

## Assessing undergraduate nursing students perceptions of patient safety competence at entry into practice

Heba Mahmoud Mahmoud Mohamed

(Lecturer Medical Surgical Nursing ,Faculty of Nursing, Alexandria University)

**Abstract:** Enhancing competency in patient safety at entry to practice requires introduction and integration of patient safety into health professional education. As efforts to include patient safety in health professional education increase, it is important to capture new health professionals' perspectives of their own patient safety competence at entry to practice. Existing instruments to measure patient safety knowledge, skills and attitudes have been developed largely to examine the impact of specific patient safety curricular initiatives and the psychometric analyses of the instruments used thus far have been exploratory in nature. Methods the Health Professional Education in Patient Safety Survey (H-PEPSS), a newly designed survey rooted in a patient safety competency framework and designed to measure health professionals' self-reported patient safety competence around the time of entry to practice. The H-PEPSS focuses primarily on the socio-cultural aspects of patient safety including culture, teamwork, communication, managing risk and understanding human factors. Results. support a parsimonious six-factor measurement model of health professionals' perceptions of patient safety competency. These results support the validity of a reduced version of the H-PEPSS and suggest it can be appropriately used at or near training completion with a variety of health professional groups. Conclusions Given increased demands for patient safety competency among health professionals at entry to practice and slow, but emerging changes in health professional education, ongoing research to understand the extent of patient safety competency among health professionals around the time of entry to practice will be important. )

**Keywords** undergraduate ,nursing ,students ,perceptions

Date of Submission: 03-03-2021

Date of acceptance: 17-03-2021

### I. INTRODUCTION

The need to restructure nursing education and the education of other health professional groups to ensure it equips students with the knowledge, skills and attitudes they need to function safely has been recently outlined by numerous international bodies. Enhancing competency in patient safety (PS) at entry to practice requires introduction and integration of PS content into health professional curricula and training program with a particular emphasis on the socio-cultural facets of PS. However, a growing body of literature suggests this is not happening quickly in medicine or other health professions. In 2018, the Canadian Patient Safety Institute (CPSI) initiated the Safety Competencies Project<sup>5</sup> with the aim of optimizing PS by enhancing health professional education in this area. Working with the Royal College of Physicians and Surgeons of Canada, and using the CanMEDS framework of physician competencies,<sup>10</sup> six domains of competency necessary for health professionals to be able to deliver safe patient care were identified. The safety competencies were designed to be relevant across health disciplines. Other international professional bodies and WHO have also developed PS competency/education frameworks. Central to all of these is an emphasis on the six socio-cultural areas fundamental to PS. The six domains of the safety competencies, Contribute to a culture of patient safety, Work in teams for patient safety, Communicate effectively for patient safety, Manage safety risks, Optimize human and environmental factors Recognize, respond to and disclose adverse events. As efforts to include PS in health professional education increase, it will be important to capture trainees and new health professionals' perspectives of their own PS knowledge and competence. While several other survey instruments have been developed over the last 5–10 years to measure students' attitudes, skills and knowledge about PS and medical errors, in most cases these instruments have been designed and used to measure the impact of specific PS curricular or training interventions, their use has been largely confined to a single educational institution, and only preliminary psychometrics have been reported (eg, scale alphas and, in some cases, exploratory factor analysis). Other recent studies exist concerning the development and evaluation of questionnaires to measure PS knowledge and/or attitudes. However, in all of these studies the psychometrics presented were also exploratory. Finally, a recent systematic review found no existing surveys that measure the breadth of content reflected in the safety competencies. This paper reports on the psychometric properties of the Health Professional Education in Patient Safety Survey (H-PEPSS). The H-PEPSS measures health professionals' self-reported PS competence. In the context of outcomes for evaluating training programmes outlined by Kirkpatrick and used by Barr, the H-

PEPSS is a tool for educational evaluation that reflects educational outcomes at level 1 and level 2. Level 1 outcome reflects trainees' views of their learning experience and satisfaction with a program. Level 2 outcomes reflect whether trainees learned the program content. The H-PEPSS can also be situated in the context of evaluating attitudes and knowledge (self-reported) that define the quality and safety education for nurses competencies.<sup>4</sup> This is useful given the early stage of development of KSA evaluation metrics. Given the H-PEPSS focus on more complex socio-cultural aspects of safety, it is best suited for use with those who recently completed or are nearing completion of their training and is intended to be used broadly (eg, with a wide range of health professional groups).

**Aim of the study** Assessing undergraduate nursing students perceptions of patient safety competence at entry into practice

## **II. MATERIALS AND METHODS**

### **MATERIALS**

#### **Design:**

A descriptive research design was utilized in this study.

#### **Setting**

This study was conducted at the faculty of nursing, Alexandria.and.....

#### **Subjects:**

The study Subjects comprise one group:

Group (students)

This group included cluster sample of nursing undergraduates students involved (Their number was 60).

Data collect for this study:

**Tool:** Vascular Staff Nurse Portfolio of Competency assessment checklist A structured sheet was developed by the researcher based on reviewing related literatures , regarding nursing competencies evaluation and its related activities required for dealing with patient comprised the nursing knowledge and skills required for controlling infection.

#### **Method:**

1) An official permission to carry out the study were obtained from the responsible authorities at faculty of nursing, Alexandria.

2) Tool of the study was developed by the researcher and tested for content validity by five experts from professor of medical surgical nursing, nursing education. Required corrections were done.

3) Reliability of tools were Assured by means of Cronbach's coefficient alpha which had a value of .98

4) A pilot testing was conducted with five nurses using tool 1, to test the feasibility and the applicability of the developed tool, modification was done.

6) Data collection covered a period of 2 months started from march 2019 till june2019

7) Ethical considerations:

1.1. Written consent of the nurses was obtained, after explanation of the aim.

1.2. Anonymity, confidentiality

## **III. RESULTS**

Table (I): Shows distribution of patients of both studied groups (I and II) regarding their socio-demographic characteristics.

As regards age, it was observed that the highest percentages of students in the study group were in the age group of (20) .Regarding sex, around two thirds of students were females .In relation to marital status, the highest percentages were single. All of the students did not have any previous training program.

Table (II): Shows distribution of Students regarding their knowledge of the six domains of The CPSI Safety Competencies

In this study, we used survey data from a large, cross-sectional sample of new graduates nursing to test a six-factor model of the H-PEPSS and determine scale internal consistency.To measure self-reported PS competence, the authors created draft survey items that ask about trainees' confidence in knowledge of the six domains of The CPSI Safety Competencies Framework shown in box. Twenty-three items, beginning with the stem 'I feel confident in what I learned about...' were drafted and grouped into the following six domains: Working in teams (six items), Communicating effectively (three items), Managing safety risks (three items), Understanding human and environmental factors (three items), Recognizing and responding to adverse events (four items) and Culture of safety (four items). Feedback on the draft questionnaire was solicited from three PS

experts who are involved with the training of health professionals in nursing. The pilot used cognitive interview techniques to probe item interpretation and also assessed survey relevance, language appropriateness and alternatives to the question stem 'I feel confident in what I learned about...'.

All items are answered using a 5-point disagree–agree Likert type scale and include a 'don't know' option. For each item respondents are asked to respond separately about their confidence in what they learnt in the classroom setting versus the clinical setting (given the structure of postgraduate medical training, this group is only asked about the clinical setting). Mean scores are calculated from the items in each dimension for each learning setting (eg, you will have a score for confidence in learning around Communicating effectively based on education provided in the classroom and a separate score for confidence in learning around Communicating effectively based on education provided in the clinical setting). Scoring is done separately for these two learning environments given they provide very different educational experiences and there is often inconsistency in how PS issues are imparted in the classroom and clinical settings (the longstanding theory–practice gap). Self-reported competence is likely to be maximized when safety knowledge, skills and attitudes are integrated consistently and progressively across all learning settings.

### Analysis

The domains of safety competency included in the H-PEPSS were theoretically derived and were specifically designed to measure learner's self-reported knowledge of six unique but related dimensions of PS. Accordingly, a confirmatory factor analytic approach was deemed to be more appropriate than exploratory factor analysis. Confirmatory factor analysis (CFA) represents a measurement model which depicts the links between latent variables (in this case the six PS competency domains) and their observed measures, the 23 items used to measure these six domains.<sup>33</sup>

We used AMOS V.7 (SPSS, Inc.) and performed a series of four CFAs. In CFA-1, the six-factor, 23-item model of PS competency was tested using data provided by all four respondent groups (two in medicine, one nursing and one pharmacy) regarding their training in the clinical practice setting (n=1016). Because the model did not demonstrate a good fit, a modified model with fewer items was tested in CFA-2. When this kind of retrofitting of a model to the data is done, it is important to validate the modified model in a separate (cross-validation) sample; this was done in CFA-4 using an independent sample of upper-level nursing students from one Ontario university (n=132) as well as with data from our main sample regarding their classroom experiences. CFA-3 used multiple group CFA techniques<sup>34</sup> to test the validity of the modified six-factor model (from CFA-2) across the four different health professional groups.

The comparative fit index (CFI) and the root mean square error of approximation (RMSEA) were used to evaluate the model fit in CFA-1, CFA-2 and CFA-4. Models with CFI values >0.95 and RMSEA values <0.06 are indicative of a good model fit.<sup>35</sup> These criteria have been used previously in medical education research.<sup>36</sup> Given the controversy surrounding their use,  $\chi^2$  values are provided and discussed only in the paper's online technical appendix. Slightly different metrics are required to evaluate multiple group CFA. Accordingly, CFA-3 model fit would be supported by non-significant  $\chi^2$  difference values and by changes in CFI <0.01. Finally, internal consistency reliability of the six dimensions of PS competence (using the reduced CFA-2 model) was examined using Cronbach's  $\alpha$  coefficients.

CFA-1 tested the six-factor model of PS competency and included all 23 items shown in table 1 that were initially designed to measure the six PS competency domains. Seven items that were not well accounted for by the model were eliminated. From a theoretical standpoint the seven items that were removed were either redundant or seemed more distal to the remaining items in the latent construct. For instance, item 8 asks about engaging patients as participants in the healthcare team and while this item is important it is not central to factor 1 which focuses on working in teams with other health professionals. Table 1 shows the initial 23 items and indicates the seven items that were removed. The rationale for item removal is indicated by one of two symbols

**IV. FIGURES AND TABLES**

**Table (I):** Distribution of patients of both studied groups regarding their sociodemographic characteristics

Socio-demographic Data	Group I (Study)	
	No (30)	%
<b>Age</b>		
20	60	100
>20	0	0
<b>Sex</b>		
Male	18	30
Female	42	70
<b>Marital status</b>		
Single	60	100
Married	0	0
Divorced	0	0
Widow	0	0
<b>Received previous training</b>		
No	60	100
Yes	0	0

**Table (II):** Shows distribution of Students regarding their knowledge of the six domains of The CPSI Safety Competencies

		Study group	
		No	%
		(n=60)	
Contribute to a culture of patient safety,	disagree strongly	0	0.0%
	disagree	0	0.0%
	neutral	34	56.7%
	agree	26	43.3%
	strongly agree		
Work in teams for patient safety,	disagree strongly	0	0.0%
	disagree	0	0.0%
	neutral	32	53.3%
	agree	28	46.7%
	strongly agree		
Communicate effectively for patient safety,	disagree strongly	0	0.0%
	disagree	1	3.3%
	neutral	38	60.0%

	agree	22	36.7%
	strongly agree		
Manage safety risks,	disagree strongly	0	0.0%
	disagree	0	0.0%
	neutral	26	43.3%
	agree	34	56.7%
	strongly agree		
Optimize human and environmental factors Recognize,	disagree strongly	0	0.0%
	disagree	0	0.0%
	neutral	34	56.7%
	agree	26	43.3%
	strongly agree		
respond to and disclose adverse events	disagree strongly	0	0.0%
	disagree	0	0.0%
	neutral	38	63.3%
	agree	22	36.7%
	strongly agree		
	disagree	0	0.0%
	neutral	48	80.0%
	agree	12	20.0%
	strongly agree	0	0

## V. CONCLUSION

The need for greater PS content in health professional education and training programmes is clear<sup>1–5</sup>,<sup>37</sup> and particular attention to incorporating the socio-cultural aspects of safety is required.<sup>1,4,5,9</sup> While achieving curricular reform in health professional education is challenging, efforts in this area are slowly emerging<sup>6–8</sup> which means that ongoing research to understand the extent of PS knowledge among new health professionals is important. The present study suggests the H-PEPSS can be used to assess self-reported confidence in PS knowledge by new health professionals. Indeed, the learner perspective of his/her own professional confidence is one of several key metrics for assessing the effectiveness of medical education<sup>38</sup> and for assessing how well we are teaching health professionals to provide safe patient care.<sup>1</sup> Existing instruments to measure PS knowledge, skills and attitudes were developed primarily to examine the impact of specific PS curricular initiatives,<sup>13–21</sup> and while that work has contributed important insights, the psychometric analysis of the instruments used thus far has been largely exploratory in nature. Indeed, a recent systematic review of tools to assess safety competencies of healthcare professionals<sup>26</sup> concludes that most measurement tools have demonstrated limited psychometrics and do not reflect the broad spectrum of PS competencies outlined by national<sup>5,11</sup> and international bodies.<sup>12</sup> By designing the H-PEPSS to reflect this broad spectrum of PS competencies and using confirmatory factor analytic techniques, the present study helps to address these two gaps in the literature.

Regarding age: The results of the present study demonstrated that, the age group was almost similar for

group I and group II (20) years old. As regards sex: the present study showed that, the majority of students in both groups were females'. Regarding marital status: the finding of this study indicated that the majority of students were single. This may be attributed to the selection criteria of students; this is supported by Hyatt (2012) who reported that it is much better to evaluate the training effect among students with similar personal characteristics (21).

Our results suggest a parsimonious six-factor, 16-item measurement model of health professionals' self-reported PS competence that can be used to measure new graduates confidence in learning about six broad socio-cultural dimensions of PS competence: (1) Working in teams with other health professionals, (2) Communicating effectively, (3) Managing safety risks, (4) Understanding human and environmental factors, (5) Recognising, responding to and disclosing adverse events and close calls and (6) Culture of safety. Note that reductions to the initial item set following CFA-1 narrows the scope of factor 5 so the focus is limited to recognising and responding to remove immediate risks to harm (but not responding to remove broader systematic causes of PS events or disclosure). These results raise questions about whether greater consideration of the theoretical domains of PS competency is warranted. Before discarding items 7, 22 and 23 it may be prudent to consider whether response to patient safety events and disclosure are simple PS skills that should be taught or whether a properly specified model of PS competency should be expanded to include distinct domains reflecting each of these two areas. Finally, it is worth noting that factor 6 reflects a fairly specific conceptualisation of a culture of safety which emphasises a supportive environment that encourages people to speak up about safety and recognises the truly systematic nature of safety problems.

Use of the H-PEPSS (1) is not resource intensive and (2) obviates the need to address the numerous challenges inherent in trying to measure the impact of curricular change on more distal outcomes such as provider behaviour or change in patient outcomes. That said, as we seek to more fully assess PS competency among new health professionals, it will be important to use a range of approaches including objective structured clinical exams and other methods that address the limitations of self-report measures such as the H-PEPSS.26 ,41 ,42

Broader context for achieving curricular change

Clearly, it will take more than measuring PS competence among new health professionals to raise the profile of PS in health professional education. At least one key challenge to incorporating PS content in health professional training programmes stems from the fact that there are relatively few faculty members with the knowledge and skills required to teach PS-related material.1 ,4 ,6 ,43 This has led to the development of a curriculum for training health professional faculty in PS.44 In addition, training programmes may benefit from using non-clinical faculty from other disciplines or health executives with expertise in PS to deliver socio-cultural PS content,1 particularly given early evidence that this approach can be effective.16

A second challenge is that achieving curricular reform may be easier at certain stages of training and for certain health professional groups. For instance, in postgraduate medicine where there tends to be one national accrediting body, such as the Accreditation Council for Graduate Medical Education in the US, the Royal College of Physicians and Surgeons in Canada and the General Medical Council in the UK, it may be far easier to influence the extent of PS in medical training than it is in an undergraduate medical education. Postgraduate national accrediting bodies define competencies required to achieve proficiency and to receive official specialty or board certification status.45 No singularly powerful coercive type of institutional force46 exists to influence curriculum at the undergraduate level or in other health professions.

Accordingly, as researchers and policy makers pursue curricular reform, further research is also required to better understand where the key leverage points are for imparting PS knowledge: are learners better able to accept and incorporate PS learning in the postgraduate training environment or is it important to deliver certain PS content in the more structured and consistent confines of the undergraduate medical classroom training environment? Put differently, what aspects of PS knowledge and learning approaches are best suited to the undergraduate versus postgraduate training environments for physicians? And for all health professional groups, what aspects of PS knowledge and learning approaches are best suited to the classroom versus the clinical setting? Finally, as researchers and others consider and examine approaches to PS in health professional education, it will be important to assess not only formal aspects of PS in a curriculum, but also informal and hidden curricula, particularly since broader academic and hospital cultures can play a positive (or negative) role in imparting the importance of PS for effective practice.47 ,48

Regardless of these challenges to moving PS in health professional education forward, there is encouraging evidence to suggest that most PS curricula, when they are introduced, are accepted (though perhaps less so by medical students in preclinical years6) and lead to PS knowledge acquisition.6 ,13 ,15 ,18 ,19 ,49 Others have also found that trainees recognise the value of achieving competence in non-clinical areas such as communication and professionalism50 and learning from errors.51 In addition, varying approaches to teaching PS, ranging from didactic approaches to role play and simulation, can be equally effective for improving knowledge and attitudes.21 ,52 Crucial to this discussion then is the recognition that health professional

students' knowledge of PS is important and modifiable.

This study has some limitations worth noting. First, there are questions regarding generalisability. These study data come from new graduates of medical schools, nursing and pharmacy schools in one Canadian province, Ontario. Ontario is Canada's largest province, has six of the country's 17 medical schools with roughly a third of the country's enrolment in these six universities. Thirty-six per cent of Canadian physicians practice in Ontario.<sup>53</sup> In Canada, there tends to be some variation in medical school curricula; however, there is likely as much variation within Ontario as there is across the country. Internationally, Canada's medical training structure and environment are comparable with most Western countries. It is however possible that new graduates from other national cultures may find different meaning in the six PS competence factors validated in this Canadian sample. Further research and cross-validation of the reduced H-PEPSS will be required with international samples of health professionals who have recently completed or are nearing completion of their training. Second, the response rate for this study was close to 30% and while it is possible that non-responders may differ in how they perceive their own PS competence, it is unlikely their conception of the six dimensions of PS competence would be structurally different.

Finally, as noted above, as we seek to more fully assess PS competency among new health professionals, it will be important to also use other objective approaches such as objective structured clinical exams in order to address the limitations of more subjective self-report measures such as the H-PEPSS.<sup>26 ,41 ,42</sup> While the present study focuses on certain aspects of establishing construct validity of the H-PEPSS, future research in this area should also explore criterion-related validity (eg, the relational side of construct validity such as whether the H-PEPSS behaves in ways you would expect it to). For instance, one might expect H-PEPSS scores of confidence in learning in different clinical training settings to be partially predicted by assessments of PS culture provided by broader groups of staff in those settings  
Recommendations.

## **VI. Recommendations**

Evaluation of learner perceptions of knowledge in key safety competency areas is important, particularly given the paucity of evidence about how best to evaluate safety competency.<sup>39</sup> The H-PEPSS can be used in several ways:

1. Health professional programmes, as well as individual educators teaching in classrooms or clinical settings, can use the H-PEPSS to help assess whether trainees have achieved certain PS learning objectives at training completion. Local programme directors and educators will, however, need to decide what levels of confidence are expected for some of the items in the H-PEPSS (eg, it may be reasonable to expect only learners in more advanced programmes or degrees to have high levels of confidence in skilled safety learning behaviours such as 'identifying and implementing safety solutions' (q15) whereas learners completing virtually any health professional programme might be expected to have high levels of confidence in their ability to 'recognise an adverse event or close call' (q20)).
2. The H-PEPSS can be used to gauge trainee confidence in socio-cultural aspects of PS at several key junctures in a training programme (eg, at the completion of more theoretical classroom courses and again to evaluate training experiences following placement in the clinical setting). Such an approach would allow programmes to examine the consistency with which PS is being imparted at different stages of training/in different training environments.
3. Survey data gathered using the H-PEPSS which point to gaps in learners' confidence (eg, about managing inter-professional conflict or anticipating and managing high risk situations) can be used to point out where more education needs to be delivered. Educators will, however, need to be more cautious about using self-reports of high confidence in PS knowledge as a sole indicator of PS educational success given that learners are sometimes unaware of what they do not know.
4. Because our results support its use with a range of health professional groups, the H-PEPSS can be useful for assessing the impact of interdisciplinary approaches to educating health professionals about PS. This will be useful given (a) the collaborative, team-based approach to care that is seen as central to achieving high levels of PS and (b) growing demand for PS education to be delivered to interdisciplinary groups of health professionals in order to reflect the realities of the practice environment.<sup>19 ,20 ,37 ,40</sup>

## **VII. Conclusions**

As PS competencies emerge and efforts to include PS in health professional education increase it will be important to capture trainees and new health professionals' perspectives of their own PS competence at entry to practice. The H-PEPSS was designed specifically for this purpose, it asks respondents about their confidence in knowledge of a broad spectrum of PS competency areas, and the psychometric properties of the reduced item set are strong and promising for use to assess PS education across different groups of health professionals at or near training completion as well as in interdisciplinary environments.

## REFERENCES

- [1] Lucian Leape Institute. *Unmet Needs: Teaching Physicians to Provide Safe Patient Care*. Boston, MA: National Patient Safety Foundation, 2010.
- [2] Department of Health. *Modernising Medical Careers. The New Curriculum for the Foundation Years in Postgraduate Education and Training*. London, UK: Department of Health, 2007.
- [3] American Association of Colleges of Nursing. *Hallmarks of quality and patient safety: recommended baccalaureate competencies and curricular guidelines to ensure high-quality and safe patient care*. *J Prof Nurs* 2006;22:329–30.
- [4] help with the sampling and data collection processes.
- [5] Lucian Leape Institute. *Unmet Needs: Teaching Physicians to Provide Safe Patient Care*. Boston, MA: National Patient Safety Foundation, 2010.
- [6] Department of Health. *Modernising Medical Careers. The New Curriculum for the Foundation Years in Postgraduate Education and Training*. London, UK: Department of Health, 2007.
- [7] American Association of Colleges of Nursing. *Hallmarks of quality and patient safety: recommended baccalaureate competencies and curricular guidelines to ensure high-quality and safe patient care*. *J Prof Nurs* 2006;22:329–30.
- [8] . *Quality and safety education for nurses*. *Nurs Outlook* 2007;55:122–31.
- [9] Bandura, A. (1988). "Perceived self-efficacy: exercise of control through self-belief," in *Annual Series of European Research in Behavior Therapy*, eds J. P. Dauwalder, M. Perrez, and V. Hobi (Lisse: Swets & Zeitlinger), 27–59.
- [10] Bressan, V., Stevanin, S., Bulfone, G., Zanini, A., Dante, A., and Palese, A. (2016). Measuring patient safety knowledge and competences as perceived by nursing students: an Italian validation study. *Nurs. Educ. Pract.* 16, 209–216. doi: 10.1016/j.nepr.2015.08.006
- [11] Chinese Hospital Management Association (2014). *Goals of patient safety (2014-2015)*. *Chin. Hospitals* 10:22.
- [12] Christiansen, A., Robson, L., and Griffith, E. (2010). Creating an improvement culture for enhanced patient safety: service improvement learning in pre-registration education. *J. Nurs. Manag.* 18, 782–788. doi: 10.1111/j.1365-2834.2010.01114.x
- [13] Colet, P. C., Cruz, J. P., Cruz, C. P., Al-Otaibi, J., Qubeilat, H., and Alquwez, N. (2015). Patient safety competence of nursing students in Saudi Arabia: a self-reported survey. *Int. J. Health Sci.* 9, 418–426.
- [14] Cooper, E. (2013). From the school of nursing quality and safety officer: nursing students' use of safety reporting tools and their perception of safety issues in clinical settings. *J. Prof. Nurs.* 29, 109–116. doi: 10.1016/j.profnurs.2012.12.005
- [15] Doyle, P., VanDenKerkhof, E. G., Edge, D. S., Ginsburg, L., and Goldstein, D. H. (2015). Self-reported patient safety competence among Canadian medical students and postgraduate trainees: a cross-sectional survey. *BMJ. Qual. Saf.* 24, 135–141. doi: 10.1136/bmjqs-2014-003142
- [16] Dubois, C. A., D'amour, D., Tchouaket, E., Clarke, S., Rivard, M., and Blais, R. (2013). Associations of patient safety outcomes with models of nursing care organization at unit level in hospitals. *Int. J. Qual. Health Care* 25, 110–117. doi: 10.1093/intqhc/mzt019
- [17] Ginsburg, L., Castel, E., Tregunno, D., and Norton, P. G. (2012). The H-PEPSS: an instrument to measure health professionals' perceptions of patient safety competence at entry into practice. *BMJ. Qual. Saf.* 21, 676–684. doi: 10.1136/bmjqs-2011-000601
- [18] Ginsburg, L. R., Tregunno, D., and Norton, P. G. (2013). Self-reported patient safety competence among new graduates in medicine, nursing and pharmacy. *BMJ. Qual. Saf.* 22, 147–154. doi: 10.1136/bmjqs-2012-001308
- [19] Hambleton, R. K., Swaminathan, H., and Rogers, H. J. (1991). *Fundamentals of Item Response Theory*. Newbury Park, CA: Sage Publications Inc.
- [20] Huang, F. F., Yang, Q., Han, X. Y., Zhang, J. P., and Lin, T. (2017). Development and validation of a self-efficacy scale for postoperative rehabilitation management of lung cancer patients. *Psychooncology* 26, 1172–1180. doi: 10.1002/pon.4296
- [21] Hwang, J. I., Yoon, T. Y., Jin, H. J., Park, Y., Park, J. Y., and Lee, B. J. (2016). Patient safety competence for final-year health professional students: perceptions of effectiveness of an interprofessional education course. *J. Interprof. Care* 30, 732–738. doi: 10.1080/13561820.2016.1218446
- [22] Ji, J. X. (2016). *Investigation and Analysis on Professional Exposure and Protection of Nursing Students in Practice*. Jinan: Shandong University.
- [23] Jones, P. S., Lee, J. W., Phillips, L. R., Zhang, X. E., and Jaceldo, K. B. (2001). An adaptation of Brislin's translation model for cross-cultural research. *Nurs. Res.* 50, 300–304. doi: 10.1097/00006199-200109000-00008
- [24] Liu, H. P., Wang, Q., and Liu, G. Y. (2018). Development and reflection of nursing safety education in and out of China. *Chin. Nurs. Manage.* 18, 1316–1320.
- [25] Long, Y. F., Li, Y. L., and Guo, Y. H. (2011). The status quo investigation and analysis of nursing adverse events report in China. *Chin. Nurs. Manage.* 11, 16–20.
- [26] Stump, G. S., Husman, J., and Brem, S. K. (2012). The nursing student self-efficacy scale: development using item response theory. *Nurs. Res.* 61, 149–158. doi: 10.1097/NNR.0b013e318253a750
- [27] Suliman, M. (2019). Measuring patient safety competence among nursing students in the classroom and clinical settings. *Nurs. Educ. Perspect.* 40, E3–E7. doi: 10.1097/01.NEP.0000000000000460
- [28] PubMed Abstract | CrossRef Full Text | Google Scholar
- [29] Sweeney, C. F., LeMahieu, A., and Fryer, G. E. (2017). Nurse practitioner malpractice data: informing nursing education. *J. Prof. Nurs.* 33, 271–275. doi: 10.1016/j.profnurs.2017.01.002
- [30] PubMed Abstract | CrossRef Full Text | Google Scholar
- [31] Tang, S. T., and Dixon, J. K. (2002). Instrument translation and evaluation of equivalence and psychometric properties: the Chinese sense of coherence scale. *J. Nurs. Meas.* 10, 59–76. doi: 10.1891/jnum.10.1.59.52544
- [32] PubMed Abstract | CrossRef Full Text | Google Scholar
- [33] Usher, K., Woods, C., Parmenter, G., Hutchinson, M., Mannix, J., Power, T., et al. (2017). Self-reported confidence in patient safety knowledge among Australian undergraduate nursing students: a multi-site cross-sectional survey study. *Int. J. Nurs. Stud.* 71, 89–96. doi: 10.1016/j.ijnurstu.2017.03.006
- [34] VanDenKerkhof, E., Sears, N., Edge, D. S., Tregunno, D., and Ginsburg, L. (2017). Patient safety in practical nurses' education: a cross-sectional survey of newly registered practical nurses in Canada. *Nurse Educ. Today* 51, 48–56. doi: 10.1016/j.nedt.2017.01.003
- [35] World Health Organization [WHO] (2009). *Global Priorities for Patient Safety Research*. Geneva: World Health Organization.
- [36] Zhao, Q. L. (2014). *Development and Application of Assessment Instruments in Nursing Field*. Beijing: People's Medical Publishing House.
- [37] Zhu, H., Liu, C., and Jin, X. D. (2013). Adverse event reporting system and patient safety. *J. Med. Philos.* 34, 1–3.
- [38] Keywords: patient safety, nursing, reliability, item response theory, validity



- [39] Citation: Chen L, Huang F, Yuan X, Song J and Chen L (2019) An Assessment of the Reliability and Factorial Validity of the Chinese Version of the Health Professional Education in Patient Safety Survey (H-PEPSS). *Front. Psychol.* 10:2183. doi: 10.3389/fpsyg.2019.02183
- [40] Copyright © 2019 Chen, Huang, Yuan, Song and Chen. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.
- [41] A Comparison of Differential Item Functioning Detection Methods in Cognitive Diagnostic Models
- [42] Yanlou Liu, Hao Yin, Tao Xin, Laicheng Shao and Lu Yuan
- [43] Emotional Labor: Scale Development and Validation in the Chinese Context
- [44] Chunjiang Yang, Yashuo Chen and Xinyuan Zhao
- [45] An Item Response Theory Analysis of DSM-5 Heroin Use Disorder in a Clinical Sample of Chinese Adolescents
- [46] Noise, Age, and Gender Effects on Speech Intelligibility and Sentence Comprehension for 11- to 13-Year-Old Children in Real Classrooms
- [47] Nicola Prodi, Chiara Visentin, Erika Borella, Irene C. Mammarella and Alberto Di Domenico
- [48] The Big Bang of Originality and Effectiveness: A Dynamic Creativity Framework and Its Application to Scientific Missions
- [49] , *Interval analysis* (Englewood Cliffs, NJ: Prentice-Hall, 1966).

*Note that the title of the book is in lower case letters and italicized. There is no comma following the title. Place of publication and publisher are given.*

Heba Mahmoud Mahmoud Mohamed. "Assessing undergraduate nursing students perceptions of patient safety competence at entry into practice" *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 10(2), 2021, pp. 07-15.