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Health care professionals' skills regarding patient safety

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ABSTRACT

Background and objective: The importance of patient safety is growing worldwide, and every day, health care professionals face various challenges in how to provide safe care for their patients. Patient safety skills are one of the main tools to ensure safe practice. This study looks to describe health care professionals' skills regarding patient safety.

Materials and methods: Data were collected using the skill scale of the Patient Safety Attitudes, Skills and Knowledge (PS-ASK) instrument from different health care professionals ($n = 1082$: physicians, head nurses, nurses and nurse assistants) working in hospitals for adult patients in three regional multi-profile hospitals in the western part of Lithuania.

Results: Overall, the results of this study show that based on their own evaluations, health care professionals were competent regarding their safety skills. In particular, they were competent in the sub-scale areas of error analysis (mean = 3.09) and in avoiding threats to patient safety (mean = 3.31), but only somewhat competent in using decision support technology (mean = 2.00). Demographic and other work related background factors were only slightly associated with these patient safety skills areas. Especially, it was noted that nurse assistants may need more support from managers and colleagues in developing their patient safety skills competence.

Conclusions: This study has served to investigate the general skills of health care professionals in regard to patient safety. It provides new knowledge about the topic in the context of the Baltic countries and can thus be used in the future development of health care services.

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1. Introduction

Most recently, the concept of safety skills (i.e. skills and behaviors that enhance the safe delivery of care) has emerged in healthcare literature [1–3]. Safety skills include non-technical skills such as leadership, teamwork, communication, co-operation, situation awareness and decision making, and also go beyond these to include other behaviors and attributes such as conscientiousness, vigilance and humility. Importantly, these skills have been recognized as both crucial to patient safety and also as highly trainable [1]. Non-technical skills support technical skills such as systematic assessment, fluid management during simulation, urethral catheterization, central venous catheter insertion performed during resuscitation, or carrying out surgery [3].

Researchers investigating health care professionals' knowledge, attitudes and skills regarding patient safety have remarked that a less investigated field is that of safety skills [4]. In the varied and complex health care systems seen worldwide, risks frequently occur that impact upon safe patient care. Health care professionals have to manage these risks using their knowledge and skills in complex systems, and also whilst maintaining a safe level of patient care [5].

Physicians play an important role in their workplace related to patient safety. As such, they need safety skills in their daily activities. They should also be able to recognize patient safety incidents, conduct patient safety incident analysis using protocols, work in a team, learn from errors, and be able to identify actions and recommendations on how to prevent patient safety incidents [6,7]. Nurses have a tradition of enhancing the quality of health care and patient safety, particularly through the use of problem-solving and practice development skills [8]. For example, nurses must exercise their professional judgment when administering any medication, and apply their skills in any given situation so as to act in the best interests of the patient [9].

Previous research has lacked any investigation of how well health care professionals perform in error analysis, although errors themselves have been given more coverage. For example, it was found that more than 90% of medical errors in the United States were preventable, and that to improve patient safety and error prevention, it is essential to utilize error reporting mechanisms [10]. Improvements in surgeons' skills have been reported as improving following the analysis of patient safety issues, and a greater understanding and recognition of patient safety issues was seen following a safety skills training course [1]. Also, another study [11] found that safety improvement program courses improved health care professionals' understanding and allowed them to conduct a root-cause analysis, and most agreed that this improved their skills to lead or be involved in root-cause analysis. In the same study, most of the health care professionals involved gained more skills regarding error reporting practices.

There are several ways to avoid threats to patient safety in clinical practice, such as using pressure relieving bedding materials to prevent pressure ulcers, or using antimicrobial handwashing substances to reduce infection. Handwashing has been investigated in several health care studies, and a compliance with hand hygiene protocols is seen as a good quality indicator of patient safety [12]. Based on earlier studies, a poor compliance with hand hygiene has been seen. In one study, only 66% of personnel performed hand hygiene before or upon entry into a patient's room, and 58% upon exiting the patient's room [13], although a systematic review of handwashing practices worldwide has showed that approximately 19% of the world's population washes their hands with soap after contact with excreta [14].

One way to add support to patient safety is to consider how we may use technology to assist our decision making, related to patient safety issues. The degree to which technology has succeeded in supporting health care professionals in their decision making has not been investigated in any depth. Overall however, while studies have shown a general improvement in patient safety skills, they have not reported any direct patient benefits [15].

The healthcare management body has a central role in helping staff to develop good patient safety skills. Within this, a transformational leadership style has been shown to have a big influence in creating a positive safety climate, contrary to a more laisser-faire style of leadership which tends to focus on a culture of blame [16].

This study looks to describe the kinds of patient safety skills that health care professionals have and the associations that related individual backgrounds factors have on them.

2. Materials and methods

2.1. *Data collection*

The data were collected in three regional multi-profile hospitals in the western part of Lithuania. The study participants were health care professionals (physicians, head nurses, nurses and nurse assistants) working in hospitals for adult patients. Permission to conduct the study and collect data was granted by the ethical committees of the hospitals which participated in both the pilot phase and the main data collection. The ethical considerations related to data collection focused on the ethical principles for research, namely those of confidentiality, privacy, and the voluntary nature of participation in the study [17]. Permission to use the instrument used in the study was obtained from the copyright holder of the instrument by the first author.

The questionnaire consisted of two parts: background questions, and the instrument which measured the respondent's skills regarding patient safety. Nineteen background questions gathered data on basic demographic characteristics (e.g. work position, age, gender, education, years at work, usual shift, etc.), and further questions gathered information about their experiences of patient safety.

Skills were investigated using the skills scale (13 items) of the Patient Safety Attitudes, Skills and Knowledge (PS-ASK) instrument developed by Schnall [18] measuring health care professionals' general skills related to patient safety. The scale has three subscales: error analysis (6 items), threats to patient safety (4 items) and decision support technology (3 items). The items measuring health care professionals' error analysis related to patient safety included items such as ''participating as a team member of a Failure Mode & Effect analysis,''

''interpreting aggregate error report data,'' ''participating as a team member of a root- cause analysis,'' ''accurately entering an error report,'' ''participating in morbidity and mortality conferences,'' and ''supporting and advising a peer who must decide how to respond to an error.'' The subscale concerned with avoiding threats to patient safety included items such as ''using antimicrobial hand washing substances,'' ''using pressure relieving bedding materials to prevent pressure ulcers,'' ''asking patients to recall and restate what they have been told during the informed consent process,'' and ''disclosing an error to a patient and/or family member.'' The use of decision support technology was investigated by items such as ''using computer-based provider order entry,'' ''using computer-based falls risk assessment,'' and ''using barcode medication administration system.'' All items were rated on a Likert scale (1, not competent; 2, somewhat competent; 3, competent; 4, proficient; 5, expert; and 6, not applicable).

The instrument used was originally developed in the US, and was translated from English into Lithuanian using the back-translation technique [19]. For an evaluation of the instrument's validity and its use in the Lithuanian context, a pilot study was conducted in one regional hospital in Western Lithuania. The hospital was selected, based on the multi-profile services it provided for adult patients. Data were collected from all of the health care professionals involved in the pilot test ($n = 90$), which took place in February 2014. Based on the pilot, the instrument developed by Schnall was shown to have good psychometric properties in the Lithuanian context, so no changes were made. The scale's reliability was assessed with a total Cronbach's alpha of 0.91, corrected by inter-item correlation from 0.13 to 0.84. The Cronbach's alpha values were good for the whole scale in both the pilot and main study, and also for the sub-scales of error analysis (0.82 and 0.90), threats to patient safety (0.53 and 0.66), and decision support technology (0.91 and 0.92) (Table 1).

The main data were collected in three regional hospitals in May 2014. Each hospital gave their permission to conduct the study, and to have one contact person who circulated questionnaires with envelopes to all of the staff ($N = 1687$). After two weeks, the researcher collected the questionnaires in sealed envelopes from each unit. In order to increase the response rate, an additional two weeks response time was given. After that, the researcher returned to the units to collect the remaining questionnaires. The total response rate for this study was 64% ($n = 1082$).

2.2. Statistical analysis

Descriptive statistics were used to describe the characteristics of respondents, the safety skills sub-scale items, and the scale-level results of the three hospitals. Differences in sample characteristics between hospitals and professional groups were tested using the Kruskal–Wallis test. Differences in sample characteristics between specific hospitals were tested using the Mann–Whitney U test. Data were presented using mean (SD) or median (IQR) expressions. Any negatively worded items of the instruments were reversed prior to analysis. The internal consistency of the safety skills instruments and the sub-scales of error analysis related to patient safety, avoiding threats to patient safety, and decision support technology was measured by calculating the Cronbach's alpha for each sub-scale and total field. Associations between respondents' background factors and their patient safety skills were calculated by way of Spearman correlations. All of the data were analyzed using SPSS (v. 22.0; SPSS Inc., Chicago, IL, USA). A P value of <0.05 was considered to be statistically significant.

3. Results

3.1. Participants

Altogether, 1082 health care professionals participated in the study. The biggest employment group of participants were nurses ($n = 756$, 70%), with smaller groups of nurse assistants ($n = 180$, 17%) and physicians ($n = 146$, 14%). The number of returns from the three regional hospitals was: 301 (28%) from hospital 1; 411 (38%) from hospital 2; and 370 (34%) from hospital 3. The mean age of participants was 46.7 (SD = 11) years. They had many years of work experience (mean = 24), and worked an average of 40 h per week in their unit. The units in which respondents worked were internal medicine ($n = 276$, 26%), acute ($n = 161$, 15%), psychiatric ($n = 134$, 12%), surgical ($n = 131$, 12%), and others ($n = 380$, 35%). Given that the biggest group of participants were nurses, the most common education institution of the study participants was medical school 493 (46%), and the main base-qualifications were a non-university bachelor 130 (12%) and a university bachelor program 118 (11%). The majority of health care professionals ($n = 659$, 61%) worked variable shifts, in units with an average of 30.7 (SD = 17.27) beds per unit, 24.1 staff members per unit (SD = 10.33), and they had an average of 18 patients per working shift (SD = 12.03). More than half of the participants ($n = 673$, 62%) of this study had received no information about patient safety during their vocational education, but about half ($n = 589$, 54%) had received information during their continuing education. Four-fifths ($n = 866$, 80%) of respondents had reported no patient safety incidents during the last year.

3.2. Safety skills

Overall, the results of this study showed that based on their own evaluations, health care professionals perceived

Table 1 – Safety skills sub-scales and psychometric properties.

Safety skills sub-scales	Items	Cronbach's alpha from pilot study	Cronbach's alpha from main study
Error analysis	6	0.82	0.90
Threats to patient safety	4	0.53	0.66
Decision support technology	3	0.91	0.92

themselves as competent regarding their safety skills. They were competent in error analysis (mean = 3.09) and skills to avoid threats to patient safety (mean = 3.31), but only somewhat competent in using decision support technology (mean = 2.00). In error analysis, the respondents were most skilled in supporting and advising a peer who must decide how to respond to an error. Respondents were seen to be least skilled in interpreting aggregate error report data. In looking at the area of how skilled staff was in avoiding threats to patient safety, the highest evaluated skill was seen to be in using antimicrobial handwashing substances. Lesser evaluated skills included disclosing an error to a patient and/or family member. A considerable amount of variation was seen in the area of using decision support technology (Table 2).

Based on their profession and the area of hospital health care that professionals worked in, some statistically significant findings were found. Physicians and nurses were more skilled than nurse assistants in error analysis ($P < 0.001$). Nurses were more skilled regarding the avoidance of threats to patient safety than nurse assistants ($P < 0.001$), and also more skilled in using decision support technology than nurse assistants ($P < 0.01$). Differences between safety skills subscales regarding using decision support technology were also seen by hospital, and health care professionals were less skilled in hospitals 1 and 2 than in hospital 3 ($P < 0.001$) (Table 3).

Many of the participants demographic and work related background factors were slightly associated with several areas of patient safety skills. Especially, the professionals' background factors seem to correlate with their safety skills involving error analysis and the avoidance of threats to patient safety (Table 4). Health care professionals with a university or college education were seen to be less skilled regarding error analysis (−0.062, $P < 0.05$), in avoiding threats to patient safety (−0.158, $P < 0.01$), and in using decision support technology (−0.065, $P < 0.05$), than those who had received their nurse education in medical school (vocational).

Health care professionals with more experience in their primary specialty were seen to be more skilled in error analysis (0.098, $P < 0.01$), avoiding threats to patient safety (0.061, $P < 0.05$), and using decision support technology (0.089, $P < 0.01$). Those who received no information about patient safety in their continuing education had less skills in regard to error analysis (−0.082, $P < 0.01$) and avoiding threats to patient safety (−0.079, $P < 0.01$).

Professionals with more beds per unit evaluated themselves to be less skilled in areas related to avoiding threats to patient safety (−0.090, $P < 0.01$), but more skilled with using decision support technology (0.072, $P < 0.05$). When more nurses worked on a night shift, health care professionals were seen to have better skills in error analysis (0.086, $P < 0.05$) and in avoiding threats to patient safety (0.097, $P < 0.01$). The higher the number of patients that health care professionals usually had per working shift, the less skilled they were in avoiding threats to patient safety (−0.077, $P < 0.05$), but the more skilled they seemed to be with using decision support technology (0.067, $P < 0.05$).

Comparing the safety skills between health care professionals by working unit, some significant differences were found. Those working in acute and other units had significantly more safety skills regarding error analysis ($P < 0.05$) compared to health care professionals who worked in internal medicine, surgical, and psychiatric units. Health care professionals working in acute units had significantly more safety skills relating to the avoidance of threats to patient safety ($P < 0.05$), than those working in internal medicine, surgical, and psychiatric units. No significant differences were found between health care professionals by working unit regarding their skills in using decision support technology.

Amongst respondents who had reported a safety incident during the last year, physicians and nurses had significantly higher safety skills related to error analysis ($P < 0.01$) than nurse assistants. Also within the same group, skills relating to the avoidance of threats to patient safety ($P < 0.01$) were significantly higher for nurses than nurse assistants. In the health care professional group who had not reported a safety incident during the last year, physicians and nurses had significantly higher safety skills related to error analysis than nurse assistants ($P < 0.001$). Physicians who had not reported safety incidents during the last year had more skills regarding

Table 2 – Patient safety skills by participants.

Safety skills sub-scales	Mean	SD
Error analysis		
Supporting and advising a peer who must decide how to respond to an error	3.19	0.840
Participating as a team member of a root-cause analysis	3.18	0.816
Participating as a team member of a Failure Mode & Effect analysis	3.16	0.834
Accurately entering an error report	3.09	0.792
Participating in morbidity and mortality conferences	3.06	0.925
Interpreting aggregate error report data	2.93	0.871
Avoidance the threats to patient safety		
Using antimicrobial handwashing substances	3.78	0.734
Using pressure relieving bedding materials to prevent pressure ulcers	3.12	0.955
Asking patients to recall and restate what they have been told during the informed consent process	3.08	0.840
Disclosing an error to a patient and/or family member	2.75	0.883
Using decision support technology		
Using computer-based provider order entry	1.93	1.210
Using barcode medication administration system	1.92	1.193
Using computer-based falls risk assessment	1.72	1.090

Table 3 – Patient safety skills by participant groups and hospitals.

Safety skills sub-scales	Mean (SD)	Median (IQR)	Chi-square	P value
Error analysis			67.22	<0.001
Physicians	3.25 (0.59)	3.33 (0.7)***		
Nurses	3.16 (0.59)	3.0 (0.7)###		
Nurse assistants	2.64 (0.84)	2.83 (1.2)***,###		
Total	3.09 (0.67)	3.0 (0.7)		
Avoidance the threats to patient safety			40.41	<0.001
Physicians	3.27 (0.58)	3.25 (0.7)**		
Nurses	3.39 (0.59)	3.33 (0.8)**,###		
Nurse assistants	3.01 (0.76)	3.0 (1.0)**,###		
Total	3.31 (0.63)	3.25 (0.75)		
Use of decision support technology			8.61	0.014
Physicians	1.96 (1.13)	1.67 (2.0)		
Nurses	2.08 (1.19)	1.67 (2.0)##		
Nurse assistants	1.69 (0.99)	1.0 (1.3)##		
Total	2.00 (1.16)	1.67 (2.0)		
The mean difference between participants by chi-square (Kruskal–Wallis test).				
The mean difference between concrete participants (Mann–Whitney test):				
** $P < 0.01$ between physicians and nurses, nurse assistants.				
*** $P < 0.001$ between physicians and nurse assistants.				
## $P < 0.01$ between nurses and nurse assistants.				
### $P < 0.001$ between nurses and nurse assistants.				
Error analysis			3.26	0.196
Hospital 1	3.10 (0.60)	3.0 (0.6)		
Hospital 2	3.04 (0.71)	3.0 (0.7)		
Hospital 3	3.13 (0.68)	3.0 (0.7)		
Total	3.09 (0.67)	3.0 (0.7)		
Avoidance the threats to patient safety			0.97	0.617
Hospital 1	3.35 (0.64)	3.25 (0.8)		
Hospital 2	3.27 (0.60)	3.25 (0.7)		
Hospital 3	3.32 (0.66)	3.25 (0.8)		
Total	3.31 (0.63)	3.25 (0.75)		
Use of decision support technology			26.84	<0.001
Hospital 1	1.73 (0.97)	1.0 (1.3)***		
Hospital 2	1.70 (1.09)	1.0 (1.7)###		
Hospital 3	2.33 (1.26)	2.0 (2.3)***,###		
Total	2.00 (1.16)	1.67 (2)		
The mean difference between three hospitals by chi-square (Kruskal–Wallis test).				
The mean difference between specific hospitals (Mann–Whitney test):				
*** $P < 0.001$ between hospital 1 and hospital 3.				
### $P < 0.001$ between hospital 2 and hospital 3.				

Table 4 – Correlations between respondents' background factors and their patient safety skills.

Demographic and work related characteristics	Error analysis	Avoidance of threats to patient safety	Use of decision support technology
Age	0.060*	−0.035	0.021
Education (e.g. medical school, college, bachelor, etc.)	−0.062*	−0.158**	−0.065*
Years of experience in primary specialty	0.098**	0.061*	0.089**
Years of work experience in general	0.091**	0.027	0.057
Information about patient safety in continuing education	−0.082**	−0.079**	−0.011
Usual shift	−0.063*	−0.052	−0.033
Extra job	−0.054	0.012	0.063*
Received hours regarding extra job	−0.071	−0.077	−0.207*
Number of beds per unit	−0.061	−0.090**	0.072*
Number of physicians working in unit on day shifts	0.035	0.080*	−0.007
Number of nurses working in unit on day shifts	0.058	0.116**	0.001
Number of nurses working in unit on evening shifts	0.101**	0.071	−0.055
Number of nurses working in unit on night shifts	0.086*	0.097**	−0.026
Number of patients health care professionals usually have per working shift	−0.041	−0.077*	0.067*
* $P < 0.05$.			
** $P < 0.01$.			

the avoidance of threats to patient safety than nurses ($P < 0.05$) and nurse assistants ($P < 0.01$). Nurses in the same group were significantly more skilled than nurse assistants ($P < 0.001$), and had significantly higher safety skills related to decision support technology ($P < 0.01$) than nurse assistants in the same group.

4. Discussion

Overall, health care professionals were competent regarding patient safety skills, based on their own evaluations. In more detail, health care professionals were competent regarding error analysis and the avoidance of threats to patient safety, but only somewhat competent regarding their use of decision support technologies. Regarding threats to patient safety, they were most competent in using antimicrobial handwashing substances and using pressure relieving bedding materials to prevent pressure ulcers, and overall, the mean of handwashing skills was seen to be the highest. Health care professionals were also seen to be competent in supporting and advising a peer who must decide on how to respond to an error, and in participating as a team member of a root-cause error analysis.

Health care professionals showed the lowest level of competence regarding the use of decision support technology (mean = 2.00). Decision support technologies are quite new in Lithuania and not often used. Therefore, in this setting, hospital managers may need to pay more attention to computer-based learning when planning health care professionals' continuing education in this field. National-level support may also be needed with the integration of computer-based technologies into health care professionals' daily practices, so as to promote patient safety and good quality patient care. This is an especially important issue, as at the time of data collection, the hospitals included in this study were at different stages in using decision support technologies in the area of patient safety. However, the resources, technology and related staff education should be at same level at similar types of hospitals to ensure the provision of equal care in each publicly funded hospital, therefore we asked how much they used the technology and not whether it was available.

Based on this study, the central issues related to the respondent's patient safety skills are whether they were more experienced and educated, and whether there were more nurses working during night shifts. A surprising result is that health care professionals with a lower level of education (such as that received in a medical school for nurses) evaluated themselves as more skilled than those who received their professional education at bachelor level at a university. However, given that they may also be differently trained, have less responsibility etc., this may influence how they evaluate their skills compared to those who have different roles and responsibilities. In the Lithuanian context, nursing science is very young and bachelor studies were only established in 1990 (initially only available in the city of Kaunas). Most of participants in this study were nurses, and one of the main reasons for this educational observation is that nurses who studied at medical school tended to gain more practical skills which they could use more easily in clinical practice. The results of this study also confirm that health care professionals tend to gain their safety skills through many years' of experience, and so their education level is not the only contributory factor. Safety competence was seen to be closely associated with the presence of more nurses working on night shifts, and this is quite a natural finding as having more staff to do clinical work is likely to make for a safer nursing environment. Especially, having a higher staffing ratio is important in managing situations that entail a high number of patients. When more nursing personnel are present, it may also be that health care professionals feel they have a supportive working atmosphere and are better able to consult with colleagues when faced with challenging working situations.

However, it seemed that more beds and a higher number of patients in the unit posed a threat to patient safety skills. According to the Lithuanian Minister of Health Order [20], nurses should have a maximum of 11 patients per nurse when they are working with psychiatric patients and a descending ratio with patients of other profiles. It seems that a high patient-to-nurse ratio forces nurses to work quickly because they do not have enough time for each patient, and this presents a challenge for nurses to maintain a high quality of nursing care, and to take safe care of their patients. Previous literature has found that safety incidents have been especially associated with nurse overtime and patient–nurse ratios [21], and it is therefore important for nurses to have enough staffing and resources to deliver a good quality of nursing care [22].

Strengths and limitations of this study have to be mentioned. The strength of this study is that the sample size ($n = 1082$) was large and the response rate (64%) was good. It also comprised several health care professional groups, including physicians, nurses, and nurse assistants. Given the lack of previous studies concerning patient safety conducted in the Baltic area, this study can be considered as a pioneering work. Furthermore, this study is the first of its kind to investigate the general patient safety skills of health care professionals in Lithuania.

However, a limitation exists related to the instrument used in this study. The issues concerning patient safety skills were investigated at general level, for the purpose of investigating a representative spectrum of health professionals such as physicians, nurses and nurse assistants. To expand this general view, further research is needed to investigate the specific skill areas in different professions, and also in different clinical settings. The data were purposefully collected in one region, but it is one of the biggest regions in Lithuania and may be seen as representative of the national context. Also, those who dropped-out (36%) might have a different level of patient safety skills than majority respondents of this study. Furthermore the correlations found were very weak, so we need to moderate which kind of conclusions we make based on the results.

Regardless of these points, however, the instruments used in the study were validated and piloted in the featured research context, and returned a good psychometric performance.

5. Conclusions

This study has served to investigate the general skills of health care professionals in regard to patient safety. It provides new

knowledge about the topic in Baltic countries, and can thus be used in the development of health care services. Overall, health care professionals in this setting had good skills in error analysis and skills linked to the avoidance of threats to patient safety, but were less skilled in using decision support technology. Health care professionals who were more experienced and with a medical school education had better safety skills, as did those who worked on night shifts with more nursing personnel. However, it was shown that compared to the other groups in this study, nurse assistants were less skilled regarding patient safety. Therefore, more support by managers and colleagues is needed to ensure their competence. Further research is also needed to investigate the patient safety skills of different healthcare professions, and more specifically, to determine their safety skills needs.

Conflict of interest

None declared.

Authors' contribution

Study conception/design: I.B., M.K., T.S.; data collection/analysis: I.B., A.M.; drafting and writing the manuscript: I.B., M.K., A.M., V.M., T.S.; approval of the final text: I.B., M.K., A.M., V.M., T.S.

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Ethical approval

Ethical approval was received from the ethical committee of Klaipeda University, Faculty of Health Sciences and study permission was obtained from the hospitals who participated in this study.

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