

## REVIEW

# Measuring patient safety culture from the perspective of nursing students – a literature review

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## Abstract

**Aim:** To identify instruments measuring patient safety culture from the perspective of nursing students and to assess the content and reported psychometric properties of these instruments. **Design:** A narrative literature review. **Methods:** The search was carried out (according to institutional availability) in three scientific databases: ProQuest, PubMed, and Scopus. The search produced a total of 645 studies published up to May 2021. For data analysis, a summative content method was used. **Results:** We identified 12 instruments for measuring patient safety culture from the perspective of nursing students. Four instruments were designed to assess the perception of patient safety culture in the workplace, and eight instruments were designed for assessing nursing students' competencies in patient safety culture. **Conclusion:** The instruments share a core set of domains. However, details on conceptualisation, and methodological rigor differed substantially. Moreover, data on psychometric properties have not been published for most instruments. The absence of well-established instruments calls for further research.

**Keywords:** instrument, nursing, patient safety culture, safety climate, student.

## Introduction

Patient safety undeniably remains at the forefront of providing quality health care. Nurses, who make up the largest segment of healthcare professionals, with around 20 million worldwide (World Health Organization [WHO], 2018), play a significant role in safety through direct contact with patients. The European Union Patient Safety Network project states that healthcare professionals should have basic knowledge, skills, and attitudes regarding patient safety. In addition, the International Nurses Association (INA) has declared that a professional nurse should develop scientific knowledge focused on patient safety and develop safety in general. Therefore, the ability of nurses to develop and adhere to patient safety culture (PSC) is emphasized worldwide, as it significantly contributes to quality and safe care (Rizalar et al., 2016). By assessing patient safety culture, areas that need improvement can be identified. Furthermore, an evaluation serves to raise awareness of patient safety among professionals, to monitor changes in safety initiatives

over time, and also to compare results at both a national and international level (Taskiran et al., 2020).

Patient safety has recently become an area of increased concern in nurse education and continuing education worldwide (Kirwan et al., 2019). For this reason, future nurses must be sufficiently prepared for practice with respect to the complexity of the healthcare system. Therefore, universities for nursing education should respond positively to the challenges of curriculum reforms and develop effective strategies to prepare graduates for the provision of safe care, which is constantly being improved nowadays (Rebeschi, 2020). The Institute of Medicine (IOM) and Quality and Safety Education in Nursing (QSEN) initiative have provided curriculum frameworks focusing on competencies related to quality and safety, patient-centered care, evidence-based practice, and collaboration and teamwork, as well as technology, informatics, and development (Cronenwett et al., 2007; IOM, 2003). Evidence-based recommendations for the inclusion of patient safety training in the curricula of health education institutions have subsequently been issued by the WHO in the Multi-professional Patient Safety Curriculum Guide. The handbook states that nursing students are expected to learn patient-centered care, systems-based

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approaches, clear communication, effective team-working, prevention of adverse events, learning from errors, and to engage in designing systems changes (Mansour et al., 2015). However, in the EU, patient safety is not taught systematically in all areas, and good role models are lacking. Moreover, patient safety is taught differently in nursing education in different European countries (Tella et al., 2014). Alarming, a gap between the academic and practice environment in patient safety education is evident and perceived by nursing students and nurse educators. Formal education in the field of patient safety should be integrated into the practice environment. Students consider learning in clinical practice to be meaningful (Cronenwett et al., 2007; Steven et al., 2014). Therefore, nursing curricula should include specific content on patient safety, and universities should develop educational methods geared to both academic and practice environments (Tella et al., 2014). Initially, however, a patient safety culture should be created (Taskiran et al., 2020). With the implementation of PSC in both academic and practice environments, student competencies and perceptions of PSC should be assessed. Although instruments for its measurement exist, they are not used as standard worldwide. Information on the tools available for nursing students and the most appropriate tool to choose are lacking in the literature. Nevertheless, evaluation of nursing students' perspectives of PSC can, through use of a suitable and psychometrically stable tool, further strengthen the issue of patient safety.

## Aim

This narrative literature review aimed to a) identify instruments measuring PSC from the perspective of nursing students; b) to assess the content and reported psychometric properties of these instruments.

## Methods

### Design

The study adopted the design of a narrative literature review.

### Eligibility criteria

All studies up to May 2021 were included in the search (from the earliest available studies to May 2021). Predefined criteria were stated. Studies were included if they: a) were empirical papers; b) used quantitative research methods (validation studies); c) were published in peer-reviewed journals; d) were written in English; e) consisted of the full-text; f) focused on the topic of interest (instruments measuring PSC); and g) involved nursing students. Editorials, reviews,

protocols, case studies, and discussion articles were all eliminated, as were studies that used mixed-method or qualitative research methodologies.

### Search strategy

A literature search was performed on the 12th of May 2021 in three scientific databases: Scopus, PubMed, and ProQuest (including studies published up to May 2021). The databases were chosen based on their availability to the university. The same key phrases ("patient safety culture" OR "culture of patient safety" OR "safety climate" OR "patient safety") AND ("nurse\* student\*" OR "student nurs\*") AND ("instrument\*" OR "scale\*" OR "tool\*" OR "questionnaire\*" OR "measure\*") were used in all database search queries. At the title / abstract level, the literature search was limited to peer-reviewed and scholarly journals in English. A total of 645 studies fit the criteria (313 from ProQuest, 64 from Scopus, and 268 from PubMed).

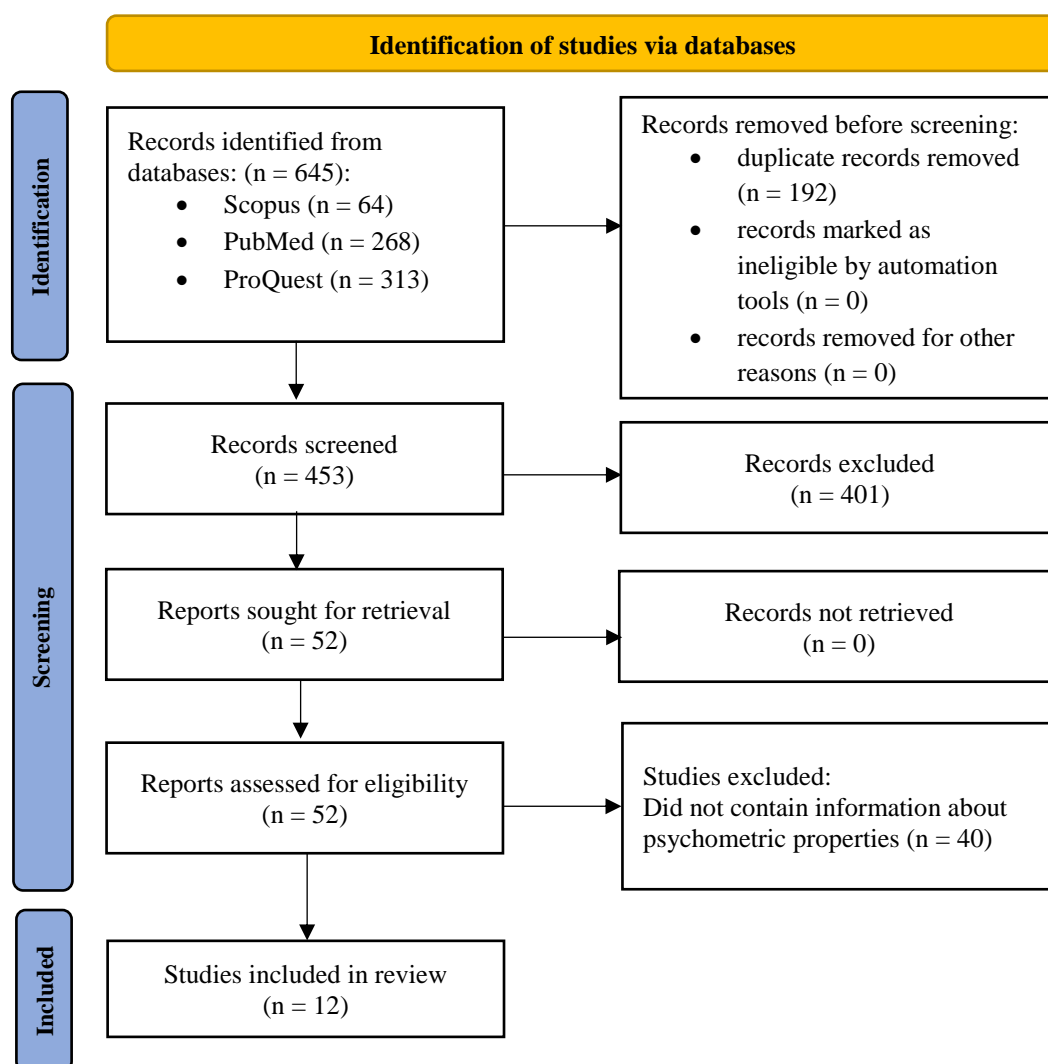
### Study Selection inc. PRISMA flow diagram

Two independent researchers (DB and DK) followed the PRISMA flow diagram, retrieving the data in two phases (Figure 1). The Rayyan QCRI® program was used in both rounds of retrieval (Ouzzani et al., 2016). Following the removal of duplicates (n = 192), a total of 453 papers were individually analyzed by all of the authors in the first phase, utilizing titles, abstracts, and inclusion criteria. In the second step, 52 studies were read in detail until the two independent researchers (DB and DK) came to an agreement.

The COSMIN checklist was used to evaluate specific features of the psychometric quality of the instruments (Consensus-based Standards for Selecting Health Status Measurement Instruments). Internal consistency, reliability, structural validity, content validity, cross-cultural validity, criterion validity, responsiveness, measurement error, and hypothesis testing are among the nine items on the COSMIN checklist that are used to rate different aspects of study design, methods, and reporting quality based on instrument measurement properties (Mokkink et al., 2010). As a result, forty studies were ruled out because they lacked information on psychometric features. The final analysis included a total of twelve studies.

### Evaluation of quality of articles

The quality of included studies was evaluated by the critical appraisal method using the four-point COSMIN checklist (Mokkink et al., 2010). For each of the psychometric properties, an assessment of study quality is made according to study design standards and preferred statistical methods. Studies examining the methodological quality of more than one



**Figure 1** PRISMA flow diagram

psychometric property have separate ratings and scores for each property. Only the sections listed in the studies are rated, all other sections are left blank and not rated (only some of the ten psychometric properties are rated). This entire process was provided by two independent researchers (DB, DK).

#### Data extraction

The following data was taken from the twelve studies by the two independent researchers (DB and DK): author, year, country, instrument, sample size and respondents, number of items, assessment area, evaluation description, and psychometric features. The data were analyzed in narrative and tabular format. The summative content analysis method was used in the data analysis (Hsieh & Shannon, 2005).

## Results

### *Description of basic characteristics of instruments measuring PSC*

We identified 12 instruments for measuring PSC from the perspective of nursing students. Most instruments were developed in the USA ( $n = 6$ ), followed by Spain, China, Turkey, Canada, Finland, the UK, and Korea, (one from each). The items in instruments ranged from 10 to 57. Response options in analyzed instruments were recorded using Likert-type scales from 3 to 7 points, except in the case of one tool for which information about the type of Likert scale was not provided. Dimensions ranged from 2 to 12, although one instrument was identified as unidimensional. Instruments were divided into two groups, according to their focus: four instruments measuring the perception of PSC in the workplace (Table 1) and eight

instruments measuring nursing students' competencies in PSC (Table 2).

Instruments measuring nursing students' perceptions of PSC were adapted versions of tools designed for nurses. Two of these instruments were modified for nursing education (Ortiz de Elguea et al., 2019; Walker et al., 2019), while the other two were used without modification (Çiftcioğlu et al., 2022; Kong et al., 2019). The instruments focusing on nursing students' competencies in PSC were developed based

on a literature review (Ginsburg et al., 2012; Lee et al., 2014; Tella et al., 2015), and QSEN KSA competencies (knowledge, skills, attitudes) (Miller & LaFramboise, 2009; Piscotty et al., 2013; Sullivan et al., 2009), and two instruments were developed based on the Madigosky et al. (2006) framework intended for medical students (Chenot & Daniel, 2010; Schnall et al., 2008). The origin of individual instruments is shown in the Tables (Table 1 and 2).

**Table 1** Instruments measuring nursing students' perception of PSC in the workplace

Study country	Instrument	Sample	Number of items	Number of dimensions	Evaluation of items	Origin of the instruments
Çiftcioğlu et al. (2022) Turkey	Patient Safety Culture Scale (PSCS)	n = 299 undergraduate nursing students	51	5	4-point Likert scale	the PSCS for nurses by Türkmen et al. (2011)
Kong et al. (2019) China	Safety Attitude Questionnaire (SAQ)	n = 231 postgraduate nursing students	31	6	5-point Likert scale	the SAQ for nurses by Sexton et al. (2006)
Ortiz de Elguea et al. (2019) Spain	Hospital Survey on Patient Safety Culture – Nursing Students (HSOPS-NS)	n = 654 undergraduate and postgraduate nursing students	54	5	5-point Likert scale	the Hospital Survey on Patient Safety Culture (HSOPS) for nurses by the Agency for Healthcare Research and Quality (Sorra & Nieva, 2004)
Walker et al. (2019) USA	Just Culture Assessment Tool for Nursing education (JCAT-NE)	n = 133 undergraduate nursing students	27	6	7-point Likert scale	the Just Culture Assessment Tool (JCAT) for nurses by Petschonek et al. (2013)

In order to find out which dimensions addressed PSC in nursing students, we subsequently categorized dimensions that were repeated two or more times in particular tools (Table 3). Dimensions that appeared in the instruments only once were, for example, balance, trust (Walker et al., 2019), job satisfaction, stress recognition (Kong et al., 2019) and managing safety risks (Ginsburg et al., 2012). However, dimensions used multiple times, such as events reporting, or knowledge of culture of safety, might be considered vital components that should be integrated into evaluating PSC in terms of complexity. The H-PEPSS instrument reflected the most PSC dimensions (Ginsburg et al., 2012).

#### *Analysis and evaluation of the content and reported psychometric properties of instruments.*

Instruments included in our review were tested on undergraduate or postgraduate nursing students. The number of respondents in validation studies ranged from 65 to 1,247. However, the study using the H-PEPSS instrument also included medical and

pharmaceutical students, with only 132 nursing students. The highest number of respondents (n = 654) was involved in the testing of the HSOPS-NS (Ortiz de Elguea et al., 2019). The evaluation of psychometric properties followed the COSMIN Checklist. The most frequently reported psychometric property was internal consistency, represented by the Cronbach alpha coefficient, and the least frequently reported was reliability and concurrent validity (Table 4).

In testing the JCAT-NE instrument, three areas regarding psychometric properties were presented in the study. Face validity was assessed through a discussion and expert panel of five nurse educators, giving rise to a 27-item tool. The item relevance was further evaluated by the content validity index (CVI), resulting in a CVI value of 1.0, indicating that all items were valid and suitable for inclusion in the JCAT-NE. Regarding the internal consistency of the instrument, the Cronbach alpha coefficient was 0.75 (Walker et al., 2019).

**Table 2** Instruments measuring nursing students' competencies in PSC

Study country	Instrument	Sample	Number of items	Number of dimensions	Evaluation of items	Origin of the instruments
Chenot & Daniel (2010) USA	The Health Care Professionals Patient Safety Assessment Curriculum Survey (HPPSACS)	n = 318 undergraduate nursing students	23	4	Likert-type scale	the Patient Safety / Medical Fallibility Survey for medical students by Madigosky et al. (2006)
Ginsburg et al. (2012) Canada	Health Professional Education in Patient Safety Survey (H-PEPSS)	n = 1,016 medical, pharmaceutical and postgraduate nursing students	23	6	5-point Likert scale	a literature review concerning self-assessment measure of competencies regarding PSC
Lee et al. (2014) Korea	The patient safety competency self-evaluation tool (PSCSE)	n = 394 undergraduate and postgraduate nursing students	45	12	5-point Likert scale	a framework for patient safety competencies
Miller & LaFramboise (2009) USA	The Student Perception of Safety and Quality Knowledge, Skills, and Attitudes Questionnaire (QSEN KSA)	n = 65 undergraduate nursing students	10	no dimension	7-point Likert scale	the six QSEN competencies related to students' knowledge, skills, and attitudes
Piscotty et al. (2013) USA	Nursing Quality and Safety Self-Inventory (NQSSI)	n = 176 undergraduate nursing students	18	2	7-point Likert scale	the six QSEN competencies related to students' knowledge, skills, and attitudes
Schnall et al. (2008) USA	The Patient Safety Attitudes, Skills and Knowledge Scale (PS-ASK)	n = 285 undergraduate nursing students	26	10	5-point Likert scale	the Patient Safety / Medical Fallibility Survey for medical students by Madigosky et al. (2006)
Sullivan et al. (2009) USA	QSEN Student Evaluation Survey (QSEN SES)	n = 565 undergraduate nursing students	41	3	4-point Likert scale	the six QSEN competencies related to students' knowledge, skills, and attitudes
Tella et al. (2015) Finland United Kingdom	The Patient Safety in Nursing Education Questionnaire (PaSNEQ)	n = 353 undergraduate nursing students	57	3	3-point rating scale	integration of literature reviews and international guidelines on patient safety

**Table 3** Representation of PSC dimensions in analyzed instruments

Dimensions of PSC	JCAT-NE	HSOPS-NS	SAQ	PSCS	H-PEPSS	PaSNEQ	QSEN SES	QSEN KSA*	PSCSE	PS-ASK	HPPSACS	NQSSI
Management and leadership			✓	✓								
Teamwork and collaboration			✓		✓							
Communication and feedback	✓				✓				✓			
Events reporting	✓	✓		✓	✓	✓			✓	✓	✓	
Culture of safety		✓	✓		✓					✓	✓	
Quality improvement	✓	✓							✓			
Working conditions			✓	✓	✓				✓			
Knowledge, skills and attitudes							✓					✓

Only dimensions that were repeated two or more times in the instruments were displayed. \*Since there is no abbreviation for The Student Perception of Safety and Quality Knowledge, Skills and Attitudes Questionnaire instrument, it has been added by the authors. PSC – Patient Safety Culture; JCAT-NE – Just Culture Assessment Tool for Nursing Education; HSOPS-NS – Hospital Survey on Patient Safety Culture – Nursing Students; SAQ – Safety Attitude Questionnaire; PSCS – Patient Safety Culture Scale; H-PEPSS – Health Professional Education in Patient Safety Survey; PaSNEQ – The Patient Safety in Nursing Education Questionnaire; QSEN SES – QSEN Student Evaluation Survey; QSEN KSA – The Student Perception of Safety and Quality Knowledge, Skills, and Attitudes Questionnaire; PSCSE – The Patient Safety Competency Self-Evaluation Tool; PS-ASK – The Patient Safety Attitudes, Skills and Knowledge Scale; HPPSACS – The Health Care Professionals Patient Safety Assessment Curriculum Survey; NQSSI – Nursing Quality and Safety Self-Inventory

**Table 4** Psychometric properties of analyzed instruments

Instrument (authors)	Face validity	Content validity	Concurrent validity	Construct validity	Internal consistency	Reliability
HPPSACS (Chenot & Daniel, 2010)	✓			✓	✓	
PSCS (Çiftcioğlu et al., 2022)					✓	
H-PEPSS (Ginsburg et al., 2012)	✓			✓	✓	
SAQ (Kong et al., 2019)			✓		✓	
PSCSE (Lee et al., 2014)				✓	✓	
QSEN KSA (Miller & LaFramboise, 2009)	✓				✓	
HSOPS-NS (Ortiz de Elguea et al., 2019)	✓			✓	✓	✓
NQSSI (Piscotty et al., 2013)			✓	✓	✓	
PS-ASK (Schnall et al., 2008)		✓		✓	✓	
QSEN SES (Sullivan et al., 2009)	✓	✓				
PaSNEQ (Tella et al., 2015)	✓	✓		✓	✓	
JCAT-NE (Walker et al., 2019)	✓	✓			✓	

HPPSACS – The Health Care Professionals Patient Safety Assessment Curriculum Survey; PSCS – Patient Safety Culture Scale; H-PEPSS – Health Professional Education in Patient Safety Survey; SAQ – Safety Attitude Questionnaire; PSCSE – The patient safety competency self-evaluation tool; QSEN KSA – The Student Perception of Safety and Quality Knowledge, Skills, and Attitudes Questionnaire; HSOPS-NS – Hospital Survey on Patient Safety Culture – Nursing Students; NQSSI – Nursing Quality and Safety Self-Inventory; PS-ASK – The Patient Safety Attitudes, Skills and Knowledge Scale; QSEN SES – QSEN Student Evaluation Survey; PaSNEQ – The Patient Safety in Nursing Education Questionnaire; JCAT-NE – Just Culture Assessment Tool for Nursing Education

The HSOPS-NS was verified in all areas except content and concurrent validity, and was the only tool tested for reliability. Face validity was assessed by 15 respondents in terms of general understanding, resulting in no changes. Construct validity was examined by exploratory factor analysis (EFA), which resulted in a five-factor structure, and confirmatory factor analysis (CFA), which evaluated the five-factor structure to be a good fit with moderate factor loadings, and was statistically significant. The Cronbach alpha coefficient was between 0.74 and 0.77 for each dimension. Furthermore, interclass correlation coefficients (ICC) were tested within individual dimensions, both within and between academic groups and in general ( $ICC \geq 0.94$ ). The median of Rwg (j) used as a measure of absolute agreement in evaluating each dimension was high in all five dimensions of the PSC survey (0.81–0.96), which supports the idea of a shared perspective on PSC between undergraduate and postgraduate nursing students (Ortiz de Elguea et al., 2019).

The SAQ has been used without changes to evaluate PSC in postgraduate nursing students from the original Chinese version designed for nurses and tested only in terms of concurrent validity and internal consistency. Concurrent validity was tested by using safety-related behaviors. Pearson's correlation showed that all SAQ domains, except for stress recognition, positively correlated with good cooperation with nurses and physicians, adhering to aseptic procedures during operations, reporting of adverse events, and with active learning of knowledge about patient safety ( $p \leq 0.05$ ;  $p \leq 0.01$ ). Cronbach's alpha coefficient was 0.93 for the whole instrument, with individual dimensions ranging from 0.75 to 0.89 (Kong et al., 2019).

The PSC scale was verified only for internal consistency. The value of Cronbach's alpha coefficient was found to be 0.97 (Çiftcioğlu et al., 2022).

Three areas were presented in the testing of the H-PEPSS instrument. Face validity was assessed regarding language appropriateness, item interpretation, and survey relevance, with a convenience sample of 20 newly-trained professionals. Of the total respondents, 132 nursing students were included in the 4<sup>th</sup> phase of construct validity testing, including CFA, which supported a good model fit of the six-factor structure in a sample of nursing students. Cronbach alpha coefficient for the instrument and domains was not less than 0.80 (Ginsburg et al., 2012).

The PaSNEQ was tested in four areas regarding psychometric properties. Firstly, five experts,

including nurse educators, assessed face and content validity. The CVI index demonstrated that items were relevant, and only minor changes were made. Subsequently, a pilot study was conducted on a sample of 39 nursing students to increase the clarity of the instrument, and minor changes were incorporated. Principal component analysis (PCA) was used to determine the construct validity, resulting in a three-factor structure for the instrument. The value of the Cronbach alpha coefficient ranged from 0.78–0.88, except for the dimension "Reporting patient safety incidents" with a value of 0.43 (Tella et al., 2015).

The QSEN was only tested in the areas of face and content validity. Face validity was assessed by experts who discussed the inclusion of individual competencies related to knowledge, skills, and attitudes in the instrument. The content validity was ensured through pilot testing on a sample of 25 students who were at least six months before graduation. These students were asked to assess the extent to which the individual items were relevant in terms of knowledge, skills, and attitudes. Many items were reformulated to increase the clarity of the statements (Sullivan et al., 2009).

The face validity and internal consistency of the QSEN KSA were presented. Face validity was ensured by nurse educators who actively participated in the QSEN project. Cronbach alfa coefficient for pre-test was 0.58, and 0.65 for the post-test. The authors attribute the low values of Cronbach alpha to multiple constructs of the tool (Miller & LaFramboise et al., 2009).

The PSCSE was evaluated in terms of construct validity and internal consistency in the study. Construct validity of the PSCSE instrument was analyzed by EFA and CFA. Based on the EFA results, an 11-factor structure was demonstrated, with one factor for knowledge, four factors for skills, and six factors for attitudes. Subsequently, the CFA divided the knowledge area into two factors. The skills area was categorized into six factors. The last area evaluated was attitudes, with a total of four factors and satisfactory goodness-of-fit indices. The Cronbach alpha values were satisfactory for individual categories: knowledge ( $\alpha = 0.859$ ), skills ( $\alpha = 0.912$ ), and attitudes ( $\alpha = 0.794$ ) (Lee et al., 2014).

The PS-ASK's content and construct validity, and internal consistency were confirmed. Content validity was performed by a panel of nurse researchers, patient safety experts, clinicians, and external advisory board members. Construct validity was analyzed using the PCA, resulting in a three-factor model for attitudes and skills, and a one-factor structure for knowledge.

The value of Cronbach's alpha for attitudes items ranged from 0.49 to 0.76, for the skill items it ranged from 0.71 to 0.84, and the knowledge items had a single value of 0.86 (Schnall et al., 2008).

Three areas in terms of psychometric properties were presented for the HPPSACS instrument. The original study authors assessed face validity. Construct validity was analyzed by EFA, resulting in a four-factor structure. Cronbach alpha coefficient ranged between 0.64 to 0.82 for each factor (Chenot & Daniel, 2010).

The NQSSI was tested in the study for construct and concurrent validity and internal consistency. To analyze the construct validity, the EFA was used with principal axis factoring. Factor analysis supported the authors' two-factor hypothesis. Inter-item correlations were examined for possible extraction of items, but none of the items was removed. Cronbach alpha coefficient attained a value of 0.93; the subscales ranged between 0.88 to 0.92. Concurrent validity was tested through a construct comparing accelerated versus traditional students. The independent sample t-tests showed that accelerated students had completed all of their acute clinical experience. In contrast, the traditional students had not completed it ( $p < 0.05$ ), which was a prerequisite for contrast validity (Piscotty et al., 2013).

## Discussion

The literature review revealed 12 tools to measure PSC from nursing students' perspective. Internationally, only one study focused on a compendium of instruments related to this topic (Taskiran et al., 2020). The authors also identified 12 tools to assess PSC, albeit from the perspective of healthcare students in general. In their overview, six tools were identified exclusively for nursing students, five were also intended for medical students or exclusively for them, and one tool was designed for nurse educators. The authors identified one instrument – The Latino Student Patient Safety Questionnaire – intended for medical and nursing students (Mira et al., 2015). Tools designed exclusively for medical students included the Medical Student Safety Attitudes and Professionalism Survey (Liao et al., 2014), and the Patient Safety / Medical Fallibility Survey (Madigosky et al., 2006). It is quite obvious that there is a wide range of tools for different groups of students. In our review, we focused specifically on tools designed exclusively for nursing students, five of which were identified in a Turkish study (Taskiran et al., 2020).

Assessing the PSC from nursing students' perspective is necessary, since in 2009, The Council of the

European Union recommended the inclusion of patient safety in the curricula of undergraduate and postgraduate health professionals (Council of the European Union, 2009). Based on our review, instruments were divided into two groups (perception of PSC; competencies in PSC). Both groups have a common variable that can be used to evaluate the development and the implementation of PSC perceived by nursing students. Our evaluation of their psychometric properties can be helpful in choosing the most suitable. The instruments measuring nursing students' perception of PSC focus on assessing patient safety during their clinical practice. Primarily, all were intended for nurses. Within this group, two instruments were adapted regarding nursing education. Considering the psychometric properties of these instruments, the most acceptable values were reported when using the HSOPS-NS (Ortiz de Elguea et al., 2019). However, no other studies, besides a validation study, have been published worldwide. The instrument originated from the HSOPS, commonly used on nurses, and transcultural validation studies continue to be published on it (e.g., Tereanu et al., 2018). Since only minor changes were made in its adaptation for nursing students, we consider this tool suitable for future studies investigating the differences between nursing students' and graduate nurses' perceptions of PSC.

Instruments designed for measuring nursing students' competencies in PSC were mainly based on the set of competencies established by the QSEN. These competencies should be based primarily on the knowledge, skills, and attitudes of nursing students. In connection with this issue, many studies have examined the impact of education following the QSEN framework, and several instruments have been developed to measure this concept (Chenot & Daniel, 2010; Miller & LaFramboise, 2009). In terms of the psychometric properties of these instruments, the most acceptable values were reported when using the PaSNEQ (Tella et al., 2015). Transcultural validation studies are less frequently reported and have been conducted mainly in European countries, such as Spain (Cervera-Gash et al., 2021), Finland, or the UK (Tella et al., 2015). This instrument group's most widely used tool is the H-PEPPS (Ginsburg et al., 2012), and has also been used most often on samples of nursing students in validation studies (e.g. Bergs et al., 2021; Bressan et al., 2016; Taskiran et al., 2020).

To the authors' knowledge, none of the tools for assessing PSC – both in terms of the perception of PSC and the competencies of PSC – has been used within a Czech or Slovak setting. Therefore, our literature review could be helpful in the selection



of an appropriate instrument for these and other countries. However, to improve the quality and safety of care during the clinical practice of nursing students, the most important factor is the regular evaluation of PSC.

### Limitation of study

This literature review has several limitations, one of which is that the search was conducted only in English and based on the institutional availability of the scientific databases. Another limit is that only validation studies were included in the search and retrieval process. In further and broader investigations of PSC involving these instruments, e.g., a scoping review, all available studies should be included in the analysis, thereby raising awareness of the instruments' use around the world to an even higher level.

### Conclusion

The instruments identified in our review for assessing patient safety culture from nursing students' perspectives differ mainly in their focus: whether intended to assess the perception of PSC in the workplace or to self-assess competencies in connection with the issue of safety culture. They also differ in the number of items, dimensions, or cultural differences. All of these aspects must be taken into account when choosing a suitable instrument. In terms of acceptable values regarding the psychometric properties of instruments, we evaluated which was most suitable from each category, i.e., which had the best reported data regarding face, content, concurrent and construct validity, internal consistency, and reliability. Those tools were the HSOPS-NS and the PaSNEQ. It is essential to create and begin to assess PSC from the perspective of undergraduate and postgraduate nursing students. Regular and repeated assessment of PSC may contribute to curriculum changes and effective prevention strategies necessary to provide quality and safe care.

### Ethical aspects and conflict of interest

The authors declare that there is no conflict of interest in connection with the research, authorship and / or publication of this article.

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### Author contributions

Conception and design (DB, DK, KŽ), data collection (DB, DK), data analysis and interpretation (DB, DK,

KŽ), manuscript draft (DB, DK), critical revision of the manuscript (KŽ), final approval of the manuscript (DB, DK, KŽ).

### References

- Bergs, J., Peeters, K., Kortleven, I., Creemers, S., Ulenaers, D., Desmedt, M., Schrooten, W., & Van Bogaert, P. (2021). Translation and validation of the Dutch version of the health professional education in patient safety survey amongst nursing students in Belgium: a psychometric analysis. *PLOS ONE*, 16(3), e0247869. <https://doi.org/10.1371/journal.pone.0247869>
- Bressan, V., Stevanin, S., Bulfone, G., Zanini, A., Dante, A., & Palese, A. (2016). Measuring patient safety knowledge and competences as perceived by nursing students: an Italian validation study. *Nurse Education in Practice*, 16(1), 209–216. <https://doi.org/10.1016/j.nepr.2015.08.006>
- Cervera-Gasch, Á., 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*, 20(1), 101. <https://doi.org/10.1186/s12912-021-00634-y>
- Chenot, T. M., & Daniel, L. G. (2010). Frameworks for patient safety in the nursing curriculum. *Journal of Nursing Education*, 49(10), 559–568. <https://doi.org/10.3928/01484834-20100730-02>
- Çiftcioğlu, Ş., Cırık, V. A., & Efe, E. (2022). Student nurses' perceptions of a patient safety culture: a descriptive and cross-sectional study. *Perspectives in Psychiatric Care*, 58(2), 658–663. <https://doi.org/10.1111/ppc.12830>
- Council Recommendation 2009/C 151/01 on patient safety, including prevention and control of healthcare associated infections (2009). *Official Journal of the European Union*, 52, 1–7. <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32009H0703%2801%29>
- Cronenwett, L., Sherwood, G., Barnsteiner, J., Disch, J., Johnson, J., Mitchell, P., Sullivan, D. T., & Warren, J. (2007). Quality and safety education for nurses. *Nursing Outlook*, 55(3), 122–131. <https://doi.org/10.1016/j.outlook.2007.02.006>
- Ginsburg, L., Castel, E., Tregunno, D., & Norton, P. G. (2012). The H-PEPSS: and instrument to measure health professionals' perceptions of patient safety competence at entry into practice. *BMJ Quality & Safety*, 21(8), 676–684. <https://doi.org/10.1136/bmjqs-2011-000601>
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- Institute of Medicine. (2003). *Health professions education: a bridge to quality*. National Academies Press.
- Kirwan, M., Riklikiene, O., Gotlib, J., Fuster, P., & Borta, M. (2019). Regulation and current status of patient safety content in pre-registration nurse education in 27 countries: Findings from the Rationing – Missed nursing care (RANCARE) COST Action project. *Nurse Education in Practice*, 37, 132–140. <https://doi.org/10.1016/j.nepr.2019.04.013>
- Kong, L.-N., Zhu, W.-F., He, S., Chen, S.-Z., Yang, L., Qi, L., & Peng, X. (2019). Attitudes towards patient safety culture

- among postgraduate nursing students in China: a cross-sectional study. *Nurse Education in Practice*, 38, 1–6. <https://doi.org/10.1016/j.nepr.2019.05.014>
- Lee, N.-J., An, J.-Y., Song, T.-M., Jang, H., & Park, S.-Y. (2014). Psychometric evaluation of a patient safety competency self-evaluation tool for nursing students. *Journal of Nursing Education*, 53(10), 550–562. <https://doi.org/10.3928/01484834-20140922-01>
- Liao, J. M., Etchegaray, J. M., Williams, S. T., Berger, D. H., Bell, S. K., & Thomas, E. J. (2014). Assessing medical students' perceptions of patient safety. *Academic Medicine*, 89(2), 343–351. <https://doi.org/10.1097/ACM.0000000000000124>
- Madigosky, W. S., Headrick, L. A., Nelson, K., Cox, K. R., & Anderson, T. (2006). Changing and sustaining medical students? Knowledge, skills, and attitudes about patient safety and medical fallibility. *Academic Medicine*, 81(1), 94–101. <https://doi.org/10.1097/00001888-200601000-00022>
- Mansour, M., Skull, A., & Parker, M. (2015). Evaluation of World Health Organization multi-professional patient safety curriculum topics in nursing education: pre-test, post-test, none-experimental study. *Journal of Professional Nursing*, 31(5), 432–439. <https://doi.org/10.1016/j.profnurs.2015.03.002>
- Miller, C. L., & LaFramboise, L. (2009). Student learning outcomes after integration of quality and safety education competencies into a senior-level critical care course. *Journal of Nursing Education*, 48(12), 678–685. <https://doi.org/10.3928/01484834-20091113-07>
- Mira, J. J., Navarro, I. M., Guilabert, M., Poblete, R., Franco, A. L., Jiménez, P., Aquino, M., Fernández-Trujillo, F. J., Lorenzo, S., Vitaller, J., Valle, Y. D. de, Aibar, C., Aranaz, J. M., & De Pedro, J. A. (2015). A Spanish-language patient safety questionnaire to measure medical and nursing students' attitudes and knowledge. *Pan American Journal of Public Health*, 38(2), 110–119.
- Mokkink, L. B., Terwee, C. B., Patrick, D. L., Alonso, J., Stratford, P. W., Knol, D. L., Bouter, L. M., & de Vet, H. C. W. (2010). The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study. *Quality of Life Research*, 19(4), 539–549. <https://doi.org/10.1007/s11136-010-9606-8>
- Ortiz de Elguea, J., Orkaizagirre-Gómara, A., Sánchez De Miguel, M., Urcola-Pardo, F., Germán-Bes, C., & Lizaso-Elgarresta, I. (2019). Adapting and validating the Hospital Survey on Patient Safety Culture (HSOPS) for nursing students (HSOPS-NS): a new measure of Patient Safety Climate. *Nurse Education Today*, 75, 95–103. <https://doi.org/10.1016/j.nedt.2019.01.008>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan – a web and mobile app for systematic reviews. *Systematic Reviews*, 5(1), 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Petschonek, S., Burlison, J., Cross, C., Martin, K., Laver, J., Landis, R. S., & Hoffman, J. M. (2013). Development of the just culture assessment tool. *Journal of Patient Safety*, 9(4), 190–197. <https://doi.org/10.1097/PTS.0b013e31828ff34>
- Piscotty, R., Grobbel, C., & Abele, C. (2013). Initial psychometric evaluation of the nursing quality and safety self-inventory. *Journal of Nursing Education*, 52(5), 1–6. <https://doi.org/10.3928/01484834-20130412-03>
- Rebesch, L. M. (2020). Perceived patient safety competence of baccalaureate nursing students: a descriptive comparative study. *SAGE Open Nursing*, 6, 2377960820930134. <https://doi.org/10.1177/2377960820930134>
- Rızalar, S., Büyük, E. T., Şahin, R., Tülin, A. S., & Uzunkaya, G. (2016). Hemşirelerde hasta güvenliği kültürü ve etkileyen faktörler [Patient safety culture and influencing factors of nurses]. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, 9(1), 9–15.
- Schnall, R., Stone, P., Currie, L., Desjardins, K., John, R. M., & Bakken, S. (2008). Development of a self-report instrument to measure patient safety attitudes, skills, and knowledge. *Journal of Nursing Scholarship*, 40(4), 391–394. <https://doi.org/10.1111/j.1547-5069.2008.00256.x>
- Sexton, J. B., Helmreich, R. L., Neilands, T. B., Rowan, K., Vella, K., Boyden, J., Roberts, P. R., & Thomas, E. J. (2006). The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC Health Services Research*, 6(1), 44. <https://doi.org/10.1186/1472-6963-6-44>
- Sorra, J. S., & Nieva, V. F. (2004). *Hospital Survey on Patient Safety Culture*. Rockville, MD: Agency for Healthcare Research and Quality. <https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/patientsafetyculture/hospital/resources/hospcult.pdf>
- Sullivan, D. T., Hirst, D., & Cronenwett, L. (2009). Assessing quality and safety competencies of graduating prelicensure nursing students. *Nursing Outlook*, 57(6), 323–331. <https://doi.org/10.1016/j.outlook.2009.08.004>
- Steven, A., Magnusson, C., Smith, P., & Pearson, P. H. (2014). Patient safety in nursing education: contexts, tensions and feeling safe to learn. *Nurse Education Today*, 34(2), 277–284. <https://doi.org/10.1016/j.nedt.2013.04.025>
- Taskiran, G., Bacaksiz, F. E., & Harmanci Seren, A. K. (2020). Psychometric testing of the Turkish version of the Health Professional Education in Patient Safety Survey: H-PEPSS<sup>TR</sup>. *Nurse Education in Practice*, 42, 102640. <https://doi.org/10.1016/j.nepr.2019.102640>
- Tella, S., Liukka, M., Jamookeah, D., Smith, N.-J., Partanen, P., & Turunen, H. (2014). What do nursing students learn about patient safety? An integrative literature review. *The Journal of Nursing Education*, 53(1), 7–13. <https://doi.org/10.3928/01484834-20131209-04>
- Tella, S., Smith, N.-J., Partanen, P., Jamookeah, D., Lamidi, M.-L., & Turunen, H. (2015). Learning to ensure patient safety in clinical settings: comparing Finnish and British nursing students' perceptions. *Journal of Clinical Nursing*, 24(19–20), 2954–2964. <https://doi.org/10.1111/jocn.12914>
- Tereanu, C., Smith, S. A., Ghelase, M. S., Sampietro, G., Molnar, A., Dragoescu, A., Furtunescu, F. L., Stanescu, C., Gavrilă, O. A., Patrascu, A., Golli, A. L., & Dragomir, M. (2018). Psychometric Properties of the Romanian Version of the Hospital Survey on Patient Safety Culture (HSOPS). *Maedica*, 13(1), 34–43. <https://doi.org/10.26574/maedica.2018.13.1.34>
- Türkmen, E., Altuntaş, S., Baykal, Ü., & Seren, Ş. (2011). Development of patient safety culture scale. *Journal of Nursology*, 14(4), 38–46.
- Walker, D., Altmiller, G., Barkell, N., Hromadik, L., & Toothaker, R. (2019). Development and validation of the Just Culture Assessment Tool for Nursing Education. *Nurse Educator*, 44(5), 261–264. <https://doi.org/10.1097/NNE.0000000000000705>

World Health Organization. (2018). *World health statistics 2018: Monitoring health for the sustainable development goals*. <https://apps.who.int/iris/handle/10665/272596>