A National Study of Patient Safety Culture in Hospitals in Sweden.

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Objective: Using the Hospital Survey on Patient Culture, our aim was to investigate the patient safety culture in all Swedish hospitals and to compare the culture among managers, physicians, registered nurses, and enrolled nurses and to identify factors associated with high overall patient safety.
Methods: The study used a correlational design based on cross-sectional surveys from health care practitioners in Swedish health care (N = 23,781). We analyzed the associations between overall patient safety (outcome variable) and 12 culture dimensions and 5 background characteristics (explanatory variables). Simple logistic regression analyses were conducted to determine the bivariate association between each explanatory variable and the outcome variable. The explanatory variables were entered to determine the multivariate associations between the variables and the outcome variable.
Results: The highest rated culture dimensions were "teamwork within units" and "nonpunitive response to error," and the lowest rated dimensions were "management support for patient safety" and "staffing." The multivariate analysis showed that long professional experience (>15 years) was associated with increased probability for high overall patient safety. Compared with general wards, the probability for high overall patient safety was higher for emergency care but lower for psychiatric care. The probability for high overall patient safety was higher for both enrolled nurses and physicians compared with managers.
Conclusions: The safety culture dimensions of the Hospital Survey on Patient Culture contributed far more to overall patient safety than the background characteristics, suggesting that these dimensions are very important in efforts to improve the overall patient safety culture.

Key Words: hospital survey on patient safety culture, patient safety culture, patient safety climate

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The challenges of achieving safer health care have become increasingly recognized during the last decades, after several reports on the frequency of preventable adverse events.[1–3] The importance of developing a culture of safety has been emphasized because investigations into failures in health care have identified weak patient safety culture as a common contributing factor to adverse events.[4] Safety culture is an aspect of organizational culture that refers to how safety is viewed and treated by the members in organizations.[5]

It has been argued that safety culture cannot be assessed quantitatively and that patient safety climate should be evaluated

instead as a quantifiable surrogate measure of safety culture.[6] Patient safety climate can be considered as a snapshot of the patient safety culture, representing the surface features of the underlying culture.[7] However, the concepts "climate" and "culture" are often applied interchangeably in patient safety research. Instruments developed to assess patient safety culture most likely capture the climate rather than the culture. In this study, we consistently use the term "culture."

Although instruments to measure patient safety culture vary with regard to precise content, the concept of patient safety culture is usually broken down into dimensions such as management commitment to safety, safety systems, work pressure, communication, teamwork, nonpunitive response to errors, and leadership.[8] The two most widely applied patient safety culture instruments in hospital settings are the Safety Attitude Questionnaire and the Hospital Survey on Patient Safety Culture.[8] According to Sorra and Battles (2014), Hospital Survey on Patient Safety Culture has been adopted for use in 45 countries,[8] although a smaller number of countries have published studies on the psychometric properties,[8] and it has been translated into more than 20 languages, including Swedish.[9]

Patient safety culture surveys such as HSPSC are widely used not only in research but also in practice, where they are seen as an important management tool.[10] Surveys can be used to raise staff awareness about patient safety, assess the current status of and trends in the patient safety culture, and identify strengths and areas for improvement. The patient safety culture has been surveyed regularly in Sweden since 2011 using the Swedish version of HSPSC. The county councils, which are responsible for providing health care in Sweden, have received payment for undertaking these surveys as part of a government-supported financial incentive plan to improve patient safety.[11]

Using the HSPSC, this study investigates the patient safety culture in all hospitals in Sweden. Earlier studies based on HSPSC have focused predominantly on assessing the patient safety culture in specific hospitals or care units[12–15] and/or among various professional groups.[16,17] Study populations have generally been small. Managers' perceptions are rarely investigated despite that management commitment to safety and leadership are considered important for achieving a favorable patient safety culture. We have only been able to identify 2 previous national-level studies[18,19] that have investigated the patient safety culture across many different hospitals or primary care units.

The aim of this study is to investigate the patient safety culture in all Swedish hospitals using the HSPSC. More specifically, the objectives are to compare the patient safety culture among managers, physicians, registered nurses, and enrolled nurses and to identify factors associated with high overall patient safety.

METHODS

Design and Setting

This national study has a correlational design. It is based on cross-sectional data using the Swedish adaptation of the HSPSC

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and was conducted in Sweden during 2012 and 2014. All 21 county councils in Sweden, which are all tax funded, participated in the survey. Ethics approval was obtained from the Ethical Review Board in Stockholm (no. 2010/820-31/5).

Participants and Data Collection

A 4-year government-supported financial incentive plan concerning patient safety in health care was carried out between 2011 and 2014 under the strategic leadership of the Swedish Association of Local Authorities and Regions. Patient safety culture was an important aspect of the plan. The research team behind this study was granted access to a national database administered by the Swedish Association of Local Authorities and Regions. The data in this study were obtained from the surveys conducted in all hospitals in Sweden from November 2012 to September 2014.

The survey encompassed all health care practitioners employed in Swedish health care. Questionnaires were answered individually using a digital system whereby no personal identification was possible. The participants could choose to answer during work time or from home.

A total of 182,413 questionnaires were administered, of which 111,478 were answered, yielding a response rate of 64.7%. For the present study, the following 3 work areas were selected: general wards, emergency care, and psychiatry care (n = 75,282). The following 4 staff positions in these work areas were selected: managers, registered nurses, enrolled nurses, and physicians (n = 58,671). Questionnaires with any data missing were excluded, and the final sample consisted of 23,781 participants.

The Questionnaire

The HSPSC questionnaire[20] was translated into Swedish in 2007 and has been validated in a study.[9] The questionnaire was translated by a professional independent translator and then controlled by 4 health care and patient safety experts. It was then back-translated by another translator. Discrepancies between versions were solved by collaboration between the experts and translator.[9] The Swedish version differs slightly from the original HSPSC, featuring 7 additional items. The additional items are a further "outcome" question, which concerns the number of reported risks, 4 questions about information and support to patients and family who have had an adverse event, and 2 questions regarding information and support to staff who have been involved in an adverse event.[9] However, the present study included only variables from the original HSPSC.

The HSPSC includes a number of background demographic variables. The following 6 background variables were used in the present study: sex, age, professional experience (years), work time (hours per week), work area (general wards, emergency care, and psychiatry care), and staff position (manager, registered nurses, enrolled nurses, and physicians).

The HSPSC also includes 12 patient safety culture dimensions (Table 1), encompassing a total of 42 items, with 3 or 4 items per dimension.[20] All items are based on a 5-point Likert-type response scale of agreement ("strongly disagree" to "strongly agree") or frequency ("never" to "always"). When needed, items were reversed so that a higher score always indicated a higher value. The items in each dimension were then summed and linear transformed onto a 0 to 100 scale ([raw scale score − lowest possible score]/[possible score range] × 100) (100 = highest value for rated patient safety culture).

All dimensions demonstrated satisfactory internal consistency reliability in the present study, estimated with Cronbach α (0.73–0.86). One exception was "communication openness,"

TABLE 1. Internal Consistency Evaluated with Cronbach α for the 12 Dimensions of the HSPSC

Patient Safety Culture Dimensions	Cronbach α
Communication openness	0.68
Feedback and communication about errors	0.78
Handoffs and transitions	0.77
Management support for patient safety	0.81
Nonpunitive response to errors	0.76
Organizational learning	0.73
Overall perception of patient safety	0.79
Staffing	0.73
Supervisor/manager expectations and actions promoting safety	0.82
Teamwork across units	0.74
Teamwork within units	0.79
Frequency of events reported	0.86

which had a lower Cronbach α (0.68) but still close to the desirable α level of greater than 0.7 (Table 1).

One single item in the HSPSC provides an overall grade of patient safety, with a 5-point Likert-type scale response ("failing" to "excellent"). This item has been advocated by Sorra and Dyer[20] as the most reliable outcome variable. The overall patient safety item was used as an outcome variable in the present study, similar to numerous other studies.[15,16,18,21]

Statistical Analysis

Descriptive statistics were used to present background and study variables. Pearson χ^2 test and 1-way analysis of variance were used to compare background characteristics and the reported patient safety culture among the different staff groups. Bonferroni-corrected *P* values were used as post hoc test in the analysis of variance.

A series of logistic regression analyses were conducted to determine the association between the explanatory variables (6 background variables and 12 dimensions of patient safety culture) and the outcome variable (overall patient safety).

The 12 dimensions were entered in the model as continuous variables. Sex was entered as a dichotomous variable with male sex as the reference category. Age, professional experience, work time, work area, and staff position were entered as dummy variables with the following as reference categories, respectively: 18 to 34 years, 1 to 5 years, less than 20 hours per week, general wards, and managers. The single item about overall patient safety was entered as an outcome variable after it was dichotomized into high (response options "excellent" and "very good") and low (response options "acceptable," "fair," and "failing") overall patient safety.

In a first step, simple logistic regression analyses were conducted to determine the bivariate association between each explanatory variable and the outcome variable. In a second step, all explanatory variables were entered in the model to determine the multivariate associations between the variables.

The Hosmer-Lemeshow test was used to evaluate the overall goodness of fit of the logistic regression models. All regression models demonstrated a nonsignificance test ($P > 0.05$), which indicates a good model fit. According to the variance inflation factor, no multicollinearity problems were detected across the explanatory variables in the multivariate logistic model (mean variance inflation factor = 1.87).

All data were analyzed with Stata 14.1 for Windows (StataCorp, College Station, Tex). Overall, *P* values of less than 0.05 were considered significant.

RESULTS

Sample Characteristics

The sample consisted of 23,781 participants, of which 77% were women and 23% were men. Most participants were registered nurses (51%), followed by enrolled nurses (23%), physicians (17%), and managers (8%). Sixty percent worked in general wards (medicine, surgical, obstetrics, pediatrics, and rehabilitation care). The rest worked in emergency care units, which included emergency care, intensive care units, and operating theater and anesthesiology (25%), or psychiatric care (15%). Furthermore, most participants were between the ages of 35 and 54 years (55%), had professional experience of more than 15 years (54%), and worked 20 to 59 hours per week (96%, Table 2).

Patient Safety Culture Dimensions

The highest rated patient safety culture dimensions were "teamwork within units" (mean, 73.5), "nonpunitive response to error" (mean, 67.2), "supervisor/manager expectations and actions promoting safety" (mean, 66.7), and "communication openness" (mean, 66.3). Lowest rated patient safety culture dimensions were "management support for patient safety" (mean, 47.9) and "staffing" (mean, 51.9).

Patient safety culture was rated significantly differently across the 4 staff positions. Managers scored the highest patient safety culture in all dimensions, whereas physicians scored lowest in all dimensions except for "management support for patient safety," "communication openness," "overall perception of patient safety," and "teamwork across units." Although there were significant differences between the staff positions, the post hoc tests showed that ratings from registered nurses, enrolled nurses, and physicians were less divergent than those from managers (Table 2, Fig. 1).

Overall Patient Safety

The mean rating for overall patient safety was 3.3 for all participants, but the rating differed significantly between the staff positions (*P* < 0.001), except enrolled nurses and physicians (which both scored 3.3). Managers scored highest overall patient safety (mean, 3.7), and registered nurses scored the lowest overall patient safety (mean, 3.2; Table 2).

Factors Associated With Overall Patient Safety

The bivariate analysis showed that all 12 dimensions of patient safety culture were significantly associated with overall patient safety (Table 3). A higher level of patient safety culture implied increased probability for high overall patient safety. Higher age, longer professional experience, and being manager were also associated with high overall patient safety. There were also some associations between work area and overall patient safety. The probability of reporting a high level of overall patient safety was greater for respondents working at emergency care units compared with general wards. However, no such association was shown for psychiatric care. Sex and work time were not significantly associated with overall patient safety.

The findings for the multivariate analysis including all explanatory variables were similar to those for the bivariate analysis regarding the 12 patient safety culture dimensions (Table 3). Hence, a higher level of patient safety culture implied increased probability for high overall patient safety. The opposite was shown for "nonpunitive response to errors," that is, a higher level implied decreased probability for high overall patient safety. In addition, "teamwork across units" was no longer significantly associated with overall patient safety. In contrast to the bivariate analysis, higher age decreased the probability for high overall patient safety.

There were still some associations between professional experience and overall patient safety. Long professional experience (>15 years) implied increased probability for high overall patient safety. In contrast to the bivariate model, no such association was shown for 6 to 15 years of professional experience. There was also an association between work areas and overall patient safety. Compared with general wards, the probability for high overall patient safety increased for emergency care but decreased for psychiatric care. In contrast to the bivariate model, the probability for high overall patient safety was higher for both enrolled nurses and physicians compared with managers. No such association was shown for registered nurses. As in the bivariate analyses, sex and work time were not associated with overall patient safety (Table 3).

DISCUSSION

This study sets out to investigate various aspects of patient safety culture. The results are based on 23,781 completed HSPSC questionnaires by managers, physicians, registered nurses, and enrolled nurse in Swedish hospitals. We used descriptive statistics and conducted logistic regression analyses to identify whether background variables and patient safety culture dimensions were associated with higher overall patient safety, a recommended outcome variable.[20]

The descriptive results show that the patient safety culture dimensions with highest scores were "teamwork within units," "nonpunitive response to error," "manager expectation and actions promoting safety," "communication openness," and "feedback and communication about errors." Our results are consistent with other findings concerning specific areas of strengths.[19,21] These dimensions are well recognized as important aspects of patient safety culture.[8] Indeed, open and blame-free communication, teamwork and management engagement, and support are all included in the most widely used instruments to capture patient safety culture.[20,22–24]

"Staffing" was one of the lowest rated dimensions for patient safety culture. The process of hiring, positioning, and overseeing employees in an organization, that is, staffing, is a well-known and important challenge for attaining a favorable patient safety culture. Staffing has been identified as one of the dimensions of patient safety culture that is most strongly associated with overall patient safety,[15] and there is research that demonstrates strong connections between staffing and various patient safety outcomes.[25] The relevance of staffing for patient safety culture and patient safety outcomes underscores the importance of work environment conditions for patient safety.[26,27] Other studies on patient safety culture have pointed to staffing as an important area for improvement.[19]

In the descriptive findings, "manager expectation and actions promoting safety" was rated highly, whereas "management support for patient safety" was the lowest rated dimensions. This finding suggests that the respondents are fairly content with what is currently being carried out at the department level but believe top-level managers could do more to support patient safety. Some of the patient safety challenges facing frontline health care providers cannot be solved at the floor level; they need to be addressed at higher levels of the organizations.

TABLE 2. Distribution of Questionnaires by Staff Group and the Dimensions in HSPSC

Respondent Characteristics	All Participants (N = 23,781)	Managers (n = 2015)	Registered Nurses (n = 12,145)	Enrolled Nurses (n = 5460)	Physicians (n = 4161)	P	Post Hoc (Bonferroni Corrected)*
Sex, n (%)						<0.001	
Male	5512 (23.2)	506 (25.1)	1543 (12.7)	1052 (19.3)	2411 (57.9)		
Female	18269 (76.8)	1509 (74.9)	10602 (87.3)	4408 (80.3)	1750 (42.1)		
Age, n (%), y						<0.001	
18–34	5362 (22.6)	57 (2.8)	3635 (29.9)	884 (16.2)	786 (18.9)		
35–54	13017 (54.7)	1287 (63.9)	6395 (52.7)	2928 (53.6)	2407 (57.9)		
>55	5402 (22.7)	671 (33.3)	2115 (17.4)	1648 (30.2)	968 (23.3)		
Professional experience, n (%), y						<0.001	
<5	3517 (14.8)	43 (2.1)	2413 (19.9)	524 (9.6)	537 (12.9)		
6–15	7329 (31.1)	316 (15.7)	3957 (32.6)	1529 (28.0)	1590 (38.2)		
>15	12872 (54.1)	1656 (82.2)	5775 (47.6)	3407 (62.4)	2034 (48.9)		
Weekly work time, n (%), h						<0.001	
<20	372 (1.6)	18 (0.9)	192 (1.6)	127 (2.3)	35 (0.8)		
20–39	11628 (48.9)	153 (7.6)	7389 (60.8)	3745 (68.6)	341 (8.2)		
40–59	11283 (47.5)	1753 (87)	4536 (37.4)	1564 (28.6)	3430 (82.4)		
≥60	498 (2.1)	91 (4.5)	28 (0.2)	24 (0.4)	355 (8.5)		
Work areas, n (%)						<0.001	
General wards	14306 (60.2)	1253 (62.2)	7287 (60.0)	2741 (50.2)	3027 (72.7)		
Emergency care	5976 (25.1)	392 (19.5)	3500 (28.8)	1327 (24.3)	757 (18.2)		
Psychiatry care	3499 (14.7)	370 (18.4)	1358 (11.2)	1392 (25.5)	379 (9.1)		
Patient safety culture dimensions, mean (SD)							
Communication openness	66.3 (17.9)	79.8 (13.7)	65.3 (17.3)	64.5 (18.8)	64.9 (17.8)	<0.001	ABCD–
Feedback and communication about errors	64.8 (20.3)	75.7 (15.8)	65.0 (19.7)	65.7 (20.5)	57.8 (21.1)	<0.001	ABC-EF
Handoffs and transitions	58.2 (18.2)	63.9 (17.6)	59.1 (17.3)	58.9 (17.9)	51.7 (20.0)	<0.001	ABC-EF
Management support for patient safety	47.9 (24.1)	65.2 (22.5)	44.4 (23.3)	49,0 (22.9)	48.0 (25.1)	<0.001	ABCDE-
Nonpunitive response to errors	67.2 (21.7)	84.1 (16.0)	67.0 (21.2)	64.3 (22.0)	63.4 (21.3)	<0.001	ABCDE-
Organizational learning	61.5 (19.1)	74.9 (14.4)	59.9 (18.9)	61.5 (18.9)	59.7 (19.6)	<0.001	ABCD-F
Overall perception of patient safety	58.0 (22.0)	71.3 (17.2)	55.8 (22.1)	58.7 (21.7)	57.1 (21.6)	<0.001	ABCDEF
Staffing	51.9 (22.2)	65.7 (21.0)	51.4 (22.3)	49.9 (21.8)	49.4 (20.8)	<0.001	ABCDE-
Supervisor/manager expectations and actions promoting safety	66.7 (21.6)	78.2 (16.3)	65.7 (21.8)	67.3 (21.9)	63.5 (21.4)	<0.001	ABCDEF
Teamwork across units	57.1 (17.4)	65.0 (16.6)	56.2 (16.9)	56.6 (17.0)	56.5 (19.0)	<0.001	ABC—
Teamwork within units	73.5 (17.1)	81.2 (13.3)	74.1 (16.4)	71.8 (17.7)	70.4 (18.5)	<0.001	ABCDEF
Frequency of events reported	54.4 (22.0)	62.0 (18.6)	53.5 (21.4)	58.2 (23.5)	48.3 (21.1)	<0.001	ABCDEF
Overall patient safety, mean (SD)	3.3 (0.9)	3.7 (0.7)	3.2 (0.9)	3.3 (0.9)	3.3 (0.9)	<0.001	ABCDE-

*Significant difference between staff groups are marked with the following: A, managers/registered nurses; B, managers/enrolled nurses; C, managers/physicians; D, registered nurses/enrolled nurses; E, registered nurses/physicians; F, enrolled nurses/physicians.

With regard to managers in relation to the 3 other professional categories, our findings demonstrate that managers scored all dimensions and overall patient safety higher than registered nurses, enrolled nurses, and physicians. This pattern has been shown previously.[17,28] Hammer et al[29] have stressed that managers' views on patient safety culture are important; they believe that there is a need for a modified questionnaire from their point of view.

The managers' favorable scores on patient safety culture and overall patient safety were reflected in the bivariate regression model, which also showed managers to be far more likely than the 3 professional categories to report high overall patient safety. However, the multivariate regression model revealed a different picture; the odds for high overall patient safety were 1.32 times higher for enrolled nurses and 1.24 times higher for physicians than managers. This marked difference between the bivariate and multivariate models indicates that there are underlying factors other than having a manager position, which are associated with high overall patient safety.

Professional experience of 15 years or more seems to be important for attaining high overall patient safety, as measured with the HSPSC. A study by Okuyama et al[30] found that confidence based on experience made it easier for health care providers to express their opinions on issues of patient safety, suggesting that experience breeds confidence, which is important for patient safety culture.

Considering the importance of professional experience, our findings with regard to age in relation to overall patient safety seem to be somewhat paradoxical, because higher age was not associated with high overall patient safety. To the contrary, the odds for high overall patient safety were 1.23 times lower for staff aged 35 to 54 years and 1.40 times lower for staff older than 54 years compared with staff aged 18 to 34 years. Thus, it seems that age in itself is not as important as professional experience. In addition,
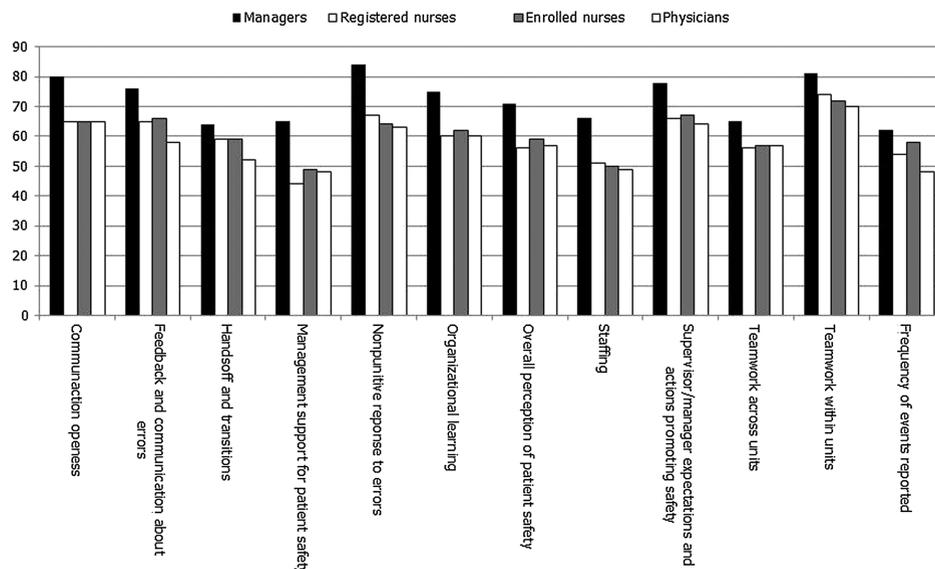
FIGURE 1. Descriptive analysis for staff positions and the average scores for the patient safety culture dimensions.

the effects of the background variables (reflected by the odds ratio) were small in relation to the patient safety culture dimensions. Together with the large sample size, even small associations will be significant. This may also explain the divergent results about staff position between the bivariate and multivariate models.

The difference between the results of the bivariate and multivariate regression models highlights the risk of presenting findings from surveys of this type without proper statistical analysis. Although HSPSC has been advocated for use as a management tool in local patient safety improvement efforts,[10] including Sweden,

our findings clearly demonstrate that the instrument requires considerable knowledge and proper statistical analyses if relevant conclusions are to be drawn.

Limitations

This study has shortcomings that must be considered when interpreting the results. One potential limitation is the high number of missing data. Only complete questionnaires with no missing data were included. Despite this, the final sample was large

TABLE 3. Bivariate and Multivariate Logistic Regression Models With High Overall Patient Safety as a Response Variable

Explanatory Variables	Bivariate Model			Multivariate Model		
	OR	95% CI	P	OR	95% CI	P
Communication openness	1.06	1.06–1.06	<0.001	1.01	1.00–1.01	<0.001
Feedback and communication about errors	1.06	1.06–1.06	<0.001	1.01	1.01–1.02	<0.001
Handoffs and transitions	1.06	1.05–1.06	<0.001	1.01	1.01–1.01	<0.001
Management support for patient safety	1.05	1.05–1.05	<0.001	1.01	1.01–1.01	<0.001
Nonpunitive response to errors	1.04	1.04–1.04	<0.001	0.99	0.99–1.00	<0.001
Organizational learning	1.07	1.07–1.07	<0.001	1.01	1.01–1.02	<0.001
Overall perception of patient safety	1.11	1.11–1.11	<0.001	1.08	1.07–1.08	<0.001
Staffing	1.06	1.05–1.06	<0.001	1.02	1.01–1.02	<0.001
Supervisor/manager expectations and actions promoting safety	1.06	1.05–1.06	<0.001	1.01	1.00–1.01	<0.001
Teamwork across units	1.06	1.06–1.06	<0.001	1.00	1.00–1.01	0.053
Teamwork within units	1.06	1.06–1.07	<0.001	1.01	1.01–1.02	<0.001
Frequency of events reported	1.04	1.03–1.04	<0.001	1.01	1.01–1.01	<0.001
Sex						
Male (reference)						
Female	0.99	0.93–1.05	0.670	0.94	0.85–1.04	0.203
Age, y						
18–34 (reference)						
35–54	1.54	1.44–1.64	<0.001	0.81	0.72–0.92	<0.001
>54	2.00	1.85–2.16	<0.001	0.71	0.61–0.83	<0.001
Professional experience						

CI indicates confidence interval; OR, odds ratio.

enough to conduct the binary logistic regression analyses. The sample size was also sufficiently large to detect small and not always clinically significant differences. We could not control for different nationalities in the sample although the knowledge of Swedish was likely acceptable because we included only fully answered questionnaires.

The study investigated the patient safety culture in hospitals with a focus on nurses, physicians, and enrolled nurses, which make up approximately 60% of the staff in Swedish hospitals. Further studies must be conducted to obtain a more complete picture of the patient safety culture by also accounting for other staff categories in Swedish health care.

CONCLUSIONS

The safety culture dimensions of HSPSC contributed more to overall patient safety than the background characteristics, suggesting that these dimensions are important in efforts to improve overall patient safety culture.

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