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ORIGINAL PAPER

Patient safety culture during Covid-19 pandemic as perceived by nursing students on their clinical placements

Daniela Bartoníčková[1,2], Dominika Kohanová[1], Katarína Žiaková[1]

[1]*Department of Nursing, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, Slovakia*
[2]*Department of Nursing, Faculty of Health Sciences, Palacký University in Olomouc, Czech Republic*

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Abstract

Aim: To investigate the perception of patient safety culture of nursing students on their clinical placement during the Covid-19 pandemic. *Design:* A cross-sectional study. *Methods:* Data were collected using the online form of the Hospital Survey on Patient Safety Culture for Nursing Students, between January and March 2021. The respondents were 248 nursing students from the Czech Republic. *Results:* Although overall level of patient safety was high in nursing students, the recommended limit of over 75% was not achieved in any dimension. Factors that influenced assessment of individual dimensions included age, student status, form of study, current clinical placement, and clinical supervision. Overall level of patient safety was found to be a predictor of the values of individual dimensions. *Conclusion:* The role of nursing students during the Covid-19 pandemic was invaluable. However, it is important to raise awareness about adverse events in nursing students in the Czech Republic.

Keywords: Covid-19 pandemic, clinical placement, nursing student, patient safety, patient safety culture.

Introduction

Patient safety is defined as the "the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum" (World Health Organization [WHO], 2009). It is a fundamental aspect that influences the quality of care provided. However, during the Covid-19 pandemic, quality and safe care were significantly affected. Increased workload, a huge increase in patient volume, uncertainty about bed capacity, and other consequences were evident (Bergman et al., 2021). Nurses, as the largest group of direct line health professionals, were exposed to moral distress (Jackson et al., 2020). The stressful situations encountered had an impact on physical and mental health (Chan et al., 2021). Ensuring adequate staffing levels was very problematic, since even before the pandemic the worldwide shortage of nurses was considered critical (Turale, 2021). In the Czech Republic, there are approximately 800 nurses for 100,000 inhabitants, but the number is falling (OECD, 2018). As a result of the pandemic crisis, many nurses were relocated to meet the needs of patients with Covid-19. For example, in China, up to 76% of health workers reported changing their work positions during the pandemic (Nie et al., 2020).

The situation was similar in the Czech Republic. The Ministry of Health called on nurses who were no longer active in health facilities to help. Not only nurses but also nursing students were called upon. In January 2021, many began volunteering in hospitals, and in March of the same year they were assigned work duties (with the exception of final year students). The participation of nursing students in the pandemic care process was also seen in other countries, such as Spain (Hernandéz-Martínez et al., 2021), Australia (Jackson et al., 2020), England (Swift et al., 2020), and others. During their participation, students reported mixed feelings: negative feelings of fear, anxiety, sadness, and stress were combined with positive feelings of being helpful and pride in their contribution (Casafont et al., 2021). Most were not adequately prepared to care for Covid-19 patients (Hernandéz-Martínez et al., 2021), with possible consequences and for patient safety.

Despite the need to include patient safety in nursing student curricula before the Covid-19 pandemic and developed frameworks (Kirwan et al., 2019), Tella et al. (2015) have revealed that patient safety is lacking in education. Topics touching on patient

Corresponding author: Daniela Bartoníčková, Department of Nursing, Faculty of Health Sciences, Palacký University in Olomouc, Hněvotínská 976/3, Olomouc, Czech Republic; email: daniela.bartonickova@upol.cz

safety are often incorporated into other subjects as a "hidden element". It has recently been specified that the curricula should include the International Patient Safety Goals of the Joint Commission International, the National Education Framework by the Canadian Association of Schools of Nursing, and the WHO Patient Safety Curriculum Guide (Ji et al., 2021).

Furthermore, a general improvement in patient safety is seen with the creation of a safety culture. Its implementation in healthcare facilities was recommended by the Institute of Medicine in 1999 (Kohn et al., 1999). Patient safety culture (PSC) in nursing has been defined as "shared values and beliefs of nurses contributing to patient safety" (Feng et al., 2008). Given the invaluable role of nursing students during the Covid-19 pandemic, they should also be taught about safety culture, a recommendation which was made even before the pandemic began (Bedgood & Mellott, 2021). The Hospital Survey on Patient Safety Culture for Nursing Students (HSOPS-NS) instrument was therefore developed, and its stable psychometric properties were proved in Spain (Ortiz de Elguea et al., 2019).

Aim

The aim of our study was to investigate nursing students' perception of PSC in their clinical placements during the Covid-19 pandemic.

Methods

Design

A cross-sectional study design, conducted according to the STROBE checklist.

Sample

All faculties offering a nursing study program in the Czech Republic were contacted, with six agreeing to participate by March 2021. Respondents were nursing students selected by a purposive sampling method. In general, a total of 248 nursing students (223 undergraduate and 25 postgraduate) were included in the sample. In light of the complexity of the information in the sample of respondents, whether the students performed volunteer work, standard practice or had a mandated work obligation was not recorded. The main inclusion criterion was the completion at least one semester in hospital practice. Conversely, students were excluded if they did not provide informed consent. Eight students did not meet the criteria and were therefore excluded.

Data collection

Due to the ongoing pandemic, distribution took place between January and March 2021 by means of Google Forms®, according to the CHERRIES standards (Eysenbach, 2004). Online questionnaires were provided to faculty heads to be sent via email to students. The online form began with the informed consent of respondents and information regarding their completion of at least one semester of clinical practice. After these items were confirmed, students were directed to complete the questionnaire. The Hospital Survey for Nursing Students (HSOPS-NS) was used to collect data during the second wave of the Covid-19 pandemic.

Instrument

The Hospital Survey for Nursing Students (HSOPS-NS) is, according to the authors, a scale to capture nursing students' perception of PSC during their clinical practice. It was developed not only to raise PSC awareness in nursing students, but also to identify areas requiring improvement without altering team perceptions, which can also be beneficial for healthcare facilities management (Ortiz de Elguea et al., 2019).

The Czech version of the instrument was created according to the methodological process of Wild et al. (2005). The research team adjusted problematic items related to practice supervision, giving rise to a Czech version of the HSOPS-NS instrument. The only change from the original version was the unification of the timeline evaluation of adverse event reporting for the last 12 months (in the original version one item focused on adverse event reporting during the last practice rather than the last 12 months). Face validity of the Czech HSOPS-NS (performed by six students of the master's degree program in Nursing) was part of the linguistic validation. All items were evaluated as clear and understandable.

The HSOPS-NS instrument consists of an introductory section focusing on sociodemographic variables, and the main section. Sociodemographic variables included the same data as the original version of the questionnaire regarding age, sex, student status, year of study, study program, and current workplace where students performed their internship or work duties (Ortiz de Elguea et al., 2019). Three more variables were added: form of study, experience in providing nursing care (outside clinical practice within the current studies), and clinical supervision. The main part is organized into four sections: A (Your unit / area); B (Your hospital); C (Communication in your unit / area), and D (Additional information). It consists of 47 items

grouped into 13 dimensions. The answers to these items are recorded using a 5-point Likert scale (1 – "strongly disagree" to 5 – "strongly agree"). Section D contains, in addition, a 1–10 scale for reporting overall level of Patient Safety; a Yes / No option for knowledge of any system of reporting adverse events; and free answer options for capturing adverse events reported by staff in the unit overall by nursing students themselves, and space for any comments. These additional elements are not included in the final evaluation of individual dimensions but are evaluated separately (Ortiz de Elguea et al., 2019).

Data analysis

Descriptive statistics (mean, SD, frequency) and inferential statistics were performed in the SPSS 25.0 statistical program to analyze the data. Due to the fact that the data did not have a normal distribution (verified by the Kolmogorov-Smirnov one-sample test; 0.061; $p < 0.01$), nonparametric tests were used to analyze the study variables. To test the differences between the dimensions' evaluation of PSC and sociodemographic variables, the Mann-Whitney U test (for two variables) and the Kruskal Wallis test (for three or more variables) were used. Multiple regression analysis was used to reveal the predictors (Outcome variables – Overall perception of patient safety, Number of adverse events reported overall and by nursing students themselves) of individual dimensions. The significance level for all results was $p < 0.05$. Internal consistency for individual dimensions ranged from 0.672 to 0.871 and was highly acceptable for the whole instrument ($\alpha = 0.90$). Acceptable values (α) for the HSOPS, from which the HSOPS-NS is directly derived, have been set ≥ 0.60 (Nieva & Sorra, 2003).

Results

Sample characteristic

The sample consisted of 248 nursing students with an average age of 24.9 years (SD = 6.93). Most were full-time female undergraduate students, studying in their second year. Most nursing students studied a general nursing program (84.7%). The majority had previous experience in providing nursing care (66.9%) and just over half had their last clinical placement in medical-surgical inpatient care units (50.8%). The students were primarily supervised by nurses without specific mentoring training (67.7%). The sample characteristics are presented in Table 1.

Table 1 Sample characteristic (n = 248)

Variables		n (%)
Age	under 25 years	198 (79.8)
	26 and older	50 (20.2)
Gender	male	12 (4.8)
	female	236 (95.2)
Student status	undergraduate	223 (89.9)
	postgraduate	25 (10.1)
Year of study	1. undergraduate study	81 (32.7)
	2. undergraduate study	101 (40.7)
	3. undergraduate study	41 (16.5)
	1. postgraduate study	19 (7.7)
	2. postgraduate study	6 (2.4)
Form of study	full-time	151 (60.9)
	part-time	97 (39.1)
Study program	general nursing	210 (84.7)
	pediatric nursing	38 (15.3)
Experience in providing nursing care	yes	166 (66.9)
	no	82 (33.1)
Current unit / area	outpatient care: day clinics, primary care and rehabilitation	33 (13.3)
	medical-surgical inpatient care	126 (50.8)
	critical-special services, intensive care, accident and emergency and the OR	36 (14.5)
	mother-child inpatient care: maternity and pediatrics, obstetrics, gynecology	28 (11.3)
	other areas	25 (10.1)
Clinical practice management / Supervision	lecturer or teacher (the nursing faculty employee)	18 (7.3)
	mentor with specific training in mentoring	62 (25.0)
	nurse without specific training in mentoring	168 (67.7)

OR – operating room

Nursing students' evaluation of PSC

Overall level of patient safety was rated very positively by nursing students (7.90 ± 1.55). On average, the total number of adverse events reported was 2.71 ± 13.00, and for nursing students themselves, 1.15 ± 6.65. More than half of the students were unaware of any reporting system during their clinical placement (55.6%). In addition, nursing students evaluated the individual dimensions of PSC (presented in Table 2). The dimension perceived most positively was "Communication openness" (3.82 ± 0.80; 70.40%). On the other hand, the least positively perceived dimension of the PSC was considered the "Frequency of events reported" (3.07 ± 0.93; 30.53%). None of the dimensions was evaluated at the level of 75% or above as recommended by the Agency for Healthcare Research and Quality (AHRQ) (Ammouri et al., 2015).

Factors affecting nursing students' evaluation of PSC

Significant differences were not confirmed between the evaluation of the dimensions of PSC and gender, year of study, and previous experience with provision of nursing care. On the other hand, statistically significant differences were found between individual PSC dimensions and age, form of study, study program, student status, current unit / area, and clinical practice management / supervision. The dimension "Handoffs and transitions" was positively evaluated by nursing students up to 25 years of age ($p = 0.044$). Students who studied full time evaluated "Teamwork within units" ($p = 0.047$) and "Handoffs and transitions" ($p = 0.015$) more positively. Furthermore, general nursing students ($p = 0.011$) and undergraduate students ($p = 0.027$) perceived "Staffing" more positively. Similarly, nursing students practicing in primary care positively evaluated "Staffing" ($p = 0.007$), whereas those practicing in critical or intensive care units perceived "Non-punitive response to errors" ($p = 0.015$) more positively. Regarding clinical supervision, students who were supervised by a lecturer or teacher (a nursing faculty employee) positively evaluated the following dimensions: "Teamwork within units" ($p = 0.003$), "Feedback and communication about error ($p = 0.001$), "Communication openness" ($p = 0.013$) and "Indicators of good practice" ($p = 0.020$). Furthermore, dimensions such as "Supervisor / manager expectations and actions promoting patient safety" ($p = 0.008$), "Management support for patient safety" ($p = 0.008$), and "Overall perception of patient safety" ($p = 0.017$) were perceived more positively by students who were supervised by nurses with specific mentoring training. The results are shown in Table 3.

Associations between PSC dimensions and outcome variables

Multiple regression analysis revealed a significant association between several dimensions of PSC and the overall level of patient safety. Results are presented in Table 4. Model 1 ($R2 = 0.395$; Adj $R2 = 0.362$; $F = 11.759$; $p = 0.000$) revealed a statistically significant association between overall level of patient safety and the following dimensions of PSC: "Feedback and communication about error" ($\beta = 0.238$; $p = 0.002$), "Teamwork between units" ($\beta = 0.180$; $p = 0.003$), "Staffing" ($\beta = 0.197$; $p = 0.001$), and "Handoffs and transitions" ($\beta = 0.123$; $p = 0.022$). Nursing students who rated overall patient safety level more positively also evaluated the above-mentioned dimensions more positively. Neither Model 2 ($R2 = 0.033$; Adj $R2 = -0.021$; $F = 0.614$; $p = 0.841$) nor Model 3 ($R2 = 0.087$; Adj $R2 = 0.071$; $F = 0.851$; $p = 0.541$) revealed a significant association between the dimensions of the PSC and the numbers of adverse events reported.

Table 2 Evaluation of PSC dimensions

Dimensions of PSC	m ± SD	% of positive responses*
Teamwork within units	3.80 ± 0.77	69.43
Supervisor / Manager expectations and actions promoting patient safety	3.79 ± 0.81	64.73
Organizational learning, continuous improvement	3.48 ± 0.72	54.10
Management support for patient safety	3.70 ± 0.82	64.95
Overall perception of patient safety	3.86 ± 0.71	63.28
Feedback and communication about error	3.65 ± 0.80	62.00
Communication openness	3.82 ± 0.80	70.40
Frequency of events reported	3.07 ± 0.93	30.53
Teamwork across units	3.49 ± 0.70	54.95
Staffing	3.10 ± 0.73	38.10
Handoffs and transitions	3.04 ± 0.44	39.45
Nonpunitive response to errors	3.26 ± 0.78	41.93
Indicator of good practice	3.57 ± 0.71	58.80

**Responses including degree of agreement – Agree / Strongly agree.*

Table 3 Factors affecting the evaluation of PSC

	Teamwork within units	Supervisor / Manager expectations and actions promoting patient safety	Organizational learning, continuous improvement	Management support for patient safety	Overall perception of patient safety	Feedback and communication about error	Communication openness	Frequency of events reported	Teamwork across units	Staffing	Handoffs and transitions	Nonpunitive response to errors	Indicators of good practice
Age[a]	0.130	0.855	0.845	0.342	0.562	0.594	0.611	0.752	0.765	0.519	0.044*	0.087	0.640
Gender[a]	0.125	0.916	0.384	0.453	0.474	0.721	0.419	0.358	0.588	0.622	0.349	0.533	0.396
Student status[a]	0.507	0.706	0.417	0.387	0.721	0.932	0.415	0.095	0.728	0.027*	0.398	0.855	0.601
Year of study[b]	0.326	0.287	0.112	0.196	0.625	0.897	0.620	0.598	0.410	0.087	0.179	0.053	0.093
Form of study[a]	0.047*	0.439	0.543	0.597	0.438	0.348	0.611	0.727	0.441	0.187	0.015*	0.242	0.918
Study program[a]	0.433	0.889	0.348	0.733	0.736	0.399	0.827	0.423	0.979	0.011*	0.324	0.051	0.833
Experience in providing nursing care[a]	0.931	0.362	0.420	0.109	0.457	0.643	0.081	0.908	0.261	0.156	0.098	0.508	0.618
Current unit / area[b]	0.146	0.232	0.257	0.137	0.936	0.324	0.435	0.884	0.975	0.007*	0.142	0.015*	0.218
Clinical practice management / Supervision[b]	0.003*	0.008*	0.099	0.008*	0.017*	0.001*	0.013*	0.095	0.634	0.431	0.150	0.549	0.020*

**p < 0.05; [a]Mann Whitney U test; [b]Kruskal Wallis test*

Table 4 Outcome variables and their association with PSC dimensions

Dimensions of PSC	Overall level of patient safety		Number of adverse events reported overall		Number of adverse events reported by students themselves	
	β coefficient*	p-value	β coefficient	p-value	β coefficient	p-value
Teamwork within units	0.076	0.316	-0.104	0.277	0.005	0.425
Supervisor / Manager expectations and actions promoting patient safety	-0.118	0.139	0.021	0.831	-0.023	0.854
Organizational learning, continuous improvement	0.130	0.066	0.112	0.210	0.026	0.336
Management support for patient safety	0.021	0.760	-0.006	0.946	-0.025	0.855
Overall perception of patient safety	0.128	0.081	-0.038	0.678	0.075	0.478
Feedback and communication about error	0.238	0.002*	-0.090	0.357	0.164	0.522
Communication openness	-0.033	0.633	-0.031	0.728	-0.096	0.120
Frequency of events reported	0.091	0.098	0.012	0.859	-0.132	0.158
Teamwork across units	0.180	0.003*	-0.082	0.286	0.065	0.226
Staffing	0.197	0.001*	-0.017	0.820	0.099	0.229
Handoffs and transitions	0.123	0.022*	-0.021	0.755	0.147	0.365
Nonpunitive response to errors	0.067	0.265	0.053	0.484	0.063	0.251
Indicator of good practice	0.022	0.733	0.034	0.676	0.003	0.659

*Multiple regression analysis: Standardized β coefficient; p-value; *p < 0.05*

Discussion

The study focuses on investigating the perception of PSC of nursing students in their clinical placements during the Covid-19 pandemic. It is quite clear that in other circumstances, the perceptions of PSC among nursing students might be different. Even before the Covid-19 pandemic, the issue of patient safety in the nursing curriculum was highlighted in the RANCARE project (Kirwan et al., 2019). In the past twenty years, many frameworks and instruments have been developed for its

evaluation. However, the Covid-19 pandemic has shown that there is an even greater need to educate nursing students about this issue, considering their important and irreplaceable role in the nursing team. Nursing students often learn about safety in the course of their education and are more confident in technical aspects than in sociocultural ones (Levett-Jones et al., 2020). Additionally, it was revealed that their knowledge was very limited in clinical placement (Bianchi et al., 2016).

The Covid-19 pandemic presented a challenge for all and continues to do so. It placed undue pressure on front-line healthcare workers, but also chronic emotional stress, burnout, and moral anxiety. PSC was significantly threatened, and management support was perceived as low, as were teamwork and staffing (Brborović et al., 2022; Huang et al., 2021). Nursing students in the Czech Republic rated the overall level of patient safety very positively. Despite this, the percentage of positive responses in individual dimensions did not achieve the recommended level of 75% (Ammouri et al., 2015). The situation was little different in Slovakia. Evaluations by Slovak nursing students were very similar to those of their Czech counterparts. In the Czech Republic, the worst rated dimensions were Frequency of events reported (30.53%) and Staffing (38.1%) and the best were Communication openness (70.4%) and Teamwork within units (69.43%). In Slovakia, nursing students also awarded the worst scores for Frequency of events reported (33%) and Staffing (35%), while the best scores were given for Feedback & communication about error (55%) and Communication openness (53%) (Kalánková et al., 2022).

In terms of factors that influence the evaluation of dimensions, previous studies before the pandemic have indicated that patient safety knowledge tends to increase over the years (Alquwez et al., 2019). In the Czech Republic, however, the dimension Handoffs and transitions was more positively assessed by students up to 25 years. At the same time, it was found that the level of safety knowledge does not differ according to student status or study program (Çiftcioğlu et al., 2022); however, undergraduate and pediatric nursing students rated Staffing more positively. This may be due to the fact that the Covid-19 pandemic did not affect pediatric workplaces so significantly. Within primary care, Staffing was more positively evaluated, as was Nonpunitive response to errors within intensive care units. The relationship between working conditions and patient safety outcomes has been demonstrated by Aiken et al. (2012). Within the management of clinical practice, the dimensions most affected in the Czech Republic were recorded. Steven et al. (2014) pointed out that a mentor / supervisor is important for students in their clinical practice. Its importance in patient safety competencies has also been emphasized by Wulandi (2020); nevertheless, clinical practice under a mentor / supervisor is rare in the Czech Republic. Similar results were achieved in Slovakia, where the evaluation of PSC during the pandemic was influenced mainly by the form of study, experience in providing nursing care, age, knowledge of any systems for adverse events reporting, the current workplace, and clinical supervision (Kalánková et al., 2022).

The final aim of our paper was to examine predictors (overall level of patient safety and numbers of adverse events reported). However, only the overall level of patient safety was demonstrated to be a predictor by nursing students in the Czech Republic. Its importance has also been demonstrated in pre-pandemic studies among nurses (Ammouri et al., 2015; Sováriová Soósová et al., 2017) but also during the pandemic in Slovakia. The authors demonstrated that a better evaluation of the patient safety grade contributes to the dimensions of support for patient safety management and general perceptions of patient safety (Kalánková et al., 2022). Therefore, it is very important to teach and develop PSC in nursing studies, while the overall level of patient safety can be further improved through the dimensions evaluated in the future.

The evaluation of PSC by nursing students may be beneficial for students themselves in raising awareness of individual aspects of PSC, but also for management of healthcare facilities due to their broader perspective, whereby perception is not influenced by shared values in the team. Assessment can also contribute to the integration of the different aspects assessed into the curriculum. In particular, those that were negatively evaluated in this research need to be incorporated. This is the only way to increase their overall value when they are reassessed in the future.

Limitation of study

The main limitation of this study was the inclusion of only certain nursing faculties in the Czech Republic. In addition, students may have a limited knowledge of PSC. Additionally, the Covid-19 pandemic may have had a significant impact on the perceptions of nursing students about safety culture. Finally, the fact that undergraduate students did not participate in the face validity of the instrument may be another limitation.

Conclusion

The worldwide incidence of the pandemic has affected not only the lives of healthcare workers but also of students. The results reflect students' perceptions of patient safety in workplaces where they have volunteered, completed an internship, or performed work duties. Therefore, the results can be beneficial not just for them but also for the management of healthcare facilities. Staffing is a worldwide problem and it is no wonder that its negative impact was also reflected in this study. However, in the Czech Republic there is a pressing need to raise awareness of nursing students about adverse events, given that their frequency was the worst rated dimension, and it is also alarming that almost 50% of nursing students were not aware of any adverse event reporting system.

Ethical aspects and conflict of interest

Approval was obtained from the Ethics Committee of the Jessenius Faculty of Medicine in Martin (EC no. 70/2020) in December 2020. The authors declare no potential conflicts of interest concerning the research, authorship, and / or publication of this article.

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Author contribution

Conception and design (DB, DK, KŽ), data collection (DB), data analysis and interpretation (DB, DK), manuscript draft (DB), critical revision of the manuscript (KŽ), final approval of the manuscript (DB, DK, KŽ).

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