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Instruments for measuring patient safety competencies in nursing: a scoping review

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ABSTRACT

Background Patient safety competencies in nursing are essential for the quality of healthcare. To develop practices and collaboration in nursing care, valid instruments that measure competencies in patient safety are needed.

Objective To identify instruments that measure the patient safety competencies of nurses.

Design A scoping review.

Data sources The Cochran Library, Epistemonikos, Eric, Ovid Medline, CINAHL, Embase and Web of Science databases were searched for articles reporting on instruments measuring patient safety competence in nursing. The search was limited to English peer-reviewed scientific papers published from January 2010 to April 2021.

Review method A blinded selection of articles fulfilling the inclusion criteria was performed by two researchers based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. Data were then extracted, synthesised and presented in tables and text.

Results Our search identified 1,426 papers, of which 32 met the inclusion criteria. The selected papers described nine instruments, of which the '*Health Professional Education in Patient Safety Survey*' was the most used instrument. The identified instruments comprised domains for patient safety skills, attitudes, knowledge, communication, teamwork and errors. The instruments had been tested for content (face) and construct validity as well as for reliability. However, sensitivity and responsiveness were rarely assessed.

Conclusions Over the last decade, there has been a growing body of instruments aimed at measuring patient safety competencies among nurses. The future development of new instruments should consider including the important dimension of ethics in patient safety as well as evaluating the instrument's responsiveness to be able to track changes over time.

Key messages

What is already known on the topic?

- Due to an increased focus on patient safety, several instruments that measure patient safety competencies have arisen over the last few years. The instruments vary on aspects of patient safety and the intended group of healthcare professionals they assess.

What this study adds?

- Our review identified instruments for measuring patient safety competencies in nursing; however, we found that ethics are a missing part of the instruments, even though this is a central aspect of patient safety. Moreover, responsiveness, which is important for evaluating quality improvement projects and education, was seldom reported.

How this study might affect research, practice or policy?

- Our study has identified instruments that are possible to use in a clinical setting. Easy access to this new information might inspire healthcare providers to apply these instruments in their hospital wards and education programmes to improve patient safety.

BACKGROUND

Patient safety competencies (PSC) in nursing are essential for healthcare quality and for nurses to address patient safety through their full scope of nursing practice.[1] The core values for healthcare are quality and safety in accordance with the ethical principles to do no harm and always include preventive safety measures in patient care.[1] Nurses spend most of their time at the bedside of patients and have a critical role and responsibility to identify patient safety risks.[2 3] Furthermore, they assure that patients receive safe and high-quality care through all disease trajectories.[2]

Patient safety in nursing is achieved through advocating for patient safety, safeguarding patient care and reporting adverse events.[4 5] However, the healthcare system is continually haunted by quality and safety issues.[4] Healthcare errors occur at a high rate and 1 in 10 patients is affected by adverse events due to patient safety failures.[6] The economic impact of medical errors is substantial, and the annual cost of adverse events, just in UK hospitals, is 728 million pounds sterling per year and, in total, over the developed countries, the costs are 606 billion US dollars.[6 7] The personal costs are even higher,

when pain, loss in quality of life, and even death have been caused by an unwanted event.[8] PSC are, therefore, crucial for all personnel caring for patients to ensure that errors and adverse events are systematically prevented.

Nurse PSC consist of having a professional attitude combined with values, knowledge, self-efficacy and skills.[9] PSC in nursing range from specific knowledge and tasks to safety in teamwork and systems thinking. In terms of frameworks, nursing knowledge and skills have been defined in domains such as patient safety culture, teamwork, communication, human and system factor optimisation, recognition, response to and disclosure of patient safety incidents.[10] Other frameworks have included domains such as person-centred care, therapeutic communication, clinical reasoning and evidence-based infection control and prevention.[11] Furthermore, PSC represent an integral part of other nursing competencies, although a consensus has never been reached.[9]

Several PSC instruments have been developed over the last two decades.[12] Using instruments to measure PSC is considered an effective strategy with low economic costs in relation to both time and money.[12] An overview that identifies instruments that measure PSC was last published in 2011.[13] Since then, several instruments have emerged and a new review is warranted. Furthermore, a summary of available instruments may facilitate the process of selecting the most suitable outcome measure for education and quality improvement projects on PSC development in nursing as well as identifying instruments that have been tested for reliability and validity.

OBJECTIVE(S)

This scoping review aims to identify instruments that measure PSC in nursing, including their content, validity and reliability.

METHOD(S)

A scoping review based on Arksey and O'Malley's framework was chosen to explore the literature for instruments that measure PSC in nursing.[14]The framework consists of five stages: identifying the research question, identifying relevant studies, selecting the studies, charting the data and collating, summarising and reporting the results.[14] Furthermore, the review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.[15]

Identifying the research question and relevant studies

In the first stage, we developed the research questions, search terms and a search strategy. The PICOS (Population, Intervention, Comparison, Outcome, Study) framework was used to support searches in which the population referred to nurses, intervention to patient safety, outcomes to questionnaires/instruments that measure skills, knowledge, attitude and self-efficacy in patient safety and study to a quantitative study design.[16] A combination of search terms with free words and medical subject headings (MeSH) terms was used and the terms were combined with Boolean operators as follows: (nurse OR RN OR nursing student OR nursing staff OR licensed practical nurse) AND (questionnaire OR instrument OR measure OR survey OR tool) AND (learning OR clinical competence OR curriculum OR learning OR in-service training OR competenc*) AND (patient safety OR safety). The searches were limited to the last 10 years, from January 2010 to April 2021. In addition, the searches were limited to original, peer-reviewed scientific studies published in the English language. Electronic searches were then carried out in the Cochran Library, Epistemonikos, ERIC, Ovid MEDLINE, CINAHL, Embase and the Web of Science databases, and a grey literature search was performed in Google Scholar. The planning of databases and search terms was conducted in collaboration with a health science librarian.

Selecting the studies

In the second stage, articles were selected based on the inclusion criteria. An article was included if all criteria were fulfilled: (1) the full text was in English, (2) the study included a questionnaire or instruments measuring nurses' PSC, (3) the article was original and peer-reviewed and (4) the target group included nurses/nursing students.

In order to ensure a blinded and unbiased selection of articles, we used the software Rayyan.[17] The initial searches in electronic databases identified 1,733 articles. Following the removal of 307 duplicates, a total of 1,426 articles were transferred to Rayyan. To test the inclusion criteria, three of the authors (MM, KIN and ALM) performed a blinded pilot screening of titles and abstracts on 10% (n=120) before a blinded screening was performed on the remaining abstracts. In the following and final screening phase, a total of 10.6% (n=151) of the articles were included, while 89.4% (n=1,275) were excluded.

Charting the data and summarising the results

The articles included in the synthesis (table 1) were charted into two tables to categorise the different instruments, including patient safety dimensions (table 2) and documented psychometric properties (table 3). We did not perform a quality appraisal of the articles, as a scoping review method was used.[14 15] The quality of the instruments was evaluated according to the taxonomy and terminology given by Streiner *et al* and the COnsensus-based Standards for the selection of health Measurement INstruments guidelines (COSMIN).[18 19] The criteria evaluation contains the assessment of reliability and validity (content validity, construct validity and criterion validity), sensitivity and responsiveness. An analysis was performed as a summary on a descriptive level.[20] The instrument's original reference was used as the primary source of information on the instrument content and psychometric properties.

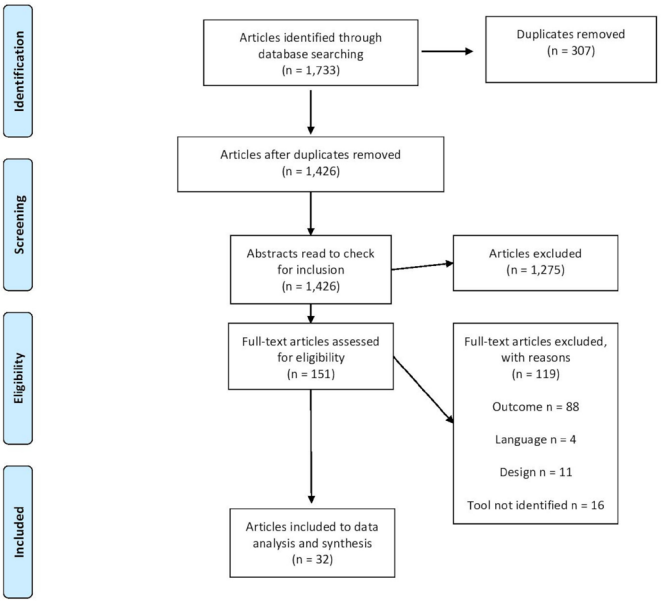

Figure 1 PRISMA flow diagram of the study selection process. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

RESULTS

Sample and settings

Of the 1,426 results from the selected databases, the full texts of the 151 selected articles were independently screened by two researchers (MM and KIN) (*blinded for review*) based on the inclusion and a total of 32 studies were included in the final full-text review (figure 1; table 1). Six studies were conducted in the USA, four in Canada, five in South Korea, four in China, three in Australia, two in Palestine, two in Saudi Arabia, two in Italy and one in each of the countries of Lithuania, Iran, Turkey and the UK (table 1).

The total number of study participants was 16,961 and comprised nursing students (n=8,795) nurses (n=5,345), medical doctors (n=2,075), pharmacists (n=521) and nursing assistants (n=180) (table 2). The included studies were conducted both in educational (n=25) and hospital settings (n=7).

Description of identified instruments

Nine instruments were used to measure PSC (table 2). All of the instruments were designed to be self-administered Likert-type scales and had an average of 30 items, of which the shortest instrument was the *Health Care Professionals Patient Safety Assessment Curriculum Survey (HPPSACS)*,[10] containing 22 items (table 2). In contrast, the longest was the *Patient Safety Competency Self-Evaluation (PSCSE)*,[21] containing 41 items (table 2). The majority (n=9) of the instruments was originally published in English, but later translated and validated into nine other languages.

Included instruments

The *Patient Safety Attitudes, Skills and Knowledge (PS-ASK)* tool originated in the USA and was first published in 2008.[22] The items were based partly on Madigosky *et al.* 28-item questionnaire targeting medical students[23] and items from Reason's model of human error.[24] The final tool consists of three subscales that measure error analysis, patient safety threats and decision support technology (table 2). The target groups for this instrument are nurses and other clinicians during educational preparation and in practice.

The *Attitudes to Patient Safety Questionnaire (APSQ III)* was developed by Carruthers *et al* in the UK in 2009.[25] The questionnaire was based on the *Operating Room Management Attitude Questionnaire*,[26] the *Medical Student Survey*[27] and the *Safety Attitudes Questionnaire*.[28] The *APSQ III* questions are divided into nine categories and the target groups for this instrument were initially medical students and tutors but later adapted to a nursing context (table 2).

The *Healthcare Professional Patient Safety Assessment Curriculum Survey (HPPSACS)* was developed in 2010 by Chenot *et al*[10] based on Madigosky *et al*'s 28-item questionnaire.[23] The purpose of this instrument is to establish undergrad students' perceived awareness, skills and attitudes towards patient safety in education.[10] The HPPSACS is a 22-items survey in which respondents answer questions about attitudes and comfort with patient safety skills (table 2).

The *Health Professional Education in Patient Safety Survey (H-PEPSS)* was originated in Canada and was developed by Ginsburg *et al*.[29] The H-PEPSS consists of 23 items and concentrates mainly on the sociocultural aspects of patient safety, including culture, teamwork, communication, risk management and the understanding of human factors (table 2). The H-PEPPS was created for healthcare workers in general.

The *Patient Safety Competency Self-Evaluation (PSCSE)*[30] originated in Korea and is based on several earlier instruments, including those developed by Frank and Brien,[31] Madigosky *et al*,[23] Schnall *et al*,[22] Sullivan *et al*[32] and Wolf *et al*.[33] Items relevant to healthcare in Korea were chosen from these instruments. The PSCSE focuses on the subdomains' attitude, skills, knowledge and specific nursing areas of the subdomain skills, such as ulcer prevention and medication safety (table 2).

The *Nurses' Attitudes and Skills around Updated Safety Concepts Scale (NASUS)* was developed by Armstrong *et al*[34] in 2017 and is based on two previous instruments, the PS-ASK[22] and the HPPSACS,[10] and assesses the perceived skills and attitudes of nurses toward updated safety concepts (table 2).

The *Medical Students' Questionnaire of Knowledge, Skills and Attitudes Regarding Patient Safety (MSQ-KSA,* author's own abbreviation) is a 34-item instrument developed in the UK in 2009 by Flin *et al*[35] that assesses student levels of knowledge and skills as well as attitudes and feelings, relating to patient safety and medical errors (table 2). The instrument was initially aimed at undergraduate medical students, but the questions were later adapted to a nursing setting by Murray *et al*.[36]

The instrument *Patient Safety Competency Nurse Evaluation Scale* (*PSCNES*) was constructed by Wang in 2018[37]

Table 1 Articles included to data analysis and synthesis

Author	Year	Country	Instrument identified in study
Abu-El-Noor *et al*[53]	2019	Palestine	Attitudes to Patient Safety Questionnaire III (APSQ III)
Alquwez *et al*[54]	2019	Saudi Arabia	The Health Professional Education in Patient Safety Survey (H-PEPSS)
Armstrong *et al*[34]	2017	USA	Nurses' Attitudes and Skills around Updated Safety Concepts Scale (NASUS)
Bottcher *et al*[55]	2019	Palenstine	APSQ III
Brasaite *et al*[56]	2016	Lituania	Patient Safety Attitudes, Skills and Knowledge (PS-ASK)
Bressan *et al*[57]	2015	Italy	H-PEPSS
Chen *et al*[58]	2019	China	H-PEPSS
Cho and Choi[59]	2018	South Korea	Patient Safety Compentency Self-Evaluation Tool (PSCSE)
Colet *et al*[60]	2015	Saudia Arabia	H-PEPSS
Duhn *et al*[50]	2012	Canada	H-PEPSS
Ginsburg *et al*[29]	2013	Canada	H-PEPSS
Huang *et al*[61]	2020	China	H-PEPSS
Hwang[62]	2015	South Korea	H-PEPSS
Lee *et al*[21]	2014	South Korea	PSCSE
Lee *et al*[63]	2020	South Korea	PSCSE
Lee *et al*[64]	2016	South Korea	PSCSE
Lewis *et al*[65]	2016	USA	Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS)
Li *et al*[39]	2020	China	Medical Student Safety Attitudes and Professionalism Survey (MSSAPS)
Mansour[66]	2015	UK	HPPSACS
Marchi and Gropelli[67]	2017	USA	HPPSACS
Murray *et al*[36]	2020	Australia	Medical Students' Questionnaire of Knowledge, Skills, and Attitudes Regarding Patient Safety (MSQ-KSA)
Oates *et al*[68]	2019	Australia	Attitudes to Patients Safety Questionnaire (APSQ3)
Raymond *et al*[69]	2016	Canada	H-PEPSS
Rebeschi[70]	2020	USA	H-PEPSS
Shanty and Gropelli[71]	2018	USA	H-PEPSS
Stevanin *et al*[72]	2015	Italy	H-PEPSS Italian version
Taskiran *et al*[73]	2020	Turkey	H-PEPSS
Torkaman *et al*[74]	2020	Iran	H-PEPSS
Usher *et al*[75]	2017	Australia	H-PEPSS
VandenKerkhof *et al*[76]	2017	Canada	H-PEPSS
Weatherford and Viveiros[77]	2015	USA	H-PEPSS
Yan *et al*[44]	2021	China	Patient Safety Competency Self Scale (PSCNES)

and consists of 35 items that measure patient-centred care, safety risk management, evidence-based nursing practice, patient safety culture, clinical practice and continuous quality improvement (table 2).

The *Medical Student Safety Attitudes and Professionalism Survey (MSSAPS)* is a 28-item instrument that measures safety culture, team culture, error disclosure culture, experiences with professionalism, professional problem statements and the implementation of safety behaviour intention (table 2). The MSSAPS was initially developed by Liao *et al*[38] for medical students and validated in a nursing setting by Li *et al*.[39]

Types of competencies in the identified instruments

As regards the identified competencies, some instruments map attitudes, skills and knowledge related to patient safety on an individual level (PS-ASK, NASUS, PSCSE, MSQ-KSA).[21 22 34 35] These instruments identify student or

Table 2 Instruments assessing patient safety competencies in nursing

Instruments, authors and country	Target group	Number of items and subdomains	
Patient Safety Attitudes, Skills and Knowledge (PS-ASK) Schnall *et al*, USA[22]	Nurses and physicians	26	Attitude (9 items) Skills (13 items) Knowledge (4 items)
Attitudes to Patient Safety Questionnaire III (APSQ III) Carruthers *et al*, UK[25]	Health professionals and students	30	Patient safety training received (3 items) Error reporting confidence (4 items) Working hours as error cause (3 items) Error Inevitability (4 items) Professional incompetence as error cause (4 items) Disclosure responsibility (4 items) Team functioning (2 items) Patient involvement in reducing error (2 items) Importance of patient safety in the curriculum (4 items)
Healthcare Professionals Patient Safety Assessment Curriculum Survey (HPPSACS) Chenot and Daniel, USA[10]	Nursing students	22	Comfort (5 items) Error reporting (8 items) Denial (4 items) Culture (5 items)
The Health Professional Education in Patient Safety Survey (H-PEPSS) Ginsburg *et al*, Canada[29]	Health professionals and students	23	Working in teams with other health professionals (6 items) Communicating effectively (3 items) Managing safety risks (3 items) Understanding human and environmental factors (3 items) Recognise, respond to, disclose adverse events and close calls (4 items) Culture of safety (4 items)
Patient Safety Competency Self Evaluation (PSCSE) Lee *et al*, Korea[21]	Nursing students and nurses	41	Attitude (14 items) Skills (21 items) Knowledge (6 items)
Nurses' Attitudes and Skills around Updated Safety Concepts Scale (NASUS) Armstrong *et al*, USA[34]	Nursing students	24	Attitude (17 items) Perceived skills (7 items)
The Medical Student Safety Attitudes and Professionalism Survey (MSSAPS) Liao *et al*, USA[38]	Medical students/nursing students	28	Safety culture (8 items) Teamwork (6 items) Error disclosure culture (4 items) Experiences with professionalism (7 items) Comfort expressing professional concerns (3 items)
Medical Students' Questionnaire of Knowledge, Skills and Attitude Regarding Patient Safety (MSQ-KSA) Flin *et al*, UK[35]	Medical students/nursing students	34	Knowledge of error and patient safety (7 items) Knowledge of workplace safety (6 items) Feelings about making errors (4 items) Speaking up about errors (4 items) Attitudes to patient safety (6 items) Safety at the workplace (7 items)
The Patient Safety Competency Nurse Evaluation Scale (PSCNES) Wang, China[37]	Nurses	35	Patient-centred care (4 items) Safety risk management (10 items) Evidence-based nursing practice (5 items) Patient safety culture (4 items) Clinical practice (5 items) Continuous quality improvement (7 items)

nurse levels of competence in these domains and their patient safety attitudes and self-evaluation of competencies. Other instruments focus on participant perceptions of patient safety issues on a more system level, for example, teamwork, safety culture, communication and error management. Teamwork is a recurrent element and consists of questions about whether better multidisciplinary teamwork could reduce errors and if learning about teamwork would reduce errors in clinical practice. Other issues, such as how to communicate effectively,

how to manage safety risks and how human factors such as fatigue affect patient safety, are also found in the instruments.

Attitudes towards patient safety were identified by the responses to such questions as what the respondent would have done if an unwanted event had been detected in a patient setting and whether they would have reported it. Content on disclosing an error to a peer or supervisor was also considered an attitude. In the MSQ-KSA instrument, the respondents were also asked to choose between several emotions to patient safety: 'afraid', 'ashamed', 'guilty' or 'upset'.[36]

Skills were concentrated around hygiene, safe medication distribution, how to report an incident report accurately and how to examine a case to determine the cause of an unwanted event. In the specific instruments for nurses, issues concerning safe nursing practices included fall prevention, pressure ulcers and patient identification verification.[21]

Knowledge about patient safety focused on the health professionals' level of competence in identifying errors, adverse events, near misses and hazards as well as the human factors that are important in creating a safe patient environment.

Psychometric properties of the instruments

Face validity was reported in six instruments (table 3) and content validity index reported in one of the included instruments.[34] Furthermore, construct validity was measured in eight of nine instruments. Moreover, criterion

Table 3 The psychometric properties of patient safety competence instruments in nursing

Instruments	Sample	Face validity	Construct validity	Criterion validity	Reliability	Sensitivity	Responsiveness	Translations
Patient Safety Attitudes, Skills and Knowledge (PS-ASK)	Nursing students	X	X		X		X	English, Lithuanian
Attitudes to Patient Safety Questionnaire III (APSQ III)	Medical students	X	X	X	X			English, Arabic
Health Care Professionals Patient Safety Assessment Curriculum Survey (HPPSACS)	Nursing students	X	X		X	X		English
The Health Professional Education in Patient safety Survey (H-PEPSS)	Health professionals	X	X		X			English, Italian, Arabic, Chinese, Turkish, French
Patient Safety Competency Self Evaluation (PSCSE)	Nursing students	X	X		X			Korean
Nurses' Attitudes and Skills around Updated Safety Concepts (NASUS) Scale	Nurses				X			English
The Medical Student Safety Attitudes and Professionalism Survey (MSSAPS)	Medical students/ nursing students	X	X	X	X			English, Chinese
Medical Students' Questionnaire of Knowledge, Skills, and Attitude regarding patient safety (MSQ-KSA)	Medical students/ nursing students		X		X			English
The Patient Safety Competency Nurse Evaluation Scale (PSCNES)	Nurses		X		X			Chinese

validity (n=2), sensitivity (n=1) and responsiveness (n=1) were seldom reported. Reliability was most often (n=9) described as internal consistency using Cronbach's alpha values. The included instruments were reported to be acceptable, ranging from 0.64 to 0.91. The most often (n=8) used reply scale was the 5-point Likert-type scale (table 3).

DISCUSSION

This scoping review adds to the literature the content, validity and reliability of nine instruments used in nursing education and management to measure PSC in nursing. Nurse competence in patient safety is a precondition for good healthcare quality and adequate training is warranted.[40] Patient safety has been raised as a global health priority by the WHO and can be categorised under the United Nations' Sustainable Development Goal three, stating that everyone should have access to quality essential healthcare services.[5] In order to provide nursing professionals with an ample competency level to ensure safe patient care, courses and modules in patient safety to improve student knowledge, skills and attitudes are offered at universities.[41]

Across the included instruments, identical measurement areas such as teamwork and communication can be reidentified in the existing frameworks for patient safety.[5 11 31] However, one of the frameworks includes evidence-based practices in nursing and medication safety.[11] The area of medication is of utmost importance and is a specific Global Patient Safety Challenge issued by the WHO that aims to reduce medication-related harm by 50% over the next five years.[4 42] Moreover, patient safety in securing treatment and care based on current best evidence depends on nurses bringing the best evidence to the patient.[43] In this respect, nursing education warrants efficient and non-hierarchical collaboration. The framework originating from Canada can, therefore, be interpreted as assessing patient safety on a more complex system level, which is reidentified in the APSQ-3, H-PEPSS, HPPSACS, MSSAPS, PSCNES instruments.[10 11 25 29 38 44]

The identified instruments that assess several of the general nursing competencies on patient safety presented by Takase and Teraoka[9] include the healthcare provider's perceived attitudes, skills and knowledge of patient safety. The instruments that measure dimensions close to these nurse competencies can be reidentified in the NASUS Scale,[34] PS-ASK,[22] PSCSE[30] and the HPPSACS.[10] With the exception of the NASUS scale, all include the three abovementioned dimensions. It can be observed that many of the elements are recurrent, such as error disclosure and reporting and how the healthcare professional communicates an unwanted event to peers or supervisors.

Nursing ethical values seem to be lacking as a dimension in the included instruments. Even though patient safety has been an area of increased focus in recent years, ethical aspects are not well described; nonetheless, these issues form the basis of patient safety.[45] Nurses should act as 'whistle-blowers' and be held responsible for identifying situations that may compromise patient safety.[45] The ethical and patient safety values of nurses are critical factors that can potentially influence the safe practices of nurses and patient safety.[46] Elements concerning ethical values that should be included when measuring competencies in patient safety are nurse knowledge of how to protect and promote human dignity as well as how nurses can respect patient autonomy and care for the entire patient, including his or her ethical values.[45]

Safety problems relating to non-technical skills (NTS) are significant, but appear to be underrepresented in medical and nursing education and training curricula.[47] Typical NTS training topics are described in the literature as performance-shaping factors, planning, preparation and prioritisation, situation awareness and perception of risk, decision-making, communication, teamwork and leadership.[47] NTS elements can be found in the APSQ-3, H-PEPSS, HPPSACS, MSSAPS, PSCNES instruments. When these NTS are compared with the frameworks and definition of nurse competence, it can be observed that communication and teamwork are typically recurrent elements in the instruments: both dimensions are undeniably crucial to patient safety.

An instrument that measures PSC must be useful on several levels, such as for clinical practice, educational or managerial purposes.[5] First, at an individual level, the respondent could be made aware of and increase his or her knowledge and PSC. Second, an instrument can be used on an educational level to investigate the discordance between what is taught and what clinical competence reflects. A possible difference between theory and practice may warrant the possibility of universities to make curriculum changes in theoretical and practical studies. Finally, hospital administrators could use instruments to establish employee knowledge of PSC. Knowing more about employee levels of knowledge could potentially lead to the need for more training, leading to a higher level of patient safety and quality in the nursing given.[4] However, in our review, two of the instruments were not developed with nurses as the target group in the original version: the MSSAPS and MSQ-KSA were made for medical students, but later adapted and used for nurses.[35 38] Awareness of the use of instruments created for a different profession or domain should be taken into account, as there are potential pitfalls and the measured outcome could be erroneous.[48]

Patient safety frameworks contain important dimensions and competencies for nurses and future nurses. For future nurses, Bianchi *et al*[49] comment that more research is needed to identify more explicit education strategies to develop nursing student competencies in patient safety. Although several frameworks describe different PSC, it has been made clear that it is essential to introduce safety principles in student curricula as soon as they have started their degree programme and the topic must be continued throughout their studies.[50] Nevertheless, more

knowledge and research must identify what they need to learn and what competencies are required. The identified instruments may facilitate improved patient safety curricula and courses through the quality of outcome assessments.

Reliability and validity of identified instruments

Validity was assessed in all but one of the instruments, either as content or construct validity. Validity assures that the instrument measures what it is intended to assess.[51] However, reliability is a prerequisite to obtaining validity and internal consistency in terms of Cronbach's alpha was assessed in all instruments, but the test–retest stability was only tested in one instrument, the PS-ASK.[22] Criterion validity was reported in only one study, perhaps because of no established 'gold standards'. Furthermore, sensitivity and responsiveness seem to be very rarely reported, raising uncertainty about the instrument's ability to distinguish between groups or identify change over time. Both features are essential to reveal the effects of an intervention study like an educational patient safety programme.

Strengths and limitations

This scoping review has limitations and by adopting this methodology, it is intended to investigate breadth rather than depth.[14] First, a comparison of findings across studies must be carried out with caution, given the variations in how data were reported. Second, the search for studies was systematic and comprehensive, but English manuscripts might limit the applicability of the findings to English-speaking parts of the world. In addition, our search was up to date as of April 2021 and the findings only reflect that they have been indexed and assigned MeSH. According to the guidelines for scoping reviews, performing a quality check is not considered obligatory.[14] Furthermore, whereas a systematic review intends to provide a complete and exhaustive summary of the existing literature, we were limited to a general overview of the instruments that exist.[52]

CONCLUSION

Our scoping review identified nine instruments that can be used to measure patient safety competencies in nursing. The identified instruments measure and contain a wide variety of domains, such as attitudes, skills and knowledge, communication skills, patient safety culture and talking openly about patient safety issues. These dimensions are identified in the instruments from existing frameworks in patient safety, but a measurement of the ethical and patient safety values of nurses is lacking in all of the instruments. Future research and development of instruments should include ethical issues in patient safety. Furthermore, the measurement of instruments responsiveness is seldom measured. In order to assure that instruments distinguish between groups or identify change over time, this psychometric aspect should be taken into account in future studies in which new instruments are created or validated into new languages.

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