culture

The safety culture was measured with the validated Norwegian version of the instrument HSOPSC [22]. The original HSOPSC was developed by the Agency for Healthcare Research and Quality (AHRQ) [10]. The HSOPSC consists of 42 items, and measures the health care personnel’s perception of the dimensions of the safety culture, seven at the unit level, three at hospital level and two multiple items outcome measuring “Frequency of event reporting” and “Overall perceptions of safety”. The items were scored on a five-point Likert scale where 1 = strongly disagree/never, 2 = disagree/rarely, 3 = neither/sometimes, 4 = agree/most of the time, and 5 = strongly agree/always [10]. After reversing negatively worded items, the mean score with SD for each dimension was calculated for each participant and all participants. The scores 4 to 5 were defined as satisfactory. For each participant, the proportion of positive response was calculated for each item and each dimension, and the mean proportion of positive response with SD was calculated for all participants. Percent positive response below 50% was defined as areas where improvements were needed, 51% - 74% as moderate and 75% or higher as satisfactory [10]. In addition, the instrument includes two single items outcome “Patient safety grade” scored as 1 = excellent, 2 = very good, 3 = acceptable, 4 = poor and 5 = failing, and “Number of events reported” scored as 1 = no event reports, 2 = 1 to 2 event reports, 3 = 3 to 5 event reports, 4 = 6 to 10 event reports, 5 = 11 to 20 event reports, and 6 = ≥ 21 event reports [10]. **Table 1** present the dimensions of the HSOPSC.

When less than half of the items in a dimension were missing, the mean value was calculated from the responded items.

2.4.2. The Incident Culture

The dependent variable “incident culture” is the mean score for the six items within the dimensions of the safety culture “Frequency of event reporting” (three items) and “Feedback and communication about error” (three items) measured with HSOPSC [10]. The items consider reporting of mistakes that did not harm the patients, and feedback and communication about errors and implemented changes based on event reports. The items included in the “incident culture” are given in **Table 2**.

2.4.3. Participants’ Characteristics

The characteristics of the participants were recorded as follows: gender, age (≤ 30 , 31 - 40, 41 - 50, 51 - 60, ≥ 61 years), profession (registered nurse, auxiliary nurse, physician), length of service in the unit (< 1 , 1 - 5, 6 - 10, 11 - 15, 16 - 20, ≥ 21 years), place of education (inside or outside Scandinavia) and place of work in the hospital trust.

2.5. Statistics

First, comparison and association between participant characteristics and the incident culture was analysed using Student t-test, one-way ANOVA and Pearson correlation. Then the association between each of the dimensions of HSOPSC and the incident culture was analysed using Pearson correlation. Further, we used multiple linear regression analyses with incident culture as the dependent variable. These analyses included as independent variables all characteristics of the participants as follows: participant age, place of education and length of service in the unit as covariates, gender, profession and clinic as categorical covariates (fixed factors), hospital as random factor, and the interaction between clinic and hospital. The regression analyses were first carried out including one of the dimensions of the safety culture at a time, and then including the four strongest predictors of the incident culture simultaneously. The outcome measures (HSOPSC) not included in the multiple linear regression were the “Overall perception of safety”, “Patient safety grade” and “Number of events reported”.

Results are presented as percent positive response, mean (SD), Pearson’s correlation coefficient (r) and regressions coefficient B with 95% confidence interval (95% CI). Two-sided $p < 0.05$ were considered statistically significant. SPSS Statistics 18 was used for the analyses.

2.6. Ethics and Formal Requirements

The survey was approved by the Privacy Ombudsman for Research, representing The Norwegian Data Inspec-

Table 1. The dimensions of HSOPSC, scores and associations with the incident culture.

Dimensions of HSOPSC	n (%)	Percent positive responses mean (SD)	Mean score (SD)	Correlation with the incident culture	
				r	p-value
<i>Unit Level</i>					
Manager expectations and actions promoting safety	631	73 (30)	3.87 (0.64)	0.413	<0.001
Organisational learning and continuous improvement	628	53 (34)	3.50 (0.60)	0.418	<0.001
Teamwork within hospital units	631	79 (28)	4.04 (0.54)	0.280	<0.001
Communication openness	631	71 (33)	3.85 (0.62)	0.503	<0.001
Feedback and communication about error	631	48 (35)	3.39 (0.75)	-	-
Non-punitive response to error	631	80 (29)	4.00 (0.61)	0.239	<0.001
Staffing	631	56 (29)	3.55 (0.59)	0.153	<0.001
<i>Hospital Level</i>					
Hospital management support for patient safety	616	32 (35)	3.05 (0.74)	0.351	<0.001
Teamwork across hospital units	627	44 (33)	3.35 (0.53)	0.336	<0.001
Hospital handoffs and transitions	622	54 (33)	3.51 (0.55)	0.206	<0.001
<i>Outcome</i>					
Overall perceptions of safety	630	64 (32)	3.67 (0.62)	0.312	<0.001
Frequency of event reporting	631	22 (33)	2.81 (0.78)	-	-
<i>Patient safety grade (Single item)</i>					
Excellent	15 (2.4)				
Very good	404 (64.8)				
Acceptable	192 (30.8)				
Poor	12 (1.9)				
Failing	0			-0.347	<0.001
<i>Number of events reported (Single item)</i>					
No reports	260 (41.6)				
1 - 2 reports	237 (37.9)				
3 - 5 reports	88 (14.1)				
6 - 10 reports	24 (3.8)				
11 - 20 reports	12 (1.9)				
≥21 reports	4 (0.6)			0.123	0.002

torate. The participation was voluntary, and the survey was performed anonymously. The participants received written information about the survey and the use of data for research.

3. Results

3.1. Participants' Characteristics and the Safety Culture

Out of 1172 invited health care personnel, 631 were included in the analysis (response rate 54%). **Figure 1** shows a flow chart of the participants. The median age was the group 41 to 50 years, 493 (81.2%) were female, and median length of service in the unit was the group six to ten years. **Table 3** gives the participants' characteristics.

Table 2. Percent positive response and the mean score with SD for each item included in the variable incident culture.

Items	n	Percent positive responses	Mean score (SD)
Frequency of event reporting:			
<i>When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?</i>	629	24%	2.87 (0.93)
<i>When a mistake is made, but has no potential to harm the patient, how often is this reported?</i>	630	13%	2.56 (0.87)
<i>When a mistake is made that could harm the patient, but does not, how often is this reported?</i>	624	30%	2.98 (0.97)
Feedback and communication about error:			
<i>We are given feedback about changes put into place based on event reports.</i>	618	27%	2.83 (1.10)
<i>We are informed about errors that happen in this unit.</i>	630	50%	3.51 (0.97)
<i>In this unit, we discuss ways to prevent errors from happening again.</i>	628	66%	3.79 (0.79)
Sum (incident culture)	631	35%	3.10 (0.65)

The dimensions and items presented in the table are part of the HSOPSC questionnaire.

Table 3. Characteristics of participants and their association with the incident culture.

Characteristics Total = 631	Groups	n (%)	The incident culture Mean (SD)	p-value
Gender (n = 607)	Female	493 (81.2)	3.09 (0.65)	0.998 ^A
	Male	114 (18.8)	3.09 (0.59)	
Age (n = 617)	≤30 years	65 (10.5)	2.99 (0.62)	<0.001 ^B
	31 - 40 years	145 (23.5)	2.96 (0.53)	
	41 - 50 years	197 (31.9)	3.06 (0.66)	
	51 - 60 years	180 (29.2)	3.24 (0.69)	
	≥61 years	30 (4.9)	3.25 (0.71)	
Profession (n = 631)	Registered nurse	495 (78.4)	3.08 (0.66)	0.273 ^C
	Auxiliary nurse	48 (7.6)	3.21 (0.62)	
	Physician	88 (13.9)	3.15 (0.56)	
Length of service in the unit (n = 625)	<1 years	52 (8.3)	2.99 (0.62)	0.005 ^B
	1 - 5 years	160 (25.6)	3.04 (0.62)	
	6 - 10 years	157 (25.1)	3.08 (0.68)	
	11 - 15 years	100 (16.0)	3.10 (0.67)	
	16 - 20 years	68 (10.9)	3.12 (0.59)	
	≥21 years	88 (14.1)	3.26 (0.66)	
Place of education (n = 604)	Inside Scandinavia	575 (95.2)	3.08 (0.64)	0.166 ^A
	Outside Scandinavia	29 (4.8)	3.25 (0.64)	
Clinic (n = 631)	a	92 (14.6)	3.12 (0.61)	<0.001 ^C
	b	194 (30.7)	2.98 (0.61)	
	c	267 (42.3)	3.13 (0.68)	
	d	50 (7.9)	3.14 (0.59)	
	e	21 (3.3)	3.60 (0.57)	
	f	7 (1.1)	2.73 (0.26)	
Hospital (n = 631)	1	144 (22.8)	2.92 (0.63)	0.001 ^C
	2	269 (42.6)	3.13 (0.59)	
	3	55 (8.7)	3.20 (0.58)	
	4	35 (5.5)	3.12 (0.88)	
	5	22 (3.5)	2.89 (0.68)	
	6	106 (16.8)	3.24 (0.68)	

Student t-test^A, Pearson correlation^B and one-way ANOVA^C. Clinic a, b, c, d, e and f express units with identical specialities across the hospital. Hospital 1, 2, 3, 4, 5 and 6 express the six somatic hospitals within the Hospital Trust.

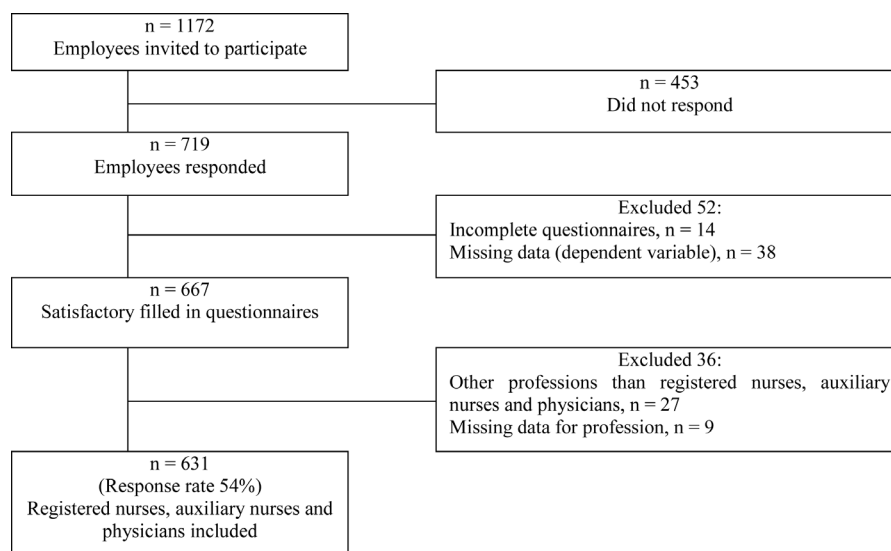


Figure 1. Participation in the study.

The mean proportion positive responses for the safety dimensions of the HSOPSC varied from 22% (SD 33%) to 80% (SD 29%), and the mean scores from 2.81 (SD 0.78) to 4.04 (SD 0.54). **Table 1** gives the scores of all dimensions of the safety culture.

3.2. The Incident Culture

The mean proportion positive response for the incident culture was 35% (SD 28%), and the mean score was 3.10 (SD 0.65). All of the items included in the dependent variable “incident culture” needed improvements, apart from one item that received a moderate score. The score for the two dimensions within the dependent variable are presented in **Table 1**, and for each item within the dependent variable in **Table 2**. Comparisons and correlations between the incident culture and the characteristics of the participants are presented in **Table 3**.

3.3. Predictors for the Incident Culture

In the multiple linear regression analyses, “Communication openness” was the strongest predictor for incident culture, followed by “Manager expectations and actions promoting safety”, “Organisational learning and continuous improvement”, and “Teamwork across hospital units”. The interaction between clinics and hospitals was statistically significantly ($p < 0.001$ to 0.001) associated with the incident culture (data not shown). **Table 4** gives the results of the multiple linear regression analyses when the interaction between clinics and hospitals was included. **Figure 2** shows the interaction by presenting the estimated marginal means of the incident culture at each unit after adjustment for the characteristics of the participants. The differences in the incident culture were larger between the units than between the clinics and hospitals.

Finally the four strongest predictors of the incident culture: “Communication openness”, “Manager expectations and actions promoting safety”, “Organisational learning and continuous improvement” and “Teamwork across hospital units” (according to unstandardized coefficients in multiple linear regression analyses) were included in a multiple linear regression analysis adjusted for the characteristics of the participants. The interaction between clinic and hospital, and all of the safety dimensions included were statistically significantly associated with the incident culture, while gender, age, profession, length of service in the unit, place of education, clinic and hospital were not. “Communication openness” showed the strongest association. The results are presented in **Table 4**.

4. Discussion

In this study, the two safety dimensions included in the incident culture were detected as areas where improvements were needed, in accordance with other surveys of the safety culture in Norwegian hospital settings [11]

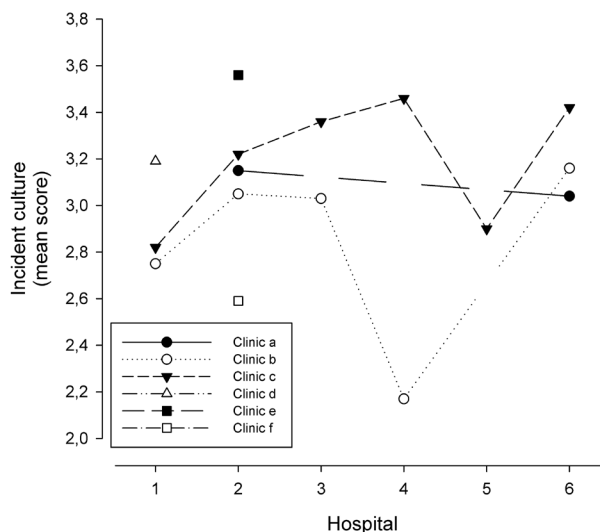


Figure 2. The incident culture in the units, clinics and hospitals. Each point shows the incident culture (given as estimated marginal means) in one unit after adjustment for the characteristic of the participants.

Table 4. Linear regression analyses with incident culture as the dependent variable. All analyses were adjusted for the characteristics of the participants (gender, age, profession, length of service in the unit, place of education, clinic, hospital and the interaction between clinic and hospital) as covariates.

Dimensions of the safety culture	The safety culture dimensions as covariate (Included one at a time)				The four strongest predictors of the incident culture as covariates (Included simultaneously) (n = 583)		
	n	Regressions coefficient B	95% CI	p-value	Regressions coefficient B	95% CI	p-value
Communication openness	589	0.470	0.398 to 0.543	<0.001	0.330	0.248 to 0.412	<0.001
Manager expectations and actions promoting safety	589	0.378	0.304 to 0.453	<0.001	0.109	0.024 to 0.194	0.012
Organisational learning and continuous improvement	586	0.374	0.293 to 0.455	<0.001	0.164	0.081 to 0.248	<0.001
Teamwork across hospital units	586	0.360	0.261 to 0.459	<0.001	0.150	0.055 to 0.245	0.002
Teamwork within hospital units	589	0.288	0.196 to 0.380	<0.001			
Hospital management support for patient safety	577	0.249	0.174 to 0.324	<0.001			
Non-punitive response to error	589	0.219	0.137 to 0.301	<0.001			
Hospital handoffs and transitions	581	0.173	0.078 to 0.268	<0.001			
Staffing	589	0.142	0.051 to 0.232	0.002			

[12]. All of the dimensions of the safety culture within unit level and hospital level included in the multiple linear regressions analyses were shown to be predictors for the incident culture, in particular, “Communication openness”, “Manager expectations and actions promoting safety”, “Organisational learning and continuous improvement” and “Teamwork across hospital units”.

4.1. The Incident Culture

The low score for the incident culture was explained by the low score for the items included in the culture dimension “Frequency of event reporting”. In particular, the item that considers reporting of mistakes with “no

potential harm to the patient” received a score that was to be improved. The result means that reporting of near-misses can be improved, as shown in other studies carried out in Norwegian hospitals [11] [12]. The hospital trust implemented an electronic reporting system three years before this study was carried out. For this reason, established procedures regarding which incidents to be reported might not yet be fully implemented.

The interaction between clinics and hospitals revealed an incident culture in the unit that was independent of the hospital and the clinic, and with variation between the units. The variation suggests different incident culture across the units within this hospital trust. This result supports the belief that safety improvements should be carried out at unit level [23].

4.2. Predictors for the Incident Culture

In this study, the dimension “Communication openness” was shown to be the strongest predictor for a positive incident culture. The result suggests that safety cultures where healthcare personnel freely can share safety concerns with colleagues are of importance for a positive incident culture. Feedback about error and communication openness has previously shown to be a predictor for frequency of event reporting in a survey of the safety culture in a Swiss University Hospital [19]. In a survey among pharmacists in the US, communication openness was conducive to reporting medical error, they found no such significant association between feedback and communication about error and reporting medical errors [24]. However, other studies have shown that lack of feedback is perceived as a barrier for incident reporting among physicians and nurses [25] [26]. The overall score for communication openness was almost satisfactory but lower than shown in a Swedish survey of the safety culture in the hospital settings [14]. The positive result for this dimension can be explained by the health care personnel’s length of service in the unit (median six to ten years). A stable group with collaboration for years may facilitate the sharing of experiences and knowledge about safety concerns with colleagues.

The dimension “Manager expectations and actions promoting safety” was the second strongest predictor for a satisfactory incident culture. A management that promotes actions to improve a culture of safety may facilitate an improved incident culture. Such actions can be facilitation of procedures for incident reporting, allocation of time and channels for feedback from incident reports. In accordance with other studies, the health care personnel reported an almost satisfactory score for management support for safety [12] [14] [17]. As described by Westrum (2004), it is important that leaders emphasize behaviour where the right information is given to the *right person in the right form and in the right time frame* ([27], p. 23).

“Organisational learning and continuous improvement” was shown to be the third strongest predictor for a satisfactory incident culture. The result suggests that a learning organisation with attention towards activities to improve the safety, and where mistakes lead to improvements are more likely to have a positive incident culture. As shown in other surveys, this dimension was scored moderately [12] [14]-[16]. However, a survey in Belgian hospitals, an acute hospital reported a satisfactory score for learning organisation [17].

“Teamwork across hospital units” was the safety dimension at the hospital level that was shown to be the strongest predictor for the incident culture. The result means that cooperation between units to provide satisfactory care for the patients may contribute to a positive incident culture. Teamwork across hospital units received a score where improvements are recommended, as shown in previous studies [11] [12] [15] [16]. Knowing that errors occur when transferring patients between units [28], a satisfactory teamwork across hospital units should be given priority.

A “Non-punitive response to error” has shown a positive association with the dimension “Number of events reported” in a previous study [29], and has been highlighted as essential for incident reporting [30]. The dimension non-punitive response to error was in this study detected as a predictor for the incident culture, but not as the strongest one. However, this dimension received one of the most satisfactory scores for all of the dimensions. “Hospital management support for patient safety” received a score that was to be improved, and was less associated with the incident culture, probably because the top management’s support for patient safety may be less visible for health care personnel at the units. As previously discussed by Turunen (2013), reducing the gap between the healthcare personnel and the hospital management regarding patient safety is of importance [20].

To improve the organisational learning from failure, Edmondson (2004) describe a leadership that initiate visions that motivates to positive changes, development of an environment where people openly can communicate and report safety concerns without fear of blame, and engagement of teams in learning processes [6].

4.3. Strengths and Limitations

The questionnaire HSOPSC has been used internationally and is validated in several languages, including Norwegian. Although, surveys are commonly used and accepted as a method for evaluation of the safety culture, other methods, e.g. anthropological methods could have resulted in different conclusions.

The variable “incident culture”, which was a combination of the dimensions “Frequency of event reporting” and “Feedback and communication about error”, was made for use in this study. This variable has not been formally validated, but a formal validation of the questionnaire with all the dimensions has been thoroughly validated before [22].

In all, the selection of the participants was judged as representative of the health care personnel in the hospital trust, but not necessarily so within all units, e.g. in units with a low response rate.

The high proportion of females in the study was representative of the health care personnel in the hospital trust, where most auxiliary nurses and registered nurses were female. The relative proportions of auxiliary nurses, physicians and registered nurses were also in large as seen in the hospital trust.

Only 16 out of 38 units in the hospital trust participated. In the participating units, the overall response rate was 54%, less than 65% that are recommended as a minimum to reduce the risk of bias [31]. The response rate varied significantly between the units.

5. Conclusion

In this study, the score for the incident culture was to be improved. For improvements, we found that a positive incident culture was associated with an open communication where health care personnel were confident with sharing experiences from incidents, a management that emphasized patient safety, a learning organisation where experiences and knowledge from incidents were utilized to improve practice and cooperation between hospital units to provide the best quality of care.

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Authors' Contributions

AV has prepared the data file, performed the statistical analyses, interpreted the results and written the manuscript. BOS has contributed to acquisition of data and has given valuable input through the whole process from data collection to completion of the paper. SL is responsible for the statistical analyses. PGF is the guarantor, project leader and main supervisor and has been responsible for the integrity of the work as a whole from inception to published article. All authors have read and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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Abbreviations

(HSOPSC): Hospital Survey on Patient Safety Culture.