








Hospital safety climate from nurses' perspective in four European countries

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Background: Nursing shortages, the substitution of practical nurses for registered nurses, an ageing workforce, the decreasing number of nurse graduates and the increasing migration of young nurses are important factors associated with the hospital safety climate in Central European countries.

Aims: The aim of the study was to investigate nurses' perceptions of the safety climate in four selected central European countries (Croatia, the Czech Republic, Poland and Slovakia) and to determine the relationship between safety climate and unfinished nursing care.

Methods: A cross-sectional study was used. The sample consisted of 1353 European nurses from four countries. Instruments used were the Hospital Survey on Patient Safety Culture and the Perceived Implicit Rationing of Nursing Care. Data were analysed using descriptive statistics and multiple regression analyses.

Results: Significant differences were found between countries in all unit/hospital/outcome dimensions. 'Perceived Patient Safety' and 'Reporting of Incident Data' were associated with aspects of 'Organizational Learning' and 'Feedback and Communication about Error'. Higher prevalence of unfinished nursing care is associated with more negative perceptions of patient safety climate.

Conclusions: Cross-cultural comparisons allow us to examine differences and similarities in safety dimensions across countries. The areas with potential for initiating strategies for improvement in all four countries are 'Staffing', 'Non-punitive Response to Error' and 'Teamwork across Hospital Units'.

Implications for nursing and health policy: 'Feedback and Communicating about Error' and 'Organizational Learning - Continuous Improvement' were the main predictors of 'Overall Perception of Patient Safety' and 'Reporting of Incident Data'. Therefore, nurse managers should focus on how to

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Conflict of Interest

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empower nurses in these areas in order to foster a no-blame culture and effective reporting. In addition, it is important for policymakers to update nursing education standards in order to address patient safety.

Keywords: Hospital Care, Nursing, Patient's Safety, Safety Climate, Unfinished Nursing Care

Introduction

Patient safety is widely recognized as a cornerstone or a prerequisite of healthcare quality aspects (Chen & Li 2010; Kirwan et al., 2013). A systematic approach to safety based on open reporting of adverse events, their effective analysis and organizational learning is cardinal in improving patient safety in hospitals (Kirwan et al., 2013). Safety climate is considered an unequivocally important strategy in healthcare safety improvement (Halligan & Zecevic, 2011; Mitchell et al., 2016) comprising a more open culture, a blame-free environment and a reflective (non-punitive) attitude towards errors and adverse events (Elsous et al., 2017; Sorra & Dyer, 2010; Wagner et al., 2013).

Assessment of existing safety climate is an important opportunity to obtain a better insight into problematic attitudes, and practices (Singla et al., 2006), or into patient safety issues demanding immediate attention (El-Jardali et al., 2010). Safety climate measures enable healthcare organizations to identify high-risk situations (Singla et al., 2006) and safety problems that put a workplace at increased risk of errors or adverse events (El-Jardali et al., 2010), and, in addition, to determine the strengths and weaknesses of their safety climate and consequently areas for improvement (El-Jardali et al., 2010; Elsous et al., 2017; Reis et al., 2018; Smits et al., 2009).

Background

The role of nurse staffing in improving patient safety climate has been widely acknowledged in safe-staffing guidelines (Griffiths et al., 2019). As pointed out by Mitchell et al. (2016), incident reporting in healthcare organizations is mainly administered by nurses. Spears (2005) has argued that nurses play a pivotal role in patient safety improvement and are analogous to the last layer in the often-cited Swiss cheese model (Reason 2000). This accident causation model looks at systems and explains how faults ('holes') in the various parts ('slices') of the system can result in adverse events (Reason 2000). Jones et al. (2015) emphasize nurses' roles as gatekeepers, coordinators and evaluators of care and stress that their perception of safety climate is, therefore, essential for patient safety improvement. Cleary-Holdforth (2019) posits nurses as key drivers of evidence-based patient safety and recommends examination of limitations in this area within evidence-based practice.

Research focusing on patient safety has also highlighted the relationship between nurse staffing and patient safety

outcomes. From an international perspective, the number of nurses in Central European countries is below the European Union average (OECD 2019). There is a large body of evidence exploring the association between low nurse staffing levels and adverse patient outcomes (Aiken et al., 2017; Recio-Saucedo et al., 2018). Unfinished care has been examined as a key mechanism behind this association (Richards et al., 2018).

There is strong empirical evidence confirming a positive relationship between a positive safety climate and the reporting of adverse events (Hutchinson et al., 2009; Mitchell et al., 2016; Pokorná et al., 2016). However, there is little evidence regarding the effectiveness of incident reporting systems in improving patient safety in Central European countries. Reporting of adverse events in these European countries is based on the WHO Draft Guidelines for Adverse Event Reporting and Learning Systems, and Council Recommendation 2009/C 151/01 (European Commission 2014). However, reporting systems vary between these countries. European countries have adopted differing models for reporting systems, with some variations in the organizational or regulatory framework, reporting and learning culture, components of reporting systems, reporting methods, etc. There are both mandatory (e.g. Croatia, the Czech Republic) and voluntary (e.g. Slovakia, Poland) reporting systems in these four countries (European Commission 2014).

In common with health services in many countries, these post-communist central European countries struggle with low nurse staffing levels and substitution of nursing assistants for registered nurses. More complex solutions aimed at tackling the growing shortage of registered nurses in health care have been introduced in some countries (e.g. encouragement of interest in medically oriented study, the stabilization of healthcare professionals in the healthcare system, increases in salaries for non-medical personnel, amendments in laws relating to practice nurses in the Czech and Slovak Republics, etc.). The continuing shortage of nurses, low job satisfaction and the migration of highly qualified nurse specialists highlight the importance of investigating hospital safety climate in Central European countries. Although there is a growing amount of research focused on patient safety and unfinished nursing care worldwide, there remain few studies investigating these phenomena in Central European countries. This study was carried out within the framework of the European Union

COST Action project CA15208: Rationing-Missed Nursing Care: An International and Multidimensional Problem (RAN-CARE, 2016). Four of the central European countries participating in the project were involved in this study.

Aim

The aim of the study was to investigate and compare nurses' perceptions of the safety climate in four selected central European countries (Croatia, the Czech Republic, Poland and Slovakia) and to determine the relationship between safety climate and unfinished nursing care.

Methods

Design

A descriptive, cross-sectional descriptive study.

Sample and setting

The sample consisted of 1353 European nurses from four selected countries (Croatia–438 nurses, the Czech Republic–306 nurses, Poland–253 nurses, Slovakia–356 nurses). Inclusion criteria for the study were as follows: nurses from acute care departments working at least one year and providing direct patient care in hospitals. Nurses in managerial positions and home care nurses were excluded. Since the population of nurses is large (approximately 270 000 nurses in Poland, 90 000 nurses in the Czech Republic, 40 000 nurses in Croatia and also in Slovakia), we set the sample size at a minimum of 196 nurses from each country. This sample gives the study a margin of error of $\pm 7\%$ (confidence interval 95%) in determining nurses' perceptions of the safety climate. The response rate in the whole sample was more than 70% (Croatian sample–73%, Czech sample–70.18%, Polish sample–79%, Slovak sample–82.38%). In Croatia, the questionnaires were distributed to registered nurses from 17 selected departments in four university hospitals. In the Czech Republic, the questionnaires were distributed to nurses from 26 selected departments in eight hospitals (three private and five public) with more than 100 beds. In Poland, the questionnaires were distributed in one university hospital. In Slovakia, the questionnaires were distributed to registered nurses working in medical and surgical units at 16 departments of eight acute hospitals (six private and two public) with more than 100 beds.

Data collection

Data were collected in paper and pencil format from April 2018 to November 2018. Self-reporting questionnaires were distributed in each country to nurses in hospitals by a country coordinator.

For the purpose of the study, the following instruments were used: demographic data sheet; the HSOPSC (Sorra & Nieva 2004); and the PIRNCA questionnaire (Jones 2014). Demographic data included the following: individual demographic items; employment attributes (work setting, overall nursing work experience, work experience in the current hospital department); and organizational variables (hospital size and hospital type).

The HSOPSC instrument

The data were collected using the 'Hospital Survey on Patient Safety Culture' (HSOPSC). The survey examines patient safety climate from a hospital staff perspective. It consists of 42 items grouped into 12 composite dimensions—two outcome dimensions, seven unit-level and three hospital-level dimensions of safety climate (Table 1). Eighteen of the 42 items in the 12 dimensions are worded negatively (Sorra & Nieva 2004).

The survey includes two items relating to an overall grade for patient safety for work area/unit and the number of events reported by respondents over the past 12 months (Sorra & Nieva 2004). The instrument was translated from English into the relevant languages (Czech, Slovak, and Polish) by forward–backward translation (a Croatian version was already available). Cronbach's alphas for each of the 12 subscales in our study ranged between 0.34 (Staffing)—0.89 (Frequency of Events Reported).

The PIRNCA questionnaire

Unfinished nursing care was assessed using the PIRNCA ('Perceived Implicit Rationing of Nursing Care') questionnaire. The PIRNCA is an inventory of 31 nursing activities common to medical–surgical inpatient settings (Jones 2014). Bedside, nurse respondents were asked to rate the frequency with which they were unable to complete any of the 31 activities deemed necessary for patients within the previous seven working shifts (never = 1, rarely = 2, sometimes = 3 and often = 4). The instrument was translated from English into the relevant languages (Czech, Slovak, Polish and Croatian) by forward–backward translation. The internal consistency estimate (Cronbach's alpha) in the original instrument was 0.97. The internal consistency of the PIRNCA in the current study was 0.96. It ranged from 0.86 (in the Czech version) to 0.90 (in the Slovak version).

Ethical consideration

Permission to conduct the study was received from the CORE group of COST Action RAN-CARE. Ethical committee approval was obtained from Ethical committee of Medical

Table 1 Comparative results on safety climate dimensions of four countries

Safety culture dimensions	Croatia		Slovakia		Poland		Czech Republic		P
	% Positive	Mean (SD)	% Positive	Mean (SD)	% Positive	Mean (SD)	% Positive	Mean (SD)	
Unit-level scales									
Teamwork within units	61.23	3.60 (0.75)	63.63	3.67 (0.71)	63.03	3.44 (0.81)	70.53	3.83 (0.66)	0.000
Supervisor/manager's expectations, actions promoting patient safety	56.15	3.52 (0.73)	67.78	3.79 (0.82)	48.60	3.14 (0.78)	78.83	4.04 (0.55)	0.000
Organizational learning–continuous improvement	54.17	3.51 (0.63)	66.47	3.69 (0.72)	51.57	3.37 (0.53)	63.57	3.61 (0.56)	0.000
Feedback and communication about error	54.30	3.48 (0.80)	67.83	3.80 (0.80)	45.43	3.34 (0.85)	81.10	4.04 (0.63)	0.000
Communication openness	47.37	3.34 (0.69)	46.73	3.23 (0.84)	39.70	3.13 (0.76)	76.10	4.00 (0.67)	0.000
Staffing	27.85	2.76 (0.59)	45.30	3.26 (0.64)	29.43	2.67 (0.47)	38.70	3.03 (0.66)	0.000
Non-punitive response to error	28.00	2.90 (0.75)	38.33	3.19 (0.71)	25.86	2.81 (0.65)	57.20	3.54 (0.71)	0.000
Hospital-level scales									
Management support for patient safety	26.50	2.97 (0.75)	54.70	3.57 (0.75)	35.17	3.08 (0.65)	63.77	3.61 (0.69)	0.000
Teamwork across units	39.18	3.23 (0.59)	47.28	3.37 (0.67)	36.78	3.03 (0.70)	57.70	3.53 (0.69)	0.000
Handoffs and transitions	52.35	3.63 (0.67)	55.45	3.51 (0.66)	48.83	3.32 (0.65)	72.00	3.84 (0.56)	0.000
Outcome variables									
Frequency of events reported	29.67	2.83 (1.02)	51.37	3.45 (1.09)	50.5	3.53 (1.13)	69.80	3.94 (1.03)	0.000
Overall perceptions of patient safety	56.10	3.51 (0.64)	61.13	3.64 (0.71)	46.78	3.23 (0.67)	67.33	3.78 (0.61)	0.000
Safety grade		3.79 (0.82)		3.79 (0.71)		3.29 (0.77)		4.09 (0.69)	0.000

Faculty University of Ostrava, Czech Republic (no. 15/2018) as a main coordinator of the study as well as from ethical committees of all four Croatian university hospitals included in study. All participants were fully informed about the purpose of the study, voluntary participation, their anonymity and confidentiality. Answering to the survey was seen as voluntary consent to participate. At any time, participants had the right to withdraw. Confidentiality of the participants was respected.

Ethical approval was obtained from the Ethics Committee of the Medical Faculty of the University of Ostrava, Czech Republic (no. 15/2018), the main coordinator of the study.

Each country independently administered a survey pack. Formal approval from the directors of nursing or ethics committee of the participating hospitals was obtained for recruitment and data collection in each country. Contacted researchers in each participating country approached hospital administrators before data collection to explain the purposes and potential significance of the study. Once approval from hospitals was obtained, researchers distributed a set of questionnaires to nurse managers of departments, who then distributed them to all registered nurses within the selected departments. The survey packs included a cover letter with an invitation to participate. The cover letter explained the purpose of the study and confirmed that participation was

voluntary, with no negative consequences for non-participation. Procedures to protect confidentiality were explained, and respondents were instructed to put completed surveys in the designated boxes located in nurse rooms. Completed surveys were regarded as informed consent.

Data analysis

The Statistical Package for Social Sciences software (SPSS, Inc, Chicago, IL) was used for data analysis. Descriptive statistics (percentages of positive responses, mean values and standard deviations), Pearson's correlations and multiple regression analyses were applied to survey results. Cronbach's alpha coefficient was calculated for all 12 dimensions. A *P*-value < 0.05 indicated statistical significance for all comparisons.

Results

Socio-demographic characteristics of the participants

The sample comprised 1,353 nurses: 32.4% (*n* = 438) from Croatia; 26.3 % (*n* = 356) from Slovakia; 22.6% (*n* = 306) from the Czech Republic; and 18.7% (*n* = 253) from Poland. Most respondents were female (94.7%), and more than half of the nurses worked in general non-teaching hospitals (53.4%), and hospitals with more than 600 beds (50.2%).

Most nurses worked in surgery units (36.3%; $n = 482$) and in ICUs (20.3%; $n = 276$). In addition, 18.8% ($n = 249$) worked in medical units, and 23.6% ($n = 321$) worked in other settings. About 52.2% of the participating nurses had professional education to the level of baccalaureate degree and above. The mean duration of professional experience was 15.9 years (SD 10.87), ranging from 11.34 years (SD 8.51) in Poland to 18.86 years (SD 10.87) in Slovakia. The mean length of employment in current hospital departments was 11.28 years (SD 9.77), ranging from 9.75 years (SD 8.42) in Poland to 12.9 years (SD 10.26) in Slovakia. The mean age of participants was 38.61 years (SD 10.52), ranging from 35.38 years (SD 11.37) in Croatia to 41.16 years (SD 9.26) in Slovakia.

Nurses' perceptions of patient safety climate

Significant differences were found between countries in all unit/hospital/outcome dimensions (Table 1). The four countries showed significant differences in their scores for all 12 safety climate dimensions. The percentage of average positive score on the dimensions were, at the unit level, between 25.86 % and 81.10 %, and at the hospital level, between 26.5 % and 72%. The lowest score in 'Overall Perception of Patient Safety' was identified in Polish nurses and the highest score in Czech nurses. In Croatia and Poland, the highest positive score was in the dimension of 'Teamwork within Units'. The dimension with the highest average percentage positive responses in the Slovak and in the Czech sample was 'Feedback and Communication about Error'.

Outcome, unit-level and hospital-level dimensions of safety climate

A statistically significant positive relationship was found between outcome, and unit- and hospital-level dimensions of safety climate. The correlation coefficients between 'Overall Perception of Patient Safety', unit and hospital-level dimensions of safety climate ranged from weak ($r = 0.23$; $P < 0.01$) to moderate ($r = 0.49$; $P < 0.01$) relationships (Table 3). The 'Overall Perception of Patient Safety' was predicted by seven dimensions of safety climate (Table 2), explaining a total of 38.7% of variance. 'Organizational Learning - Continuous Improvement' explained 24.6 % of variance. However, the percentages of variance explained by other dimensions were low (ranging from 1–8% of variance), and therefore, results suggest that the 'Overall Perception of Patient Safety' is strongly associated only with 'Organizational Learning - Continuous Improvement' (Table 2). In this study, the nurses who perceived more 'Organizational Learning - Continuous Improvement' had more positive overall perceptions of patient safety.

Table 2 Multiple regression analyses of unit-level and hospital-level dimensions on outcome dimensions of the HSOPSC

Predictor	R	R ² -change	b	T	P
Overall perception of patient safety	$(F_{\text{total}} (33.13) = 115.75; P < 0.000)$				
Organizational learning–continuous improvement	0.496	0.256	0.291	11.149	0.000
Supervisor/manager's expectations and actions promoting patient safety	0.571	0.079	0.128	4.190	0.000
Handoffs and transitions	0.602	0.037	0.184	6.199	0.000
Non-punitive response to error	0.614	0.014	0.099	3.662	0.000
Communication openness	0.619	0.007	0.081	2.796	0.005
Management support for patient safety	0.619	0.005	0.075	2.777	0.006
Feedback and communication about error	0.624	0.002	0.063	2.071	0.039
Constant			5.15		
Frequency of events reported	$(F_{\text{total}} (89.08) = 91.43; P < 0.000)$				
Feedback and communication about error	0.430	0.185	0.405	12.919	0.000
Management support for patient safety	0.456	0.023	0.225	7.089	0.000
Teamwork across units	0.462	0.005	0.085	-2.753	0.006
Supervisor/manager's expectations and actions promoting patient safety	0.465	0.003	0.067	-2.152	0.032
Constant			6.02		

b, beta standardized regression coefficients; F_{total} , F-test of overall significance; R, correlation coefficient; R²- change, change in R-Squared; T, t statistic.

The 'Frequency of Events Reported' was predicted by four dimensions of safety climate (Table 2), explaining 21.4% of variance. 'Feedback and Communication about Error' explained 18.5% of variance. The percentages of variance explained by other dimensions were low (ranging from 1–2% of variance), and therefore, results suggest that the 'Frequency of Reported Events' is strongly influenced by 'Feedback and Communication about Errors' (Table 2). The more 'Feedback and Communication about Errors' perceived by nurses, the more frequently they reported adverse events. The unit-level dimension 'Organizational Learning - Continuous Improvement' made a significant contribution to the outcome variable 'Overall Perception of Safety'. In addition, the unit-level

Table 3 Correlation coefficients between unfinished nursing care (PIRNCA score), years of experience and safety climate dimensions

	<i>Experience (total)</i>	<i>Experience–workplace</i>	<i>Safety grade</i>	<i>Unfinished care</i>	<i>Teamwork within units</i>	<i>Manager’s expectations</i>	<i>Organizational learning</i>
Age	0.946**	0.697**	0.018	-0.037	0.004	0.084**	0.036
Perceptions of patient safety	0.042	-0.024	0.378**	-0.290**	0.417**	0.467**	0.488**
Events reported	0.033	0.001	0.220**	-0.169**	0.417**	0.467**	0.488**
Handoffs and transitions	0.095**	0.027	0.340**	-0.220**	0.297**	0.345**	0.230**
Teamwork across units	0.129**	0.026	0.326**	-0.288**	0.391**	0.467**	0.488**
Management support	0.071*	-0.006	0.404**	-0.336**	0.387**	0.440**	0.420**
Non-punitive response	0.087**	0.071*	0.287**	-0.287**	0.389**	0.474**	0.272**
Staffing	0.088**	0.044	0.203**	-0.216**	0.193**	0.259**	0.147**
Communication	0.088**	0.003	0.325**	-0.226**	0.454**	0.557**	0.339**
Feedback	0.084**	-0.010	0.400**	-0.317**	0.477**	0.579**	0.459**
Organizational learning	0.065*	-0.032	0.309**	-0.244**	0.521**	0.427**	
Manager’s expectations	0.110**	-0.009	0.374**	-0.297**	0.497**		
Teamwork within units	0.030	-0.038	0.369**	-0.305**			
Unfinished care	-0.024	0.049	-0.355**				
Safety grade	0.075**	0.023					
Years of experience (workplace)	0.737**						

Significance level of correlation coefficients. Statistically significant correlations between outcome, unit, and hospital-level dimensions of safety climate, and unfinished nursing care are in bold.

* $P < 0.05$.

** $P < 0.01$.

dimension ‘Feedback and Communication about Error’ contributed significantly to the outcome ‘Frequency of Reported Events’.

Demographics, hospital variables, unfinished nursing care and outcome dimensions of safety climate

A negative moderate relationship was established between outcome, unit- and hospital-level dimensions of safety climate and unfinished nursing care (Table 3). In order to clarify the relationship between two dependent variables (outcome variables ‘Overall Perception of Patient Safety’ and ‘Frequency of Reported Events’), and unfinished nursing care, demographics, and hospital variables, stepwise multiple regression analyses were performed for each outcome variable. However, unfinished nursing care did not significantly predict outcome dimensions of safety climate. Eight per cent of total variance in perceived patient safety climate was accounted for by unfinished nursing care [$F(48,67) = 110.79, P < 0.001$]; [$b = -0.29; t = -10.53$]. Only three per cent of total variance in ‘Frequency of Events Reported’ was accounted for by unfinished nursing care [$F(44,48) = 35.31, P < 0.001$];

[$b = -0.17; t = -5.94$]. Type of hospital significantly predicted only the ‘Frequency of Events Reported’ [$F(94,17) = 86.95, P < 0.001$]; [$b = 0.34; t = 15.34$], explaining a total of 15% of variance. Nurses working in non-teaching hospitals had greater ‘Frequency of Events Reported’. Other demographic characteristics of nurses, such as years of experience, had no significant relationship to perceptions of patient safety climate, and ‘Frequency of Reported Events’.

Discussion

The overall aim of this study was to investigate the status of hospital safety climate from the point of view of nurses. Areas in which safety climate in selected European countries was categorized as strong and weak were recognized. Consistent with previous studies, most nurses reported the highest score in items of the dimension ‘Teamwork within Units’ (Ammouri et al., 2015; Hamaideh 2017; Reis et al., 2018; Wagner et al., 2013). Czech and Slovak nurses reported higher score (or more positive responses) for the safety climate dimension of ‘Feedback and Communication about Error’. Compared with the findings of another comparative

<i>Feedback</i>	<i>Communication</i>	<i>Staffing</i>	<i>Non-punitive response</i>	<i>Management support</i>	<i>Teamwork across units</i>	<i>Handoffs and transitions</i>	<i>Events reported</i>	<i>Perceptions of patient safety</i>
0.068*	0.054	0.112**	0.065*	0.110**	0.123**	0.071*	0.063*	0.026
0.430**	0.404**	0.234**	0.385**	0.407**	0.382**	0.375**	0.210**	
0.430**	0.404**	0.144**	0.225**	0.407**	0.180**	0.156**		
0.264**	0.314**	0.222**	0.363**	0.379**	0.634**			
0.404**	0.339**	0.239**	0.374**	0.568**				
0.432**	0.339**	0.327**	0.410**					
0.395**	0.445**	0.353**						
0.202**	0.157**							
0.563**								

international study (Wagner et al., 2013), and a systematic review (Reis et al., 2018), the results of this study confirmed that ‘Staffing’ and ‘Non-punitive Response to Error’ were the dimensions with most potential for improvement. A weak area in all four countries was the dimension of ‘Staffing’, reflecting the continuing shortage of nurses in Central European countries. Despite broad implementation of various incident reporting systems in acute hospital settings in Central European countries, and the emphasis on shifting from a culture of blame to a just culture, the findings of this study indicate that non-punitive response to error has not dislodged the culture of blame that still prevails in these countries. Nurses from the Czech Republic reported the highest score in the dimension ‘Non-punitive Response to Error’ in comparison with other countries. One explanation for the variation could be the differences in the reporting systems of the countries. For example, in the Czech Republic, the new central adverse event reporting system was implemented in 2018 to facilitate and promote the comparison of incidents at a national level. The reporting system was voluntary until 2017, but has been compulsory since 2018. The national reporting system protects the anonymity of healthcare providers so that reporting hospitals are not penalized. Anonymized reports of

the data are regularly published in the Czech Republic, and information from data analysis results and interventions is disseminated to help improve the quality of health care provided (Pokorná et al., 2016). There are no nationwide adverse event reporting systems in Poland and Croatia. In Slovakia, the reporting of errors and adverse events in acute hospital care is regulated by *Methodological guideline no 3/2014*, which was established by the Healthcare Surveillance Authority (HCSA). Hospitals should analyse their own errors, which must be reported annually to the HCSA (European Commission 2014). However, the HCSA does not regularly publish any analyses of reported aggregated data from hospitals. In Croatia, reporting of incidents is mandatory and the reporting system is partially regulated under law (European Commission 2014). However, nurses from Croatia recorded the lowest score for the dimension of ‘Frequency of Events Reported’ in comparison with countries with voluntary reporting systems (Slovakia and Poland). This safety outcome variable is closely linked with other dimensions referring to a reporting environment (‘Non-punitive Response to Error’, ‘Organizational Learning’, and ‘Feedback and Communication about Error’). Inadequate report processing (e.g. under-reporting) and the poorly realized potential of reporting for

learning may be some of the consequences of lack of feedback from incident reporting, or a blame culture associated with fear of anticipated punishment (European Commission 2014; Kirwan et al., 2013; Wagner et al., 2013). For many healthcare organizations, it can be demanding to move towards a just culture. Moreover, in contemporary research in health care several contributing factors of inadequate report processing have been identified, including level of education (Kirwan et al., 2013), time pressure, lack of time, shortage of staff (Evans 2006), or lack of knowledge and meaningful feedback (Benn et al., 2009; Evans 2006).

Consistent with wider empirical evidence, the results of this study highlight the importance of 'Feedback and Communication about Error' in reporting of incident data. Additionally, 'Organizational Learning - Continuous Improvement' is positively associated with perceptions of patient safety by nurses. Findings from the regression analyses also show that nurses from selected central European countries perceive patient safety predominantly in terms of 'Organizational Learning' and 'Feedback and Communication about Error'. In line with numerous important reports (European Commission 2014) and empirical studies (Anderson et al., 2013; Benn et al., 2009; Mitchell et al., 2016), the findings of the current study place emphasis on the effective analysis of incidents and the development of effective systems for learning from incidents, in order to influence failure factors before a real adverse event or patient harm occurs. Reason (2008) analysed three mutually connected qualities of safety culture—just, learning and reporting—arguing that learning is essential to safety culture. A 'reporting culture' includes data collection, local investigation of incidents, analysis of aggregated incident data and dissemination of information about adverse events and near misses (Reason 2008). The learning component of safety culture in healthcare organizations emphasizes the importance of learning from reports, of analysing underlying contributing factors, and of searching for possible and visible interventions and feedback loops (Benn et al., 2009; Mitchell et al., 2016). 'Organisational Learning - Continuous Improvement' does not imply a single intervention, but a continuous strategy including formal and informal learning to reveal inherent system failures or unsafe practices, contributing to organizational change (Reis et al., 2018). Incident reporting systems, analysis of adverse events and near misses during the provision of health care (e.g. through their root causes) can provide potentially utilizable data regarding latent system problems (Benn et al., 2009).

Compared with the findings of the multi-centre study (Ausserhofer et al., 2013), a negative moderate relationship was found between the 12 culture dimensions and

perceptions of unfinished nursing care. The results of this study indicated a negative relationship between mean frequency of unfinished nursing care activities (or failure to complete specific nursing tasks) and perception of safety climate from a nursing point of view. A previous study (Ausserhofer et al., 2013) similarly revealed a moderate negative relationship between unfinished nursing care (measured by the Basel Extent of Rationing of Nursing Care—BERNCA-R, Schubert et al., 2007) and patient safety climate (measured by the Safety Organizing Scale, Vogus & Sutcliffe 2007). Higher prevalence of unfinished nursing care is associated with weaker patient safety climate. However, unfinished nursing care was not identified as a significant predictor of outcome dimensions of safety climate.

Limitation of the study

There were several limitations to the study. The first limitation is that it used an instrument which was not developed for the target languages or cultures. The internal consistency of some of the 12 safety dimensions was low. In addition, the construct validity of each language version was not tested. The second limitation was the use of a non-randomized sample of nurses and the cross-sectional design of the study. Nurses came from a limited number of the hospitals in the participating countries. In Poland, only one university hospital was recruited. In addition, there were significantly more nurses from Croatia than from anywhere else. Convenience sampling, with the possibility of under- or over-representation of the target population, may potentially result in skewed findings.

Conclusion

The results of this international study identify weak areas of patient safety climate related to 'Staffing' and 'Non-punitive Response to Error'. Perceived patient safety and reporting of incident data are associated with 'Organizational Learning', and 'Feedback and Communication about Error'. Higher prevalence of unfinished nursing care is associated with more negative perceptions of patient safety climate.

Implication for nursing and health policy

This study in four post-communist central European countries compared nurses' perceptions of the safety climate and investigated the relationship between safety climate and unfinished nursing care. The findings of this study have several implications for nursing research and health policy or for improvement of reporting and learning systems for patient safety in Central European countries. Cross-cultural comparisons allow us to examine differences and similarities in safety dimensions

across countries. Nurses from each participating country can compare the strengths and weaknesses of their safety climate and obtain a deeper insight into nurses' attitudes about various aspects of patient safety. Recognition of weak areas of safety climate can help us to focus on the specific aspects that require improvement. The findings suggest that the areas with potential for initiating strategies for improvement in all four countries are 'Staffing', 'Non-punitive Response to Error' and 'Teamwork across Hospital Units'. Most nurses complained about shortages of staff and a lack of time—factors which have a negative impact on quality of care and patient safety. The shortage of nurses—a global problem in nursing and a critical stressor for healthcare facilities—is also considered the main contributing factor to unfinished nursing care. The results of the study indicated the negative impact of unfinished nursing care on all dimensions of patient safety. Although most nurses criticized staffing levels, they had no perceptions of a just culture that encourages the reporting of unsafe conditions and adverse events. Therefore, it is important for policymakers and administrators to emphasize policies that encourage a just culture of trust and non-punitive response to errors. Since 'Feedback and Communication about Error' and 'Organizational Learning - Continuous Improvement' were among the predictors of 'Overall Perception of Patient Safety' and 'Reporting of Incident Data', nurse managers should focus on how to empower nurses in these areas in order to foster a no-blame culture.

Author contributions

Study design: EG, RZ, EP, IU, AF, DJ, KZ

Data collection: EG, RZ, IU, AF

Data analysis and interpretations: EG, RZ, EP, IU, AF, DJ, KZ

Manuscript writing: EG, RZ, IU, AF, DJ, KZ

Critical revisions for important intellectual content: EP, RZ, IU, DJ

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