Agronomy Research **22**(S1), 537–553, 2024
https://doi.org/10.15159/AR.24.018

Advancing patient safety competencies in nursing education: an examination of student attitudes

J. Sepp

Tallinn Health Care College, Academic and International Affairs Office, Kännu 67, EE13418 Tallinn, Estonia
Correspondence to: jaana.sepp@ttk.ee

Received: January 29th, 2024; Accepted: April 11th, 2024; Published: April 12th, 2024

Abstract. In nursing, patient safety is of paramount concern, requiring the development of well-defined competencies among nursing students and the early integration of safety principles into curricula. This study aimed to explore nursing students' perceptions regarding patient safety, offering valuable insights for curriculum developers. The main research questions were: What are the perceptions of nursing students regarding patient safety, and how can this information be useful for curriculum developers in improving students' safety knowledge and developing the curriculum in this direction? The Attitudes to Patient Safety Questionnaire (APSQ III) was employed to gather data due to its established reputation as a comprehensive and reliable instrument for assessing student attitudes in patient safety. The questionnaire was thoughtfully distributed to first-year nursing students with work experience in the healthcare field. The study revealed that students consider patient safety important and perceive its implementation as dependent on multidisciplinary teamwork and error reporting. Based on students' perceptions, nursing educators should increase the presence of patient safety courses in the nursing curriculum, emphasizing a multidisciplinary approach and enhancing competencies related to critical thinking. This includes improving skills in error reporting, organizing practical training, and mastering the use of standardized terminology. In conclusion, the study underscores the necessity of redefining nursing competencies, early integration of patient safety principles, the significance of research, and the role of assessment tools in shaping attitudes toward patient safety in nursing education.

Key words: curricula, patient safety, nursing students, perceptions.

INTRODUCTION

In the healthcare sector, there is a growing emphasis on safety, prompting researchers to delve into the concept of safety culture and its intricate relationship with patient safety (Ree & Wiig, 2019). Patient safety culture is comprehensively defined as a framework that encompasses attitudes, perceptions, values, individual and group competencies, and behavioural standards. These elements collectively influence the commitment, style, and proficiency demonstrated by healthcare institutions in addressing matters related to patient safety and health management (Morello et al., 2013; Nieva & Sorra, 2003).

Across the global healthcare landscape, the complex challenge of ensuring patient safety entails minimizing the risk of avoidable harm associated with healthcare interventions (Runciman et al., 2009). The integration of patient safety education into medical school curricula is becoming increasingly vital. While scientific advancements in modern medicine have significantly improved health outcomes, studies from diverse countries have highlighted that these benefits also pose substantial threats to patient safety (Nie et al., 2011). An integral aspect of mitigating risks among patients is closely tied to the professionalism of healthcare practitioners, extending beyond mere knowledge and skills to include attitudes and perceptions (Sepp et al., 2018). Professionally educated specialists not only demonstrate increased confidence in complicated situations but also play a crucial role in the provision of safe healthcare services (Nilsson et al., 2014). Their competence and confidence contribute significantly to addressing the intricate challenges associated with patient safety, reinforcing the importance of ongoing education and professional development in the healthcare sector (Sepp et al., 2018).

The ever-changing dynamics of healthcare work environments pose challenges beyond standard procedures, necessitating adaptability and innovative teaching strategies. In the quasi-experimental study by Cantero-López et al. (2021), the impact of an educational intervention on nursing students' attitudes towards patient safety was assessed. The findings revealed a noteworthy overall enhancement in the attitudes of nursing students, which persisted in the clinical practice environment. In their exploration of patient safety education for medical students, Nie et al. (2011) determined that the efficacy of the learning process relies on educators' capacity to consistently enhance course design, assess topical relevance, and integrate content seamlessly into curricula. The healthcare environment has been defined as a complex and dynamic setting where rules and procedures play a crucial role. Adhering strictly to established protocols is crucial for upholding patient safety, but the unpredictability of non-standard situations requires a flexible and interdisciplinary approach (Sepp, 2021). Cervera-Gasch and colleagues (2021) emphasized the importance of developing a progressive strategy for acquiring competencies in patient safety and evaluating specific educational interventions to enhance competency acquisition and education in patient safety. This highlights the significance of ongoing professional training that not only reinforces adherence to guidelines but also equips healthcare professionals with the skills necessary to navigate complex and unforeseen challenges. According to Neuberg et al. (2017) and Ratnapalan & Uleryk (2014), professionals with enhanced confidence levels are better equipped to handle the diverse and demanding scenarios encountered in healthcare settings. In essence, ongoing professional development serves as a cornerstone in ensuring the competence and adaptability of healthcare professionals, ultimately benefitting patient care and safety (Bianchi et al., 2016; Niemeyer, 2018). Moreover, ongoing development and training play a pivotal role in enhancing the self-assurance of healthcare professionals. This heightened confidence is especially vital in resolving conflicts and handling complex situations, where the capacity to make well-informed decisions promptly is of utmost importance. In line with the report by Alshahrani et al. (2021), it is imperative for educational institutions to consider integrating a comprehensive undergraduate educational programme focused on patient safety.

Traditionally, nursing education has focused more on general nursing, with less emphasis on safety. In post-Soviet countries, the development of occupational and patient safety has been sidelined, prioritizing the compliance with high-level nursing

regulations and elevating the profession to the level of higher education. Additionally, patient safety has generally received less attention in society (Sepp, 2021). However, with the implementation of patient insurance legislation starting from July 1, 2024, patient safety has become a focal point for healthcare institutions, making the integration of these topics into educational programs relevant and necessary.

The current study represents the first step towards creating an evidence-based framework for integrating patient safety training into nursing curricula. While nursing programs now include various topics related to safety, they do not address the holistic spectrum of needs, and the training lacks clear descriptions and outcomes that support nurses in acquiring necessary safety competences. This underscores the urgent need for the establishment of formalized training or education frameworks. Accordingly, initiatives are underway to standardize and enhance nurses' education, training, and responsibilities to ensure consistent, high-quality nursing care.

This study aimed to explore nursing students' perceptions regarding patient safety, offering valuable insights for curriculum developers. The main research questions were: What are the perceptions of nursing students regarding patient safety, and how can this information be useful for curriculum developers in improving students' safety knowledge and developing the curriculum in this direction?

MATERIALS AND METHODS

Study Design

This study employed a quantitative approach, specifically a descriptive design. This approach aimed to provide a clear understanding of the characteristics and trends among the variables under investigation. Ensuring the appropriateness of tools for the research questions and the targeted population was paramount. A pilot test was conducted to identify any issues related to wording, interpretation, or response options for such tools before administering them to the entire sample.

Study Methods

The Attitudes to Patient Safety Questionnaire (APSQ III) was used owing to its well-established reputation as a comprehensive and reliable instrument for assessing student attitudes in the domain of patient safety (Carruthers et al., 2009) (Table 1). This questionnaire explores various aspects of patient safety, such as teamwork, safety culture, communication, error management, and human factors. Notably, it assesses attitudes towards the significance of multidisciplinary teamwork in reducing errors within clinical practice. The questionnaire also examines whether acquiring knowledge about teamwork can contribute to a reduction in errors, emphasizing the pivotal role of teamwork in patient safety (Cantero-López et al., 2021). Additionally, the APSQ III scrutinizes attitudes regarding responses to adverse events and the willingness to report errors, shedding light on students' confidence and transparency in patient safety matters. This multifaceted approach renders the APSQ III a versatile tool for examining

Table 1. Dimensions of the attitudes to patient safety questionnaire

Dimensions	Items	Questions
Perception of human error	6	1–6
Workplace conditions and practices	12	7–18
Teamwork and collaboration	3	19–21
Patients' role in safety	2	22–23
Education and training	3	24–26
Knowledge assessment	6	27–33

student attitudes concerning patient safety, providing valuable insights for curriculum development and educational organization.

The study utilised a 7-point Likert scale, where respondents rated their agreement with statements from 1 (Completely disagree) to 7 (Completely agree). The Likert scale was divided into three sub-divisions: 1–2 for completely disagree, 3–5 for agree, and 6–7 for completely agree. This segmentation provides a clearer way to describe perception rates (%).

Study group

The primary data collection occurred between October and December 2023. The questionnaire was administered in Estonian to 110 first-year nursing students who met specific criteria: successful completion of the mandatory course in the nursing program titled ‘Occupational Safety’, worth 3 ECT credits. This course encompassed topics such as patient safety, occupational safety, fire safety, and first aid. Additional criteria for inclusion involved having work experience in the healthcare field and a minimum of one year of full-time employment in hospitals or nursing homes prior to enrolling in school. Out of the 440 first-year nursing students, 110 met the criteria of having more than one year of previous hospital work experience as caregivers or assistants (as indicated in Table 2), and they were selected to participate in the study.

Ethical Considerations

Ethical approval from the ethics committee was not required for this study as it did not involve the collection of biometric data or any other personally identifiable information. It is a generalising study reflecting the participance attitudes toward a particular topic. The study was approved by representatives of Tallinn Health Care College. The study is part of the project titled 'A Strategic Management Approach to Patient and Employee Safety in Healthcare Organizations'. The study design effectively addressed the research objectives, and the chosen instrument was tested for both validity and reliability. Participation in the study was voluntary, and anonymity was guaranteed.

The study procedures were communicated to the nursing students, lecturers, and head of the nursing curriculum. A cover letter was sent in advance, introducing the study to all involved parties and providing an opportunity to pose questions about the procedures or objectives. The next section will present the key findings during all four phases of the study.

RESULTS

A survey was conducted among 43 nursing students, which yielded notable insights into occupational perspectives and experiences (Table 2). Of the total participants, 21 were men. In terms of work experience, the distribution was diverse. Notably, 13 participants had work experience ranging from 16 to 18 years, demonstrating a seasoned workforce. Concerning the size of the organizations in which they work, the majority were employed in larger entities, with 19 participants from organizations comprising over 100 employees. These data provide a comprehensive understanding of the demographics and professional backgrounds of the surveyed participants, laying the groundwork for a nuanced analysis of their perspectives on workplace-related dimensions.

Table 2. Background information of study participants (*n* = 43*)*

Questions	Sub-groups	Responses (%)
Work experience in the field	1–9 years	14 (32.6)
	10–18 years	20 (46.5)
	≥ 19 years	9 (20.9)
Size of the organization	10–50 employees	12 (27.9)
	51–100 employees	8 (18.6)
	> 100 employees	19 (44.2)
	Unable to say	4 (9.3)

The perceptions of nursing students regarding patient safety

The findings reveal significant insights into nursing students' perceptions of feedback mechanisms and organizational policies (Table 3). The majority of participants reported not receiving feedback when reporting a mistake, indicating potential gaps in communication channels. In response to the question 'Do you receive feedback when reporting a mistake?', 41 respondents mentioned that they did not, constituting 95.4% of the total responses. Meanwhile, 2 respondents stated that they did, comprising 4.6% of the total responses. Furthermore, 88% believed they cannot attend training to prevent future errors, suggesting areas for improvement in learning and development initiatives. Only 5 (11.6%) participants answered positively to the question 'If you make a mistake, can you attend training to avoid future errors?' 38 (88.4%) participants answered negatively. The participants' opinions on punishment systems varied, with 83.7% expressing agreement (completely agree and agree), indicating a considerable proportion perceiving it as fair. A significant number of respondents agree that there is a fair punishment system, with 16 respondents completely agreeing and 20 respondents expressing agreement. However, 6 (14%) respondents completely disagree with this notion. Regarding the question about consequences and punishment within their organizations, the majority of respondents, totalling 36, express agreement, with 83.7% agreeing (completely agree and agree) that if something goes wrong, they will be punished. However, a smaller number, consisting of 7 (16.3%) respondents, completely disagree with this statement.

Table 3. Nursing Students' Perceptions of Organizational Perceptions on Punishment Systems (*n* = 43)

Questions	Completely agree *n* (%)	Agree *n* (%)	Completely disagree *n* (%)	Missed *n* (%)
In our organization, there is a fair punishment system	16 (37.2)	20 (46.5)	6 (14)	1 (2.3)
In our organization, employees can definitely be punished if something goes wrong	14 (32.6)	22 (51.2)	7 (16.3)	-

In the analysis of the collected data, the responses were meticulously examined and categorized according to six distinct scales, providing a comprehensive understanding of the participants' perceptions across various dimensions related to human error, workplace conditions, teamwork and collaboration, patient engagement, education, and knowledge assessment.

The analysis of the data regarding perception of human error revealed diverse perspectives among the participants (Table 4). Notably, 72% agreed that their education adequately prepared them to understand the causes of medical errors. Conversely, other participants provided lower scores. In terms of understanding patient safety topics, the scores demonstrated a generally positive perception. The majority of the participants (approximately 80%) agreed that having completed healthcare education, they have a good understanding of patient safety topics. Regarding preparedness for preventing medical errors, the scores also reflected a generally positive perception. Most participants (72%) agreed that having completed healthcare education, they feel well prepared for preventing medical errors. In contrast, other participants provided lower scores, indicating differing levels of confidence or satisfaction regarding their readiness to prevent medical errors. Further analysis could uncover specific impactful areas or those requiring additional attention in the educational curriculum.

Table 4. Nursing Students' Perceptions of Human Error (n = 43)

Questions	Totally agree n (%)	Agree n (%)	Totally disagree n (%)	Missed n (%)
1. My education prepared me to understand the causes of medical errors.	13 (30.2)	18 (41.9)	4 (9.3)	8 (18.6)
2. Having completed healthcare education, I understand patient safety issues.	20 (46.5)	14 (32.6)	-	9 (20.9)
3. Having completed healthcare education (vocational training/higher education), I am prepared to prevent medical errors.	17 (39.5)	14 (32.6)	-	12 (27.9)
4. I feel comfortable admitting my own medical errors, regardless of their severity and consequences for patients.	21 (48.8)	17 (39.5)	1 (2.3)	4 (9.3)
5. I feel comfortable admitting errors caused by other employees, regardless of their severity and consequences for patients.	17 (39.5)	22 (51.2)	1 (2.3)	3 (7.0)
6. I am confident that I can openly discuss my mistakes with my supervisor, even if they caused potential or actual harm to patients.	11 (25.6)	15 (34.9)	1 (2.3)	16 (37.2)

The majority of the participants agreed that they feel comfortable discussing their medical errors irrespective of the seriousness of such errors and the resulting consequences for patients. The differing scores indicated individual variations in the participants' experiences or attitudes towards this dimension. While a substantial number of participants indicated feeling comfortable admitting errors caused by their colleagues, the responses varied, with some participants providing lower scores. Further exploration could provide insights into the factors influencing these perceptions.

The analysis of the data regarding workplace conditions and practices revealed diverse perspectives among the participants (Table 5). There were varying views regarding the impact of shorter shifts on reducing medical errors. While some participants either strongly agreed or agreed with the statement, others provided either neutral or disagreeing scores, underscoring the diversity of opinions. These findings

suggest a need for further exploration to uncover specific factors influencing these varied perspectives.

Table 5. Nursing Students' Perceptions of Workplace Conditions and Practices (n = 43)

Questions	Totally agree n (%)	Agree n (%)	Totally disagree n (%)	Missed n (%)
7. Shorter shifts at work reduce medical errors.	14 (32.6)	14 (32.6)	9 (20.9)	6 (14.0)
8. Abandoning regular breaks during a shift increases the likelihood of making mistakes.	13 (30.2)	9 (20.9)	4 (9.3)	17 (39.5)
9. A large number of working hours increases the likelihood of making mistakes.	18 (41.9)	13 (30.2)	5 (11.6)	7 (16.3)
10. Even the most experienced and competent specialists make mistakes.	27 (62.8)	10 (23.3)	6 (14.0)	-
11. A true professional does not make mistakes.	14 (32.6)	17 (39.5)	12 (27.9)	-
12. Human error is inevitable.	21 (48.8)	13 (30.2)	9 (20.9	-
13. Most mistakes occur due to the negligence of higher-ranking representatives (including doctors and nurses).	18 (41.9)	18 (41.9)	7 (16.3)	-
14. If employees pay more attention to task completion, mistakes will not occur.	16 (37.2)	23 (53.5)	4 (9.3)	-
15. Most mistakes occur due to the negligence of healthcare assistants.	4 (9.3)	18 (41.9)	21 (48.8)	-
16. Errors are a sign of incompetence.	3 (7)	20 (46.5)	20 (46.5)	-
17. It is not important to report errors that do not affect patients' condition.	8 (18.6)	15 (34.9)	20 (46.5)	-
18. Management should disclose errors only if they cause suffering to patients.	11 (25.6)	12 (27.9)	20 (46.5)	-

In terms of neglecting regular breaks during a shift, a predominant agreement was observed among the participants, with approximately 50% agreeing that it significantly increases the probability of errors. Despite this majority consensus, there was diversity of opinions, with some participants providing lower scores. Conversely, the participants had varied opinions regarding the impact of a large number of working hours on the likelihood of making mistakes. The majority (approximately 70%) agreed with the statement, but there was diversity in the responses, suggesting differing perspectives on the influence of extended working hours. The participants (more then 80%) also predominantly agreed that even the most experienced and competent specialists make mistakes.

The acknowledgement of professional fallibility was widespread, although variations in the responses indicate room for exploration into nursing students' experiences or specific contexts contributing to this shared perception. In the realm of professionalism, there was a lack of consensus among the participants regarding the expectation of perfection in professionals. The diversity in the responses suggests a nuanced understanding of professional fallibility that merits further exploration. A prevalent acceptance of the inevitability of human error was noted among the participants, with the majority (about 80%) agreeing with the statement. The perceptions on the accountability of higher-ranking representatives for mistakes varied among the

participants, with more then 80% agreeing that most mistakes are attributed to negligence by higher-ranking representatives. The diversity in the responses underscores the need for further exploration to understand the factors influencing these perceptions, including the participants' experiences and contexts.

The participants also expressed varying opinions on whether mistakes can be prevented if employees pay more attention to task completion, with a significant proportion (approximately 90%) agreeing with this perception. The diversity in the responses suggests differing beliefs about the relationship between attention to task completion and mistake occurrence, warranting further investigation and analysis. In the context of healthcare, diverse opinions were noted regarding the negligence of healthcare assistants as the primary contributors to mistakes, with the majority of the participants (more then 90%) strongly disagreeing with the notion. This diversity suggests differing beliefs about the dynamics within healthcare teams, requiring further analysis to identify specific factors influencing these perceptions.

The importance of reporting errors that do not impact patients' condition elicited diverse opinions among the participants, with the majority (over 80%) strongly agreeing with this perception. However, the participants indicated different degrees of agreement and disagreement. This finding suggests varying perspectives on the significance of reporting errors, particularly those deemed non-impactful to patients. Further analysis could reveal specific factors influencing these perceptions, contributing to a comprehensive understanding of reporting practices in healthcare settings. Similarly, the participants express varied opinions on whether management should disclose errors only if they cause suffering to patients.

In conclusion, the perceptions of nursing students regarding patient safety were extensively examined, revealing significant insights into various aspects of their attitudes and beliefs. The findings shed light on feedback mechanisms and organizational policies, highlighting potential gaps in communication channels and areas for improvement in learning and development initiatives. Additionally, diverse perspectives emerged regarding human error, workplace conditions, and professionalism, indicating the need for further exploration to understand the underlying factors influencing these perceptions. The analysis categorized responses across six distinct scales, providing a comprehensive understanding of the participants' perspectives and areas requiring attention in educational curricula and healthcare practices. These findings contribute valuable insights for enhancing patient safety and fostering a culture of transparency and accountability within healthcare settings.

The perceptions of nursing students regarding patient safety related outcomes

The analysis of the data regarding teamwork and collaboration revealed a rich tapestry of perspectives among the participants (Table 6). The majority of the participants (81.4%) agreed that all errors must be reported, highlighting a prevailing attitude towards transparency and accountability in error reporting. However, there was diversity in the responses, with some participants expressing varying levels of agreement and disagreement. This variability underscores different perspectives on the necessity of reporting errors and emphasizes the importance of understanding the factors that contribute to these attitudes.

Table 6. Nursing Students' Perceptions of Teamwork and Collaboration (n = 43)

Questions	Totally disagree *n* (%)	Totally agree *n* (%)	Agree *n* (%)	Totally disagree *n* (%)	Missed *n* (%)
19. All errors must be reported.	8 (18.6)	23 (53.5)	12 (27.9)	8 (18.6)	-
20. Good collaboration among team members reduces errors.	-	32 (74.4)	9 (20.9)	-	2 (4.7)
21. Teaching teamwork skills reduces errors.	-	36 (83.7)	6 (14)	-	1 (2.3)

In terms of collaborative efforts within healthcare teams, most participants (95.3%) strongly agreed that good collaboration among different team members reduces errors. This finding emphasizes the perceived significance of teamwork in error prevention. Despite this majority consensus, a smaller proportion of the participants expressed varying levels of agreement and disagreement. This diversity in the responses suggests that while a substantial number recognize the positive impact of collaboration, there are still nuances in individual perspectives.

The majority of the participants (97.7%) strongly agreed that teaching teamwork skills reduces errors, indicating a consensus on the positive impact of teamwork training on error reduction within the healthcare context. While a smaller proportion expressed varying levels of agreement, the overall pattern indicated a positive association between the belief in the effectiveness of teaching teamwork skills and the potential reduction of errors. These findings illustrate a dynamic landscape of perspectives, emphasizing the importance of understanding beliefs about error reporting, collaborative efforts, and the impact of teamwork training. Further exploration of these nuanced perspectives could provide targeted insights for improving practices and education within healthcare settings.

The analysis of the data regarding patients' role in safety showed a range of perspectives among the participants (Table 7). Most participants (81.4%) agreed that patients play an important role in preventing errors, showcasing a collective recognition of the significance of patient involvement in ensuring safety. While a substantial proportion expressed varying levels of agreement, the overall trend showed a positive acknowledgement of patients' role in error prevention. Furthermore, the majority of the participants (90.3%) strongly agreed that encouraging patients to actively participate in their care activities can help reduce risks and errors, emphasizing the pivotal role of patient engagement in enhancing safety. There were varying levels of agreement among the participants, with some expressing more moderate views.

Table 7. Nursing Students' Perceptions of Patients' Role in Safety (n = 43)

Questions	Totally disagree *n* (%)	Totally agree *n* (%)	Agree *n* (%)
22. Patients play an important role in preventing errors.	8 (18.6)	21 (48.8)	14 (32.6)
23. Encouraging patients to participate more in their own care activities helps reduce risks and errors.	4 (9.3)	24 (55.8)	15 (34.9)

The analysis of the data regarding education and training unveiled varying perspectives among the participants (Table 8). The majority (90.7%) strongly agreed that teaching patient safety to learners should be a significant priority in the preparation of

healthcare and medical professionals. There were varying levels of agreement among the participants, with some expressing more moderate views. This finding highlights the consensus on the importance of integrating patient safety education into healthcare training programmes, suggesting potential implications for enhancing overall patient care and safety outcomes. Conversely, 76.7% of the participants agreed that patient safety can only be learnt in the workplace after completing school and becoming qualified for the job. However, other participants held differing views, suggesting diversity of perspectives on the effectiveness of formal education in imparting patient safety knowledge. Approximately 88% agreed that learning about patient safety topics before qualifying contributed to their professional competence. However, the responses also differed, suggesting varying levels of agreement and disagreement regarding the impact of pre-qualification education on professional preparedness.

Table 8. Nursing Students' Perceptions of Education and Training (n = 43)

Questions	Totally disagree n (%)	Totally agree n (%)	Agree n (%)
24. Teaching patient safety to learners must be a significant priority in the preparation of healthcare and medical professionals.	4 (9.3)	2 (58.1)	14 (32.6)
25. Patient safety cannot be taught and can only be learnt in the workplace after completing school and becoming qualified for the job.	10 (23.3)	18 (41.9)	15 (34.9)
26. Learning about patient safety topics before qualifying allowed me to be a better professional.	5 (11.6)	17 (39.5)	21 (48.8)

The analysis of the data regarding knowledge assessment revealed a rich tapestry of perspectives among the participants (Table 9). The familiarity with different types of human errors varied among the participants. A notable proportion (83.3%) expressed a high level of familiarity, suggesting a reasonable understanding of the various forms of human errors. However, there was also diversity in the responses, including some participants who provided lower scores, indicating differing levels of awareness or knowledge regarding different types of human errors. Similarly, the level of awareness regarding the factors contributing to human errors differed among the participants. A substantial proportion (97.7%) expressed a high level of awareness, suggesting a good understanding of the factors that contribute to making errors. However, the participants also shared varying responses, including some who provided lower scores, indicating differing levels of awareness or knowledge in this area. Approximately 98% of the participants had a strong and good awareness of the factors influencing patient safety, respectively. In the context of communication and error disclosure, the majority of the participants expressed positive perceptions, but there were also variations in the responses. Similarly, most participants expressed positive perceptions regarding their knowledge of how to act after making a mistake and report a mistake and the role of healthcare organizations in error reporting systems. However, the variations in the responses suggest areas that may require additional attention in making post-error actions, training for recovery, reporting mistakes, and understanding the role of healthcare organizations.

Table 9. Nursing Students' Perceptions of Knowledge Assessment (n = 43)

Questions	Totally disagree *n* (%)	Totally agree *n* (%)	Agree *n* (%)	Missed *n* (%)
27. I am familiar with various types of human errors.	7 (16.3)	16 (37.2)	20 (46.5)	-
28. I am aware of the factors that contribute to making human errors.	1 (2.3)	20 (46.5)	19 (44.2)	3 (7.0)
29. I know the factors that influence patient safety.	1 (2.3)	21 (48.8)	19 (44.2)	2 (4.7)
30. I have knowledge of how to talk about mistakes and, if necessary, admit them.	1 (2.3)	27 (62.8)	14 (32.6)	1 (2.3)
31. I have knowledge of how to act after making a mistake.	1 (2.3)	23 (53.5)	19 (44.2)	-
32. I have knowledge of how to report a mistake.	1 (2.3)	20 (46.5)	19 (44.2)	3 (7)
33. I have knowledge of the role of healthcare organizations (e.g. family doctors, hospitals, nursing homes, and rehabilitation hospitals) in error reporting systems.	7 (16.3)	16 (37.2)	20 (46.5)	-

In summary, the analysis of nursing students' perceptions regarding patient safety competences revealed a diverse range of perspectives across various dimensions. In terms of teamwork and collaboration, there was a consensus among participants on the importance of error reporting and the positive impact of collaboration in reducing errors within healthcare teams. Additionally, the effectiveness of teaching teamwork skills in error reduction was widely recognized. Regarding patients' role in safety, there was a collective acknowledgment of the significance of patient involvement in error prevention, with a majority agreeing that encouraging patients to actively participate in their care activities can help reduce risks and errors. In terms of education and training, there was consensus on the importance of integrating patient safety education into healthcare training programs, although views on whether patient safety can only be learned in the workplace after completing school varied. Furthermore, participants expressed varying levels of familiarity and awareness regarding different types of human errors and factors contributing to errors, highlighting areas for further education and training. Overall, the findings underscore the complexity of perceptions surrounding patient safety competences among nursing students and emphasize the importance of targeted efforts to improve practices and education within healthcare settings.

Taken together, the quantitative findings contribute to a comprehensive overview of nursing students' perceptions and attitudes towards human error in the healthcare context, highlighting both positive trends and areas for potential improvement. In the next section, the main points of the study will be discussed, with a specific focus on their implications for nursing curriculum development to enhance patient safety education.

DISCUSSION

The present findings align with the conclusions drawn by El Naggar (2020) that the implementation of a patient safety course in undergraduate medical education positively influences students' understanding of patient safety. Nursing students have highlighted the importance of integrating patient safety knowledge into nursing curricula. They recognize the necessity of studying this topic as part of their nursing education. At its core, the present study underscores the necessity for a thoughtful evolution in curriculum development within nursing programmes. The integration of patient safety courses is not only advocated but also deemed essential. This advocacy surpasses a generic call, emphasizing a meticulous tailoring of educational content to address specific concerns, including but not limited to error reporting, teamwork dynamics, and patient engagement. Nursing curriculum should to provide a comprehensive and evidence-based approach to patient safety education, focusing on developing the necessary knowledge, skills, and attitudes among students to promote safe and effective nursing practice. Based on the information provided in the table outlining important factors for ensuring patient safety in nursing, several key considerations emerge for the development of a nursing curriculum. A holistic approach to patient safety knowledge within the curriculum, ensuring that students are equipped with comprehensive understanding and skills related to patient safety principles. This should include an emphasis on understanding the causes of errors, professionalism, and the role of nurse identity (Table 10).

Table 10. Important Factors for Ensuring Patient Safety in Nursing Curriculum

Topics	Factor I Education	Factor II Perceptions	Factor III Behaviour
Human error	Sufficient knowledge of the causes of errors	Relevant perceptions of patient safety topics (error is human)	Open discussions among mistakes with colleagues and supervisor
Workplace conditions	Adequate understanding of work environment and conditions on employees abilities (inc.human error)	Awareness of professionalism and role of nurse identity	Openness of error handling and preventive measures
Teamwork and collaboration	Knowledge of error reporting system	Reporting is a part of learning system	Supportive collaboration and teamwork
Patient engagement	Ability to engage patients the care process	The patient's role in the care process	Nurses' communication skills with patients
Education	Patient safety holistic approach to knowledge in healthcare and medical education	A comprehensive and evidence-based approach to patient safety in nursing education with a definition of the necessary skills and knowledge	Preventive measures of patient safety in nursing education
Knowledge assessment	Knowledge of handling human errors in nursing - integrating a simulation	Knowledge and skills to report errors and mistakes	Skills and knowledge of how to behave in a situation when a mistake has been made

Second important update regarding the development of the nursing curriculum is associated with the need to integrate education on the impact of work environment and conditions on employee abilities, particularly in relation to human error. This involves fostering awareness of how workplace factors can influence patient safety and providing strategies for effectively managing these conditions. In the analysis of the data regarding workplace conditions and practices, diverse perspectives were noted among the nursing students in this study. The opinions varied, particularly regarding the impact of shorter shifts, thus prompting further exploration into the nuanced factors that shape these disparate viewpoints. From the workplace perspective, it is essential to implement aspects related to developing a supportive work environment in study courses, with a specific focus on recognizing positive attitudes within organizations. Organizations with a supportive work environment have been shown to have more collaborative and motivated employees who perform safely, learn from mistakes, and are more open to communication (Hinde et al., 2016). It is crucial to increase students' knowledge about their role in creating a work environment through their attitudes and values regarding safety. In the nursing curriculum, courses related to occupational and patient safety should be integrated at the bachelor's level, with a special focus on the work environment aspect related to organization and safety outcomes. Similarly, at the master's level, topics related to quality should be developed and distributed to the students, with a focus on safety management. Third factor related to the developing of students' knowledge regarding error reporting systems and emphasize the importance of reporting errors as part of the learning process. Encourage a culture of open discussion and supportive collaboration among colleagues and supervisors to facilitate effective teamwork in error management. Central to this nuanced narrative is the acknowledgement of individual variations in perceptions, serving as a linchpin in shaping attitudes towards crucial elements in healthcare, including error reporting, collaborative initiatives, patient engagement, and education. Previous studies have demonstrated that strong teamwork and open communication significantly enhance employees' commitment and motivation to perform safely, fostering open discussions about errors as well as reporting of adverse events (Sepp & Tint, 2017). The call for further exploration and analysis is not a mere refrain but an academic imperative, promising to unravel the intricate web of factors influencing the nuanced perspectives.

Themes such as the acknowledgement of human fallibility and the paramount importance of teamwork, as identified in this study, resonate as consensus points within the healthcare community, reflecting shared values. This alignment is significant within the present findings and intersects with the principles embedded in the WHO curriculum. The WHO curriculum, encompassing critical concepts such as patient safety and human factors, underscores their vital role in ensuring patient well-being (WHO, 2009). The current study aligns with these curriculum principles, reinforcing the importance of comprehending healthcare systems, understanding the impact of complexity on patient care, fostering effective teamwork, learning from errors, and managing clinical risks. The identified diversity in the responses in this study corresponds to the recognition in the WHO curriculum that educational enhancements are essential. The curriculum, mirroring the present insights, introduces students to quality improvement methodologies, emphasizes engagement with patients and healthcare specialists, and integrates cluster topics to bridge theoretical knowledge with practical application. These encompass strategies for minimizing infections, addressing patient safety in

invasive procedures, rectifying medication errors, employing root cause analysis, implementing evidence-based practice, and refining communication skills (Seiden et al., 2006; WHO, 2009). This synthesis underscores the relevance and consistency of the current findings with established global standards in patient safety education.

The present findings are consistent with the report by Sepp and colleagues (2018). It is essential to recognize that the development of professionalism is a dynamic process that commences with initial academic activities and depends on the experiences gained in both formal educational institutions and practical performances (Karami et al., 2017; Jin & Yi, 2019). Human factors play a crucial role in this process. Previous studies have shown that employees with high professional competencies exhibit greater professionalism in the workplace owing to their prior educational experiences. Understanding these dynamics becomes imperative for educators and curriculum developers to design interventions that align with the evolving needs and expectations of healthcare professionals throughout their educational journey. Previous studies have also demonstrated that employees with a higher awareness of their professionalism are more effective in their interactions with patients and their relatives (Sepp et al., 2018). According to our results, nursing programs should equip students with the skills to effectively engage patients in the care process. Emphasis should be placed on understanding the patient's role in their own care and improving nurses' communication skills to enhance patient engagement and safety.

In the dynamic landscape of healthcare, the findings contribute significantly to fostering a culture characterized by transparency, continuous learning, and effective collaboration within healthcare teams. Our study demonstrate that implementing methods for assessing students' knowledge and skills related to handling human errors, reporting mistakes, and appropriate behaviour in error situations. Utilize simulation-based learning to provide realistic scenarios for practicing these skills in a safe environment. The study emphasizes the inherent complexity of the healthcare environment and the ongoing need for efforts to align education, training, and workplace practices with the ever-evolving needs and expectations of healthcare professionals. Notably, previous discussions have underscored the role of teamwork and simulation-based learning in supporting students to develop their professional competencies within a safe learning environment, thereby preventing future unsafe behaviour and promoting patient safety (El Naggar & Al Maeen, 2020). While various considerations support students in their learning processes and enhance their professional self-esteem, it is crucial for educators to concentrate on fostering student-teacher collaboration in a learning environment that incorporates student-friendly platforms and educational perspectives (Alokluk, 2018; Uziak et al., 2018).

Such granularity is crucial in shaping a comprehensive understanding among future healthcare professionals. In line with this, Walton and colleagues (2011) advocated for a supportive educational environment and an open discussion about errors to enhance patient safety education in medical schools. Their work emphasizes the need for a cultural shift in healthcare organizations, acknowledging that change is challenging but essential for improving patient safety. The insights drawn from this study extend beyond the immediate context, assuming the role of a strategic guide for refining educational strategies. The overarching objective is a calibrated alignment with the dynamic needs of healthcare professionals, with a direct corollary of enhancing patient care and safety outcomes.

The present discussion transcends the realm of mere academic discourse; it extends an invitation to policymakers, educators, and healthcare institutions to leverage the nuanced understanding in collective efforts aimed at enhancing patient care, minimizing errors, and fostering a healthcare workforce characterized by resilience and responsiveness. Subsequent discussions could reveal detailed perspectives, each presenting distinct opportunities for strategic enhancements, ranging from understanding the aetiology of medical errors to fostering open channels of communication and addressing nuanced facets of workplace conditions.

In essence, this study could serve as a guide, charting a course towards an enriched educational landscape. This landscape not only imparts knowledge but also fosters a profound understanding of patient safety, positioning healthcare professionals as adept stewards of healthcare outcomes in the future.

The weaknesses of the study were that this study represents the first empirical investigation into patient safety attitudes among nursing students in Estonia, providing valuable insights into this previously understudied area. The use of a translated and piloted questionnaire demonstrates efforts to ensure the validity and reliability of data collection methods. Acknowledgment of the importance of patient safety in nursing education reflects a commitment to addressing critical issues in healthcare.

The relatively small sample size of 43 students with work experience in healthcare limits the generalizability of the findings. Language bias may have influenced the results, as interpretations of patient safety concepts could vary among participants. Synthesizing data from diverse sources with varying methodologies poses challenges and may impact the overall research synthesis.

Future research endeavors are necessary to fill the existing knowledge gap and provide high-quality services to patients, reduce errors, and enhance healthcare quality. Continued efforts to investigate patient safety attitudes and practices within nursing education are crucial for informing evidence-based strategies and improving training initiatives. As nursing faces ongoing evolution and new challenges, comprehensive investigations are needed to promote patient safety and quality healthcare delivery within this dynamic environment.

CONCLUSIONS

This section presents a nuanced exploration of the attitudes and perceptions of healthcare students concerning patient safety. Such exploration enables an illuminating discourse, unravelling complex themes that both affirm shared values and reveal areas necessitating strategic interventions. The analysis of nursing students' perceptions regarding patient safety and patient safety competences revealed a multifaceted landscape of perspectives. Across both dimensions, there was a clear consensus on the importance of error reporting, collaboration, and patient involvement in enhancing safety within healthcare settings. Additionally, participants recognized the value of integrating patient safety education into healthcare training programs. However, variations in views regarding the effectiveness of formal education in imparting patient safety knowledge and the role of workplace learning highlighted the need for further exploration and targeted interventions. Overall, these findings underscore the complexity of perceptions

surrounding patient safety among nursing students and emphasize the importance of comprehensive approaches to improve safety practices and education within healthcare settings. In essence, this study could serve as a guide, charting a course towards an enriched educational landscape. This landscape not only imparts knowledge but also fosters a profound understanding of patient safety, positioning healthcare professionals as adept stewards of healthcare outcomes in the future.

ACKNOWLEDGEMENTS. The development of the safety culture framework was supported by the Tallinn Health Care College project titled'A Strategic Management Approach to Patient and Employee Safety in Healthcare Organizations'.

REFERENCES

Alokluk, J.A. 2018. The effectiveness of Blackboard system uses and limitations in information management. *Intelligent Information Management* **10**, 133–149.

Alshahrani, S., AAlswaidan, A., Alkharaan, A., Alfawzan, A., Alshahrani, A., Masuadi, E. & Alshahrani, A. 2021. Medical students' insights towards patient safety. *Sultan Qaboos University Medical Journal* **21**(2), e253–e259.

Bianchi, M., Bressan, V., Cadorin, L., Pagnucci, N., Tolotti, A. & Valcarenghi, D. 2016. Patient safety competencies in undergraduate nursing students: a rapid evidence assessment. *Journal of Advanced Nursing* **72**(12), 2966–2979.

Cantero-López, N., González-Chordá, V.M., Valero-Chillerón, M.J., Andreu-Pejó, L., Vila-Candel, R. & Cervera-Gasch, A. 2021. Attitudes of undergraduate nursing students towards patient safety: a quasi-experimental study. *International Journal of Environmental Research and Public Health* **18**, 1429.

Carruthers, S., Lawton, R., Sandars, J., Howe, A. & Perry, M. 2009. Attitudes to patient safety amongst medical students and tutors: developing a reliable and valid measure. *Medical Teacher* **31**, e370–e376.

Cervera-Gasch, A., González-Chordá, V.M., Manrique-Abril, F.G., Andreu-Pejo, L., Valero-Chillerón, M.J. & Mena-Tudela, D. 2021. Validation of the Attitudes to Patient Safety Questionnaire for nursing students in the Spanish context. *BMC Nursing* **201**, 101.

El Naggar, M.A. & Al Maeen, A.H. 2020. Students' perception towards medical-simulation training as a method for clinical teaching. *Journal of the Pakistan Medical Association* **70**, 618–623.

El Naggar, M.A. 2020. Implementing and evaluating a patient safety curriculum for undergraduate medical students using backboard. *Suez Canal University Medical Journal* **23**(2), 182–191.

Hinde, T., Gale, T., Anderson, I., Roberts, M. & Sice, P. 2016. The study to assess the influence of interprofessional point of case simulation training on safety culture in the operating theatre environment of a university teaching hospital. *Journal of Interprofessional Care* **30**(2), 251–253.

Jin, J. & Yi, J.Y. 2019. Patient safety competency and the new nursing care delivery model. *Journal of Nursing Management* **27**(6), 1167–1175.

Karami, A., Farokhzadian, J. & Foroughameri, G. 2017. Nurses' professional competency and organizational commitment: is it important for human resource management? *PLoS One* **12**(11), e0187863.

Morello, R.T., Lowthian, J.A., Barker, A.L., McGinnes, R., Dunt, D. & Brand, C. 2013. Strategies for improving patient safety culture in hospitals: a systematic review. *BMJ Quality and Safety* **22**, 11–18.

Neuberg, M., Železnik, D., Meštrović, T., Ribić, R. & Kozina, G. 2017. Is the burnout syndrome associated with elder mistreatment in nursing homes: results of a cross-sectional study among nurses. *Archives of Industrial Hygiene and Toxicology* **68**(3), 190–197.

Niemeyer, M.A. 2018. Effective patient safety education for novice RNs: a systematic review. *Journal of Advanced Nursing* **8**(3), 103–115.

Nieva, V.F. & Sorra, J. 2003. Safety culture assessment: a tool for improving patient safety in healthcare organizations. *Quality and Safety in Health Care* **12**, ii17–ii23. doi: 10.1136/qhc.12.suppl_2.ii17

Nie, Y., Li, L., Yurong, D., Chen, P., Barraclough, B.C., Zhang, M. & Li, J. 2011. Patient safety education for undergraduate medical students: a systematic review. *BMC Medical Education* **11**(33).

Nilsson, J., Johansson, E., Egmar, A.-C., Florin, J., Leksell, J. & Lepp, M. 2014. Development and validation of a new tool measuring nurses self-reported professional competence-the Nurse Professional Competence (NPC) Scale. *Nurse Education Today* **34**(4), 574–580.

Ratnapalan, S. & Uleryk, E. 2014. Organisational learning in healthcare organisations. *Systems* **2**(1), 24–33.

Ree, E. & Wiig, S. 2019. Employees' perceptions of patient safety culture in Norwegian nursing homes and home care services. *BMC Health Services Research* **19**, 607. doi: 10.1186/s12913-019-4456-8

Runciman, W., Hibbert, P., Thomson, R., Van Der Schaaf, T., Sherman, H. & Lewalle, P. 2009. Towards an international classification for patient safety: key concepts and terms. *International Journal for Quality in Health Care* **21**, 18–26.

Seiden, S.C., Galvan, C. & Lamm, R. 2006. Role of medical students in preventing patient harm and enhancing patient safety. *Quality and Safety in Health Care* **15**, 272–276.

Sepp, J. 2021. *Safety Culture Framework for Nursing and Care Institutions*. PhD Thesis, Tallinn University of Technology, Tallinn, Estonia, 140 pp.

Sepp, J., Reinhold, K., Järvis, M. & Tint, P. 2018. Human factors and ergonomics in safety management in healthcare: building new relationships. *Agronomy Research* **16**(4), 1862–1876.

Sepp, J. & Tint, P. 2017. The components of non-punitive environment in nursing. *Safety of Technogenic Environment* **8**, 24–30.

Uziak, J., Oladiran, M., Lorencowicz, E. & Becker, K. 2018. Students' and instructor's perspective on the use of Blackboard platform for delivering an engineering course. *Engineering Education Faculty Publications* **237**.

Walton, M., Woodward, H., Van Staalduinen, S., Lemer, C., Greaves, F., Noble, D., Ellis, B., Donaldson, L. & Barraclough, B. 2011. The WHO patient safety curriculum guide for medical schools. *Postgraduate Medical Journal* **87**(1026), 317–321.

World Health Organization. 2009. WHO patient safety curriculum guide for medical schools. World Health Organization.