Development and Psychometric Testing of the Thai–Patient Safety Competency Scale for New Graduate Nurses

Chulaporn Yaprom, Petsunee Thungjaroenkul, Kulwadee Abhichattibutra, Apiradee Nantsupawat*

Abstract: Registered nurses must possess patient safety expertise regardless of their level. However, patient safety skills are the most crucial competency for new graduate nurses, which they must accomplish before working autonomously. Nevertheless, assessing these competencies is difficult due to the need for quality assessment tools to improve their competence in providing safe care. This study aimed to develop and test the Thai-Patient Safety Competency Scale for new graduate nurses, according to Thailand Nursing and Midwifery requirements. A descriptive design with two phases and eight steps was applied. The new instrument was examined for construct validity, known-group validity, and internal consistency reliability using factor analysis, t-test, and Cronbach's alpha coefficient. The sample comprised ten experts, 403 new graduate nurses, and 56 registered nurses.

The results showed 58 items composed of eight domains: ethical and legal aspects of patient safety, nursing practices to prevent or minimize harm from healthcare errors, professional characteristics regarding patient safety, risk management and quality improvement, academic and research skills regarding patient safety, effective communication in healthcare teams, use of technology and informatics for patient safety, and policy and networks regarding patient safety. This Thai-Patient Safety Competency Scale had good construct validity. In addition, the tool could discriminate the patient safety competency between new and experienced graduate nurses. It had good internal consistency and reliability. Thus, it can be used to assess and train new graduate nurses to increase their competency for patient safety. However, the scale needs further testing with different groups of nurses.

Keywords: Competency, Instrument development, New graduate nurses, Nursing, Patient safety, Psychometric testing, Thailand

Received 29 August 2023; Revised 18 November 2023; Accepted 21 November 2023

***Chulaporn Yaprom**, RN, BN, MSN, PhD (Candidate), Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand. E-mail: chulaporn_ya@cmu.ac.th*
***Correspondence to: Petsunee Thungjaroenkul**, * RN, PhD, Associate Professor, Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand. E-mail: petsunee.t@cmu.ac.th*
***Kulwadee Abhichattibutra**, RN, PhD, Associate Professor, Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand. E-mail: kulwadee.a@cmu.ac.th*
***Apiradee Nantsupawat**, RN, PhD, Associate Professor, Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand. E-mail: apiradee.n@cmu.ac.th*

Introduction

A lack of patient safety in healthcare facilities leads to the disability and death of patients internationally.[1] In the United States, more than 400,000 patients are adversely affected yearly, and 20 billion is the estimated annual cost of medical errors. Every year, medical errors in hospitals and clinics kill nearly 10,000 people.[2] Common medical errors include system failures, infections, falls, and healthcare technology.[3,4] In Thailand, data in 2022 showed that 1,118 patients received compensation from hospitalization with avoidable damages, amounting to $7.99 million paid by the Thai government.[5]

DOI: 10.60099/prijnr.2024.262749

In Thailand, the Ministry of Public Health directs public health organizations to create and implement a patient safety system policy.[6] Additionally, the regional hospitals improve patient safety by enhancing patient flow, providing appropriate care for patients awaiting treatment, and providing adequate staffing and resources.[7] In addition, 23.74% of 1,118 patients were injured in regional hospitals receiving services.[5] Regional hospitals care for complex patients, which take care of many patients. There is also a chance to make many mistakes, in which nurses are sufficient to perform only moderate workloads—in addition to 94% of nurses reported experiencing adverse events, most reported ≥ 21 times.[8]

Major patient safety events are usually related to human factors, which frequently cause major patient safety incidents. For example, missed or delayed medical administration, inadequate monitoring after the procedure, and malpractice in providing treatment.[9,10] Furthermore, newly graduated nurses rated their abilities for undertaking clinical skills poorly and the need to develop critical thinking skills,11 and 55% of nurses admit making mistakes in the first five years.[12] In Thailand, a study showed that 141 new nurses had seen a near-miss or an error in patient safety, and a lack of expertise in operations could result in near-missed situations and undesirable events.[13] This evidence suggests that enhancing patient safety competency (PSC) among newly graduated nurses is urgently required.

The PSC should be prepared during learning in school.[14] Consequently, a multi-professional patient safety curriculum will guide integrating patient safety concepts into education to develop patient safety competency in healthcare professionals.[15] Nursing education in several countries, including Thailand, integrates patient safety concepts into the curriculum and cascades these to daily nursing practice.[16] Safe practice requires clinical skills and knowledge needed for patient safety.[17] Thus, to ensure that new nurses can deliver safe patient care during their transition from nursing students to professional nurses, assessing PSC and identifying deficient competencies of new graduate nurses are needed. A PSC measurement tool is critical in Thailand. Nine existing instruments were developed to assess nurses' level of PSC.[17] Almost all instruments were developed in Western countries, and no existing PSC tool can comprehensively assess the competence of new graduate nurses related to patient safety in the Thai nursing context. Thus, this study intended to develop and test the psychometric properties of the Thai-Patient Safety Competency Scale (Thai-PSCS) for New Graduate Nurses.

Conceptual Framework and Literature Reviews

This study used eight domains of core competencies for graduate nurses by Thailand Nursing and Midwifery[18] to guide item generation in the Thai-PSCS. Based on the TNMC's competency of nurses in Thailand, there are eight domains of patient safety competency for new graduate nurses: 1) competency in ethics, code of conduct, and law; 2) nursing and midwifery practices; 3) professional characteristics; 4) leadership, management, and quality improvement; 5) academic and research competencies; 6) communication and relationships; 7) technology and information; and 8) social competency.

PSC refers to the ability to perform safe patient care based on the integration trait of attitudes, skills, and knowledge relevant to patient safety.[19] To assess the PSC, the framework of PSC is crucial because it outlines attitudes, skills, and knowledge necessary to accomplish safe patient care.[17]

Assessment of nurses' PSC level is paramount to improving nurses' capacity to provide safe patient care. A systematic review of thirteen studies reported nine instruments designed to assess PSC[17] (**Appendix, Table 1**).

As mentioned, a specific instrument for measuring patient safety competency in the Thai context is needed. However, only one instrument focuses on assessing the performance of behaviors related to patient safety. This instrument cannot be used because the Nursing Performance for Patient Safety Scale (NPPSS) needs to cover the competencies of Thai

professional nurses in TNMC.[20] The ethical dimensions of patient safety should be addressed in this study. Furthermore, the tool is a self-assessment instrument designed for nurses, not just new graduate nurses. In addition, this instrument assesses nursing performance for patient safety among nurses. However, the NPPSS is not a specific instrument for measuring PSC.

Several PSC instruments are available, but these instruments have three limitations. Firstly, some existing instruments are nursing students' self-evaluation measurements tested for psychometric properties from junior and senior nursing students. The difference in nursing students' characteristics may be limited in generalizing study results to new graduate nurses. Secondly, most instruments were developed without measuring the ethical aspect of patient safety. The ethical part of patient safety should be a critical dimension of the PSC measurement because ethical issues are essential components that influence nurses' decision-making in safe practices. In addition, nurses are obliged to provide safe care with a commitment to respect patient autonomy and protect and promote human dignity. Lastly, most instruments were developed in Western countries, and their contents only cover some competencies required for Thai registered nurses by TNMC.

Study Aim

This study aimed to develop the Thai-Patient Safety Competency Scale (Thai-PSCS) for new graduate nurses in Thailand and to evaluate its psychometric properties.

Methods

Design: This is an instrument development study. This report followed the STARD (Standards for Reporting Diagnostic Accuracy Studies statement).

Sample and Sampling: There were 459 nurses enrolled in the study, which included 403 new graduate nurses (30 for pilot testing, 333 for testing construct validity, and 40 for the known group technique). Moreover, 56 senior nurses comprised 16 focus group discussions in generating an item pool and 40 for known-group techniques).

The inclusion criteria for new graduate nurses were: 1) graduate from a baccalaureate program, 2) working in a regional hospital, and 3) providing direct patient care for less than one year. For the senior nurse, inclusion criteria were: 1) graduated from a baccalaureate program, 2) working in a regional hospital, and 3) providing direct patient care for at least two years.

Based on the proportion of the participants, a multi-stage random selection method was employed from nine out of 33 regional hospitals under the Ministry of Public Health across five regions of Thailand. The ratio between the five region settings was determined as 2:2:2:2:1. Therefore, nine regional hospitals were selected using simple random sampling. Two hospitals were selected from four regions: the central, the northern, the northeastern, and the southern. Only one hospital was selected for the Eastern region, which is a small region.

Ethical Considerations: The research study was approved by the Research Ethics Committee, Faculty of Nursing, Chiang Mai University (Research ID: 006/2564 Study Code: 2564-EXP005). All eligible participants gave their permission to take part in the study and acknowledged that they could change their minds at any time. They were assured of data confidentiality and anonymity.

Instruments: Two instruments were employed for data collection.

The researchers developed the *Background Characteristics Form* to obtain sociodemographic information on age, gender, certificate for a program of nursing specialty in infection control nursing, and work experience from the start of work to the present department.

The 10-Item Social Desirability Scale (10-SDS): The Marlowe-Crowne Social Desirability Scale was developed initially in English with ten items. It was translated into Thai,[20] to measure social desirability bias. Each item is rated on a scale of matches or not

match individual characteristics. The scores of individual items were correlated using Spearman's rank-order correlation coefficient with the ten items of the 10-SDS. A coefficient of 0.70 was considered acceptable, indicating that the data collected on nurses' patient safety competency were reliable and not significantly influenced by social desirability bias.

Procedure of the Instrument and Development, Data Collection, and Data Analysis

The Thai-PSCS development followed DeVellis's instrument development process, which includes two phases and eight steps.[21] The two phases were Items Development and Evaluating Psychometric Properties. The eight steps were: 1) determining the meaning and domains of patient safety competency for new graduate nurses; 2) generating an item pool; 3) determining the instrument format; 4) reviewing the items by experts; 5) considering the inclusion of validation items; 6) administering the draft instrument to the sample; 7) evaluating the draft instrument; and 8) optimizing scale length.

Phase 1: Items Development

Step 1: Determining domains of patient safety competency. An extensive literature review to enrich the understanding of PSC further. Relevant terms, such as "Patient Safety Competency," "Scale development," "Instrument development," and "New Graduate Nurses." Search engines were employed to access relevant literature, including CINAHL, PUBMED, Science Direct, research journals, and existing PSC instruments. The insights obtained were then combined with the theoretical framework to develop a set of interview questions for exploring the possible items through interviews and focus group discussions.

Step 2: Generating an item pool. Semi-structural interviews and focus group discussions explored possible items for assessing PSC among new graduate nurses.

A total of 26 participants were chosen using purposive sampling, consisting of 16 senior nurses working in Thai regional hospitals and ten experts in patient safety. who were nursing educators and nurse administrators. First, these ten experts were interviewed face-to-face to establish a rapport before conducting the in-depth interviews. The interviews followed a structured outline and lasted between 30 and 60 minutes. Participants provided their consent for the interviews to be recorded. Sample interview questions included inquiries such as "Please explain your understanding of PSC." Probing questions were used when necessary to clarify responses. Detailed field notes were taken following each interview. Lastly, 16 senior nurses from regional hospitals were invited to participate in focus discussion groups, which included one on-site group and three online groups. The same data collection method was employed, utilizing the previously mentioned interview outline. These group discussions lasted between 60 and 90 minutes.

Content analysis was applied to analyze the data. The data was accurately transcribed into Thai and subjected to open coding, wherein each line of data was carefully examined, reflecting upon and interpreting its meaning to identify domains and themes. The preliminary Thai-PSCS (Version 1) comprised 62 entries organized across eight domains, including 1) Ethical and legal aspects of patient safety, 2) Nursing practices to prevent or minimize harm from healthcare errors, 3) Professional characteristics regarding patient safety, 4) Risk management and quality improvement, 5) Academic and research skills regarding patient safety, 6) Effective communication in healthcare teams, 7) Use of technology and informatics for patient safety, and 8) Policy and networks regarding patient safety.

Step 3: Determining the instrument format. The 62-item Thai-PSCS Version 1 was designed using a 5-point Likert scale. Participants were asked to choose only one option out of the five provided. Each response was assigned a numerical value, with "0" representing the absence or inability to practice the claimed feature and "4" indicating a strong belief in one's ability to practice or possess the indicated characteristic. The final score was computed by summing the individual scores. A higher sum score corresponded to a greater level of competence exhibited by the participant.

Phase 2: Evaluating Psychometric Properties

Step 4: Reviewing the items by experts. The content validity of the 62-item Thai-PSCS Version 1 was reviewed by a panel of six experts not duplicated with other groups, comprising one research instrument development specialist, four nurse educators, and one nursing administrator. The evaluation process involved reevaluating 62 elements based on a 4-point rating system, where a rating of one indicated the lowest relevance and a rating of four denoted the highest relevance. Following the feedback received from the expert panel, revisions were made to the scale. Specifically, two identical items were recommended for removal by all six experts. These items pertained to professional traits related to patient safety and nursing practices aimed at preventing or reducing the harm resulting from healthcare errors. Additionally, the experts suggested including two new items in the measurement: knowledge of patient safety acquired from academic and research sources and evidence of successful teamwork within the medical field. These recommendations were incorporated into the 62-item Thai-PSCS Version 2.

Step 5: Considering the inclusion of validation items. 62 items in the Thai-PSCS Version 2 were assessed for content validity on the scale (S-CVI) and item (I-CVI) levels. A CVI value equal to or greater than .80 is considered an indication of good content validity.[26] Items that do not achieve minimum agreement must be deleted or revised. All 62 items demonstrated I-CVI values ranging from .80 to 1.00, indicating good content validity at the item level. The overall content validity of the 62-item Thai-PSCS was evaluated by calculating the S-CVI, which yielded a value of .95. This high S-CVI score further supports the excellent content validity of the scale as a whole.

Step 6: Administer the draft instrument to the sample. Pilot testing was conducted to assess for face validity, clarity, readability, and reliability of the 62-item Thai-PSCS Version 2. A convenient sample of thirty recently graduated nurses with less than a year of experience working in regional hospitals was invited to complete the scale2. Then, cognitive interviewing was conducted to examine whether statements in the questionnaire were understood clearly. There were no comments to add or delete the items. However, some terminology was modified to enhance clarity and ensure more accessible responses. The scale's internal consistency reliability was examined, revealing Cronbach's alpha coefficient of the eight domains ranged from 0.77 to 0.93, demonstrating satisfactory internal consistency.

A high Cronbach's alpha coefficient for the entire scale was 0.97. This step confirmed that the 62-item Thai-PSCS version 2 could be a tentative version of the Thai-PSCS. It included eight subscales and covered various topics related to patient safety.

Step 7: Evaluate the psychometric properties of the instrument. A field survey was conducted to identify potential domains within the final version of Thai-PSCS. The 62-item Thai-PSCS version 2 and demographic data collection forms were distributed to new graduate nurses along with the 10-SDS.

The second version of the Thai-PSCS was returned by 333 participants (92.5%), and 27 were unreturned (7.5 %). Therefore, 333 participants (92.5%) were available for study. A study used exploratory factor analysis (EFA) to determine factorial structure and explore item loading in a particulate domain. In the first step of EFA, the suitability of the data set for factor analysis was assessed using Kaiser-Meyer-Olkin (KMO) and Bartlett's Sphericity test. The data set is suitable for factor analysis if KMO is expected to be higher than .5 and Bartlett's test of sphericity to be statistically significant at .05.[23]

The next step was determining the number of factors needed in the scale using factor extraction with the principal component (PC) analysis. According to Kaiser's criterion, a factor with an eigenvalue of 1.00 or higher was considered acceptable.[21]

The cumulative percentage of variance explained by factors reflects the goodness of fit in the PC analysis. A total variance of .60 is considered acceptable.[22]

The last step, factor rotation with the Varimax method, was used to minimize the complexity of factor loading. Acceptable criteria included a factor loading value < 0.40.[26] Items of the scale were removed if cross-loading (the difference in factor loading value across two or more factors) was below.[24]

Step 8: Optimizing scale length. In known-group validity testing, the contrast group approach was utilized to examine the scale's ability to differentiate between new graduates (n = 40) and senior nurses (n = 40). Their mean scores were analyzed using an independent t-test with a significant level of .05. The reliability testing of the final 58-items Thai-PSCS version. Cronbach's alpha coefficients were used with acceptable coefficients of greater than .70.[21,22]

Results

Among 333 participants for EFA, the average age was 23.28 years (SD = 0.73), ranging from 22 to 26 years. The majority of respondents were female (94%). Their average work experience in the hospital was 8.4 months (SD = 2.02), with their current work experience ranging from 2 to 12 months.

Psychometric Testing of the Thai-PSCS for New Graduate Nurses

The results of EFA showed the statistical value of KMO was 0.95, which is higher than 0.50, indicating that the partial correlation between items was very weak and the sample size was adequate. The Bartlett's Sphericity test of the Thai-PSCS was statistically significant (χ^2 = 14911.02, p < .001), indicating that it was suitable for factor analysis. Results illustrated eight domains with eigenvalues ranging from 1.20 to 22.93, which accounted for 62.27% of the variance. Domains with eigenvalues greater than one were considered reliable domains and retained in the scale. All 64 items had loading values greater than .40. However, six items were deleted due to cross-loading of the difference higher than .20. Therefore, the number of items was reduced from preliminary 62 to 58 items in the final version of Thai-PSCS (**Table 1**).

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
Domain 1: Ethical and legal aspects of patient safety (5 Items) **(ด้านจริยธรรมและกฎหมายเกี่ยวกับความปลอดภัยของผู้ป่วย)**	1.27	2.20	
1. Able to express ideas to prevent risk or harm from nursing care (สามารถแสดงความคิดเพื่อปกป้องไม่ให้ผู้ป่วยอยู่ในภาวะเสี่ยงหรือได้รับอันตรายจากการรักษาพยาบาล)			0.47
2. Able to assist patients with respect to patient rights (สามารถช่วยเหลือผู้ป่วยโดยคำนึงถึงสิทธิและความปลอดภัยของผู้ป่วย)			0.70
3. Able to choose a suitable method to obtain consent for treatment based on the patient/guardian's situation and limitations (สามารถเลือกใช้วิธีการขอคำยินยอมรับการรักษาที่สอดคล้องกับสถานการณ์และข้อจำกัดของผู้ป่วย/ผู้ปกครองได้)			0.42
4. Able to apply legal and ethical principles in disclosing patient information (สามารถประยุกต์ใช้หลักการทางกฎหมายและจริยธรรมแห่งวิชาชีพในการเปิดเผยข้อมูลเกี่ยวกับผู้ป่วยได้)			0.72
5. Able to identify conflicts in ethical/legal issues of clinical risk (สามารถระบุปัญหาความขัดแย้งในประเด็นทางด้านจริยธรรม/กฎหมายกับความเสี่ยงทางคลินิกของผู้ป่วย)			0.44

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333) (Cont.)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
Domain 2: Nursing practices to prevent or minimize harm from healthcare errors (23 Items) **(ด้านการปฏิบัติการพยาบาลเพื่อป้องกันหรือลดอันตรายจากความผิดพลาดจากการรักษาพยาบาล)**	22.93	39.54	
1. Able to integrate situational data and patient differences to determine specific patient identification methods (สามารถบูรณาการข้อมูลสถานการณ์และความแตกต่างของผู้ป่วยเพื่อนำมากำหนดวิธีการระบุตัวผู้ป่วยที่เฉพาะเจาะจง)			0.50
2. Able to perform the 6 or 7 steps of hand hygiene correctly before and after providing nursing care for patients (สามารถทำความสะอาดมือ 6 หรือ 7 ขั้นตอนได้อย่างถูกต้องก่อนและหลังให้การพยาบาลผู้ป่วย)			0.50
3. Able to use aseptic techniques to perform nursing procedures and practice correctly (สามารถใช้เทคนิคการปลอดเชื้อในการทำหัตถการและปฏิบัติพยาบาลได้ถูกต้อง)			0.50
4. Able to wear personal protective equipment properly (สามารถสวมอุปกรณ์ป้องกันร่างกายได้ถูกต้อง)			0.46
5. Able to choose suitable method to sterilize equipment (สามารถเลือกใช้วิธีการที่เหมาะสมในการทำให้อุปกรณ์ปราศจากเชื้อ)			0.55
6. Able to apply empirical evidence to prevent and control the spread of infection in wards/hospitals (สามารถประยุกต์หลักฐานเชิงประจักษ์เพื่อป้องกันและควบคุมการแพร่กระจายเชื้อในหอผู้ป่วย/โรงพยาบาล)			0.55
7. Able to teach patients, family, and visitors about hand hygiene, wearing a mask, and preventing the spread of infections (สามารถสอนผู้ป่วย ญาติและผู้มาเยี่ยมเกี่ยวกับการทำความสะอาดมือ การสวมหน้ากากอนามัยและป้องกันการแพร่กระจายเชื้อ)			0.65
8. Able to take a history and accurately assess the patient's drug allergy (สามารถซักประวัติและประเมินการแพ้ยาของผู้ป่วยอย่างถูกต้องได้)			0.65
9. Able to administer drugs according to the 7 principles of accuracy: right drug, right way, right time, right size, right person, right record, and ask questions when in doubt about prescription (สามารถบริหารยาตามหลักความถูกต้อง 7 ประการ ได้แก่ ถูกยา ถูกทาง ถูกเวลา ถูกขนาด ถูกคน บันทึกถูกต้อง และซักถามเมื่อมีข้อสงสัยในการสั่งยา)			0.65
10. Able to assess abnormalities in prescribing and overdosing by physicians (สามารถประเมินความผิดปกติในการสั่งใช้ยาและการใช้ยาเกินความจำเป็นของแพทย์ได้)			0.73

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333) (Cont.)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
11. Able to distinguish high-alert drugs from other drugs (สามารถแยกประเภทยาที่มีความเสี่ยงสูง (high alert drug) ออกจากยากลุ่มอื่นได้)			0.71
12. Able to distinguish look-alike, sound-alike (LASA) drugs from other drug classes (สามารถแยกประเภทยาในกลุ่มรูปร่างและชื่อคล้ายกัน (LASA) ออกจากยากลุ่มอื่นได้)			0.74
13. Able to name pairs of drugs that are contraindicated together (สามารถระบุชื่อคู่ยาที่ห้ามใช้ร่วมกัน)			0.69
14. Able to administer high-risk drugs according to standards (สามารถบริหารยาที่มีความเสี่ยงสูงตามมาตรฐานได้)			0.70
15. Able to assess side effects or complications resulting from drug administration to patients (สามารถประเมินผลข้างเคียงหรือภาวะแทรกซ้อนที่เกิดจากการให้ยาผู้ป่วย)			0.54
16. Able to provide primary care to patients who experience side effects or complications from medications (สามารถให้การพยาบาลเบื้องต้นแก่ผู้ป่วยที่เกิดผลข้างเคียงหรือภาวะแทรกซ้อนจากยา)			0.62
17. Able to assess the level of fall risk (สามารถประเมินระดับความเสี่ยงในการพลัดตกหกล้ม)			0.60
18. Able to select fall prevention method that is appropriate for each patient (สามารถเลือกวิธีการป้องกันการพลัดตกหกล้มที่เหมาะสมกับผู้ป่วยแต่ละรายได้)			0.69
19. Able to provide primary care to patients who have had a fall (ให้การพยาบาลเบื้องต้นแก่ผู้ป่วยที่เกิดการพลัดตกหกล้ม)			0.73
20. Able to provide care for patients with pressure ulcers in each severity level (ให้การดูแลผู้ป่วยที่เกิดแผลกดทับในแต่ละระดับความรุนแรงได้)			0.52
21. Able to assess for sepsis and sepsis shock (ประเมินภาวะติดเชื้อในกระแสเลือดและภาวะช็อคจากการติดเชื้อได้)			0.56
22. Able to perform standard resuscitation (สามารถปฏิบัติการช่วยฟื้นคืนชีพตามมาตรฐานได้)			0.51
23. Able to provide care for patients during transfer between departments in the hospital (ให้การดูแลผู้ป่วยขณะเคลื่อนย้ายระหว่างหน่วยงานในโรงพยาบาลได้)			0.71

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333) (Cont.)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
Domain 3: Professional characteristics regarding patient safety (5 Items) **(ด้านคุณลักษณะเชิงวิชาชีพที่เกี่ยวกับความปลอดภัยของผู้ป่วย)**	1.96	3.39	
1. Able to assess, analyze, and diagnose problems for screening, classify patients according to the severity and urgency of the problem, and prioritize nursing procedures properly (สามารถประเมินวิเคราะห์ วินิจฉัยปัญหาเพื่อคัดกรอง จำแนกประเภทผู้ป่วยตามระดับความรุนแรง เร่งด่วนของปัญหาและจัดลำดับวิธีการพยาบาลอย่างเหมาะสม)			0.70
2. Able to be observant and sensitive to potential risks to patients (สามารถเป็นคนช่างสังเกตและไวต่อความเสี่ยงที่อาจเกิดขึ้นกับผู้ป่วย)			0.65
3. Able to speak to others with a positive attitude (สามารถมีทัศนคติต่อบุคคลอื่นในเชิงบวก)			0.61
4. Able to listen and understand others (สามารถเป็นผู้รับฟังที่ดีและเข้าใจผู้อื่น)			0.64
5. Able to express opinions and make suggestions to others with courage (สามารถเป็นผู้รับฟังที่ดีและเข้าใจผู้อื่น)			0.57
Domain 4: Risk management and quality improvement (6 Items) **(ด้านการบริหารความเสี่ยงและการปรับปรุงคุณภาพ)**	1.78	3.08	
1. Able to value and importance of multidisciplinary teams in working together to manage patient Safety (สามารถให้คุณค่าและความสำคัญของทีมสหวิชาชีพในการร่วมมือกันจัดการความปลอดภัยของผู้ป่วย)			0.68
2. Able to study the changes in the hospital's quality and safety improvement system (สามารถศึกษาการเปลี่ยนแปลงของระบบพัฒนาคุณภาพและความปลอดภัยในโรงพยาบาล)			0.78
3. Able to explore the goals and approaches used by the hospital to manage clinical risk (สามารถศึกษาเป้าหมายและวิธีการที่โรงพยาบาลนำมาใช้ในการจัดการความเสี่ยงทางคลินิก)			0.75
4. Able to identify the classification and level of clinical risks (สามารถจำแนกประเภทและระดับความเสี่ยงทางคลินิกได้)			0.74
5. Able to choose methods for reporting adverse events in each situation (สามารถเลือกวิธีการรายงานเหตุการณ์ไม่พึงประสงค์ในแต่ละสถานการณ์ได้)			0.52
6. Able to use tools to analyze the causes and effects of adverse events such as fishbone charts, root cause analysis, etc (สามารถใช้เครื่องมือวิเคราะห์สาเหตุและผลของเหตุการณ์ไม่พึงประสงค์ เช่น แผนภูมิก้างปลา การวิเคราะห์รากเหง้าสาเหตุ (root cause analysis) เป็นต้น)			0.56

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333) (Cont.)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
Domain 5: Academic and research skills regarding patient safety (4 Items) **(ด้านทักษะทางวิชาการและการวิจัยเกี่ยวกับความปลอดภัยของผู้ป่วย)**	1.43	2.48	
1. Able to present and exchange knowledge about safe patient care with other personnel (สามารถนำเสนอและแลกเปลี่ยนความรู้เกี่ยวกับการดูแลผู้ป่วยให้ปลอดภัยกับบุคลากรอื่น ๆ ได้)			0.67
2. Able to participate in the design and implementation of nursing quality improvement projects (สามารถมีส่วนร่วมในการออกแบบและดำเนินโครงการพัฒนาคุณภาพงานทางการพยาบาลได้)			0.72
3. Able to create innovations in patient care (สามารถสร้างสรรค์นวัตกรรมในการดูแลผู้ป่วยได้)			0.72
4. Able to use research or empirical evidence for safe nursing care (สามารถนำผลงานวิจัยหรือหลักฐานเชิงประจักษ์มาใช้ในการพยาบาลผู้ป่วยให้ปลอดภัยได้)			0.63
Domain 6: Effective communication in healthcare team (7 Items) **(ด้านการสื่อสารที่มีประสิทธิภาพในทีมบุคลากรทางการแพทย์)**	3.88	6.69	
1. Able to advise patients and their families to observe the patient's abnormal signs and symptoms (สามารถให้คำแนะนำผู้ป่วยและญาติให้สังเกตอาการและอาการแสดงที่ผิดปกติของผู้ป่วยได้)			0.52
2. Able to communicate to patients and family when an adverse event occurs (สามารถสื่อสารให้ผู้ป่วยและญาติไว้วางใจและจูงใจให้ญาติมีส่วนร่วมในการดูแลผู้ป่วยเพื่อความปลอดภัยได้)			0.62
3. Able to communicate to patients and family to trust and motivate the family to participate in patient care for safety (สามารถสื่อสารให้ผู้ป่วยและญาติไว้วางใจและจูงใจให้ญาติมีส่วนร่วมในการดูแลผู้ป่วยเพื่อความปลอดภัยได้)			0.58
4. Able to communicate patient's changes verbally to the treatment provider. (สามารถสื่อสารการเปลี่ยนแปลงของผู้ป่วยด้วยวาจากับผู้ให้การรักษาได้)			0.58
5. Able to practice accurate nursing shift handover (สามารถรับส่งเวรทางการพยาบาลได้ถูกต้อง)			0.64
6. Able to coordinate and forward patient information to agencies outside the hospital (สามารถประสานงานและส่งต่อข้อมูลผู้ป่วยให้หน่วยงานภายนอกโรงพยาบาลได้)			0.52
7. Able to write a comprehensive record of changes in patients' symptoms (สามารถเขียนบันทึกอาการเปลี่ยนแปลงของผู้ป่วยได้อย่างครอบคลุม)			0.46

Table 1. Domain, items, statement, eigenvalue, factor loading, and percent of variance (n = 333) (Cont.)

Domains and item statements	Eigenvalue	Variance explained (%)	Factor loading
Domain 7: Technology and informatics for patient safety (5 Items) **(ด้านเทคโนโลยีและสารสนเทศเพื่อความปลอดภัยของผู้ป่วย)**	1.64	2.83	
1. Able to assess abnormalities of medical equipment used with patients, such as heart monitors, breathing apparatus, etc (สามารถประเมินความผิดปกติของอุปกรณ์ทางการแพทย์ที่ใช้ติดตัวผู้ป่วย เช่น เครื่องวัดคลื่นหัวใจ เครื่องช่วยหายใจ เป็นต้น ได้)			0.68
2. Able to use a defibrillator and an automatic defibrillator (สามารถใช้อุปกรณ์กระตุ้นหัวใจและเครื่องกระตุกไฟฟ้าอัตโนมัติได้)			0.66
3. Able to understand the hospital's risk recording and reporting system (สามารถมีความเข้าใจระบบการบันทึกและรายงานความเสี่ยงของโรงพยาบาล)			0.56
4. Able to assess patients' risks from information in medical records (สามารถประเมินความเสี่ยงผู้ป่วยจากข้อมูลในเวชระเบียนได้)			0.68
5. Able to use the network to communicate with the treatment team without conflicting with the law and professional ethics (สามารถใช้เครือข่ายสื่อสารกับทีมผู้ให้การรักษาโดยไม่ขัดกับหลักกฎหมายและจริยธรรมวิชาชีพ)			0.66
Domain 8: Policy and networks regarding patient safety (3 Items) **(ด้านนโยบายและเครือข่ายเกี่ยวกับความปลอดภัยของผู้ป่วย)**	1.20	2.07	
1. Able to learn the health insurance system and each type of medical treatment rights for safe patient care (สามารถศึกษาระบบประกันสุขภาพและสิทธิการรักษาพยาบาลแต่ละประเภทเพื่อใช้ในการดูแลผู้ป่วยอย่างปลอดภัย)			0.77
2. Able to learn the changes in hospital quality development and patient safety policies (สามารถศึกษาการเปลี่ยนแปลงของนโยบายการพัฒนาคุณภาพโรงพยาบาลและนโยบายความปลอดภัยของผู้ป่วย)			0.72
3. Able to learn the network operations between hospitals for patient safety (สามารถศึกษาการทำงานในรูปแบบเครือข่ายระหว่างโรงพยาบาลเพื่อความปลอดภัยของผู้ป่วย)			0.50

For social desirability testing, there was no significant difference between scores measured by the 62-item Thai-PSCS and 10-SDS (r = 0.041, p = .72), indicating no response bias occurred in the participants' answer questions.

The results of known-group validity testing for the 58-item Thai-PSCS indicated a significant difference in subscales and the overall scale mean scores between the two groups of participants (t = -5.49, p = .01) **(Table 2).**

Table 2. The subscale of the Thai-PSCS, mean score, standard deviation, and results of the T-Test between new graduate nurses and senior nurses and Cronbach's alpha coefficient of the 58-items Thai-PSCS for new graduate nurses (n = 40)

Domains	New graduate nurses (n = 40)	Senior nurses (n = 40)	t	df	Cronbach's alpha
	Mean (SD)	Mean (SD)			
1. Ethical and legal aspects of patient safety	15.30 (2.82)	17.52 (1.97)	-4.08**	78	0.85
2. Nursing practices to prevent or minimize harm from healthcare errors	68.97 (11.68)	83.67 (7.24)	-6.76**	78	0.91
3. Professional characteristics regarding patient safety	15.90 (2.71)	18.25 (1.93)	-4.46**	78	0.85
4. Academic and research skills regarding patient safety	10.87 (2.72)	12.85 (2.17)	-3.53**	78	0.85
5. Risk management and quality improvement	17.65 (4.17)	20.60 (2.48)	-3.84**	78	0.83
6. Effective communication in the healthcare team	21.45 (4.19)	25.72 (2.58)	-5.48**	78	0.84
7. Technology and informatics for patient safety	13.60 (3.84)	16.87 (2.80)	-4.35**	78	0.85
8. Policy and networks regarding patient safety	8.17 (2.04)	9.90 (1.53)	-4.26**	78	0.86
Total scale	174.88 (30.54)	205.38(17.32)	-5.49**	78	0.87

** $P < .01$

As expected, the senior nurse group had higher competency scores than the new graduate nurse group in all subscales and the overall scale scores. These results reflected that all items in the scale could be used to differentiate the Thai-PSC levels between junior and senior nurses.

Discussion

The Thai-PSCS primarily derived from the core competencies established by the TNMC for Thai graduate nurses. In addition, a comprehensive literature review was undertaken to identify relevant items from existing instruments and Thailand's policy on patient safety goals. At the same time, in-depth interviews and focus group discussions were employed to clarify the PSC requirements. Consequently, the items incorporated into the instrument were synthesized from these three sources, encompassing all domains of patient safety competency within the Thai healthcare system. The final Thai-PSCS contains 58 items with eight domains. Although three items regarding patient safety were measured in the policy and networks, this is sufficient because at least three items provide valuable statistical information to interpret in each scale dimension.[22] The present study yielded favorable results regarding the known-group validity of Thai-PSCS. Domains in the scale can discern competency levels between new graduate nurses and senior nurses. This scale's internal consistency reliability was satisfactory as the value of Cronbach's alpha coefficients of each dimension reached the acceptable value of .70.[25]

Comparing the Thai-PSCS with previous studies[17] to develop patient safety competency scales found that this study was the first to measure ethical aspects of patient safety that influence nurses' decisions to practice safe practices. It is committed to respecting patient autonomy and protecting and promoting human dignity. Secondly, they all cover the competencies for Thai professional nurses by TNMC. Finally, the tool is a self-assessment measure of new graduate nurses who

have been tested psychometrically by new graduate nurses directly.

Novel interpretations were assigned to the derived factors based on thoroughly examining item meanings and considering the items with higher factor loadings. The outcomes of the EFA provided evidence that these factors could explain the underlying structure of the eight identified factors as outlined below.

Factor 1: Ethical and Legal Aspects of Patient Safety. This factor emerged as the primary dimension in assessing the patient safety competency of new graduate nurses in regional hospitals. When delivering nursing care, recognize the importance of nursing graduates upholding human values, beliefs, and dignity. By fostering awareness and comprehension of patients' rights, individuals at risk of abuse can be safeguarded. Moreover, the ability to make ethical decisions in the face of moral and legal conflicts, along with practicing nursing with compassion, serves the best interests of service recipients. Previous studies in other countries have explored patient safety performance in the domains of ethics and law through indicators such as the value placed on error prevention,[26] patient involvement,[21] and cooperation in promoting health, safety, well-being, and self-care.[27]

Mastery of ethical principles, codes of conduct, and legal knowledge contributes to the character and enhances their ability to engage in nursing practices that prioritize patient safety, thereby reducing errors and mitigating legal complications. Additionally, supporting investing in ethics education to uphold nurses' professional beliefs may have beneficial, long-lasting effects.[28]

Factor 2: Nursing Practices to Prevent or Minimize Harm from Healthcare Errors. This factor pertains to the crucial competency of new graduate nurses relevant to medical errors. Several challenges and barriers have existed, including high workload, limited resources, healthcare workers' understanding of quality and safety, medication errors, and constrained funding. This dynamic creates heightened patient safety expectations among patients, families, or consumers and necessitates collaboration with diverse stakeholders.[29]

This finding aligns with the capacity to employ the nursing process in patient care, encompassing health promotion, adherence to procedures and guidelines, and proficiency in essential skills, such as preventing nosocomial infections, following protocols for intravenous and urinary catheterization, and applying evidence-based approaches to prevent errors in treatment, such as wrong patient, wrong site, the wrong method for surgery, pressure ulcers, falls, and the management of critical conditions like sepsis and septic shock. More than 50% of healthcare workers make mistakes that affect patients during their clinical careers.[12] It was also found that over 55% of nurses admit to making mistakes within the first five years of their clinical careers, which is problematic. In particular, 49-53% of new graduate nurses with less than a year of experience made medical errors.[30] Research conducted in Thailand involving 141 new graduate nurses revealed incidents such as 50.35% of drug preparations needing to be corrected in terms of type or amount, although yet to be administered to patients. Additionally, 43.26% of cases involved patients with altered symptoms who passed away unexpectedly, while 39.01% encountered errors in drug administration related to the individual, timing, route, dosage, type, or method. Moreover, new graduate nurses should know about medical errors and patient safety measures to safeguard patients effectively.[13] Moreover, new graduate nurses should know about medical errors and patient safety measures to safeguard patients effectively.

Factor 3: Professional Characteristics Related to Patient Safety. This factor distinguishes itself from previous studies addressing this topic in their assessments. In Thailand, the TNMC has defined professional characteristics as an ongoing commitment to self-improvement.[18] This study highlights the importance of new graduate nurses continuously developing themselves to cultivate positive personality traits and attitudes. They are expected to recognize the interplay between human factors and patient safety, comprehend the intricacies of organizational systems and departments, possess

a service-oriented mindset, and effectively perform in diverse and complex environments. In addition, it was discovered that a solid professional identity was beneficial for patient safety, leading to better practice and patient outcomes. However, a lack of professional identity runs the risk of a profession-only devotion that results in subpar nursing care. Accordingly, a weakened sense of one's professional self raises stress levels and impairs one's capacity for judgment.[31]

Factor 4: Risk Management and Quality Improvement. This factor encompasses a combination of teamwork, management, and leadership skills. Effective teamwork, efficient resource allocation, knowledge sharing, and strong leadership are essential to managing and enhancing nursing quality. Furthermore, evaluating clinical risks and documenting risk-related incidents are essential components of this factor.

To develop a screening system, assess competency levels, and devise strategies, guidance from leadership, management, and quality improvement practices is invaluable. Nursing administrators, nurses, and new graduate nurses can all benefit from such advice. Nursing administrators can utilize data linked to patient safety competencies to make informed decisions regarding time management, nursing workforce development, and other pertinent areas.[32]

Factor 5: Academic and Research Skills Regarding Patient Safety. Compared to previous research, no existing test items were found to assess this particular skill set. Utilizing research methodologies to explore new knowledge, improve nursing practices, and contribute to advancing patient care innovations aligns with the desired level of academic and research competence, which involves acquiring, transferring, and sharing knowledge with colleagues.[18] This competency encompasses actively seeking, researching, and sharing knowledge with colleagues. It also involves recognizing gaps in understanding, asking relevant questions to acquire new information using appropriate methodologies, synthesizing information from textbooks, academic journals, and foundational research, and applying this knowledge in the clinical setting. Additionally, new graduate nurses should be capable of sharing and exchanging knowledge with colleagues and engaging in research that benefits patients, the healthcare organization, and society.

Factor 6: Effective Communication in Healthcare Teams. This factor is the essential skill of effective communication within healthcare teams. This factor encompasses consistent and proficient communication with patients, their relatives, and the care team, inter-hospital communication, and maintaining accurate and comprehensive care records. New graduate nurses must collaborate effectively and prioritize effective communication. Previous research has highlighted that many critical incidents can be attributed to communication errors. By fostering effective communication practices, mistakes can be mitigated, and patient risks can be reduced.[33]

Furthermore, there was a strong correlation between lower ventilator-associated pneumonia rates and more excellent average ratings for "collaborating with other medical professionals in teams" in PSC to deliver high-quality, clinically safe care.[34]

Factor 7: Use of Technology and Informatics for Patient Safety. This factor includes actively collecting data and developing information systems within healthcare organizations. Furthermore, they should possess essential computer skills, familiarity with relevant computer programs and IT components, and proficiency in competence with nursing data classification systems and health-related information systems. Additionally, they should be trained in using AEDs, infusion pumps, resuscitation equipment, and respirator bags and possess basic CPR skills. It is worth noting that this study differs from previous research in its focus on standard CPR performance. Implementing health information technology is crucial in enhancing patient safety through lowering non-compliance, adverse drug reactions, and medication mistakes with recommended practices. However, informatics proficiency played a more significant role, and a lack of ability appears to increase stress, which is already known to be high in the early phases of a

profession. For new nurses entering the field to have the necessary skills to work in the increasingly digital healthcare industry, investing in nursing informatics would be crucial for educational institutions.[35] Additionally, the year of nurses' graduation was connected to their general competence in nursing informatics and their specialized competence in terminology-based documentation. The most competent nurses were the younger ones. The findings of this study emphasize the significance of educational policies outlining the goals and orientations of educational initiatives.

Factor 8: Policy and Networks Regarding Patient Safety. This factor addresses policy and networks on patient safety. It was observed that no existing questions were available to evaluate this particular aspect. New nurses should be able to analyze data regarding social, economic, political, and policy changes for strategic purposes. They should actively participate in developing contexts, promoting values, grasping the complexity of organizational dynamics, and fostering positive interactions among patients, caregivers, service providers, and healthcare networks. Additionally, their involvement in health-related policy utilization and participation is essential, as well as the appropriate promotion of local wisdom and community lifestyles.[18]

It is essential that the scope of Thai nursing, encompassing holistic care across various aspects and levels of healthcare institutions differs from the stated fundamental clinical competencies.[36] This highlights the contextual and national variations in the competency standards for new graduate nurses.

Conclusion

The 58-item Thai-PSCS with eight domains is a self-report questionnaire to create a competency framework in the Thai context. This instrument's content validity, construct validity, and internal consistency reliability were found to be adequate. New domains are uncovered by psychometric testing of the patient safety competency of new graduate nurses who are essential to reaching the SDGs and vital in achieving patient safety in Thailand.

Limitations

The current study has several limitations. There still needs to be measurement of new nurses in each phase as a research tool to investigate the degree and associated elements. Moreover, there is a lack of measuring a future outcome, behavior, or performance, such as predictive validity. This study's findings cannot be applied in general because they need multiple contexts and situations and could only reflect some Thai nurses. The exploratory factor analysis (EFA) was also vital to this study. Nevertheless, confirmatory factor analysis (CFA) is carried out following EFA. The relationship between the variables that can be observed and the latent constructs that underlie them is examined using CFA.

Implications for Nursing Practice and Research

The Thai-PSCS aims to develop a competency framework, improve patient safety performance, and help achieve several health-related Sustainable Development Goals. It is necessary to look for new and improved training techniques to create a platform for promoting patient safety competencies to ensure healthy lives and well-being for all ages. Nursing administrators assess new graduate nurses' competency and design training programs for continuing education. The results provide information that can be used to develop the competency of new graduate nurses to deliver safe care for patients and prevent patients from fatal harm. We recommend further testing the scale in different groups of nurses across Thailand.

Acknowledgments

The author's gratitude to the King Prajadhipok and Queen Rambhai Barni Memorial Foundation for approving the graduate scholarship 2020 for the research funding and to the participants who contributed to the success of this research.

References

1. World health Organization. Patient safety [Internet].2023 [cited 2023 Nov 17]. Available from: https://www.who.int/news-room/fact-sheets/detail/patient-safety
2. Rodziewicz TL, Houseman B, Hipskind JE. Medical error reduction and prevention. StatPearls Publishing [Internet]. 2023 Jan [cited 2023 Nov 17]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK499956/
3. Janatolmakan M, Khatony A. Explaining the experience of nurses on missed nursing care: a qualitative descriptive study in Iran. Appl Nurs Res. 2022;63:151542. doi: 10.1016/j.apnr.2021.151542.
4. Albsoul RA, Alshyyab MA, Hughes JA, Jones L, FitzGerald G. Examining the reasons for missed nursing care from the viewpoints of nurses in public, private, and university hospitals in Jordan: a cross-sectional research. Collegian. 2023;30(1):110-8. doi.org/10.1016/j.colegn.2022.08.001.
5. National Health Security Office. NHSO annual report 2022 [Internet]. 2022 [cited 2023 Nov 17]. Available from:https://www.nhso.go.th/operating_results/54 https://www.nhso.go.th/operating_results/54 (in Thai)
6. Ministry of Public Health. Twenty-year national strategic plan for public health (2017-2036) [Internet]. 2018 [cited 2023 Nov 17]. Available from: http://164.115.27.97/digital/files/original/2ddc0ac1ececa4c 666af70165c23e011.pdf (in Thai)
7. Kongcheep S, Arpanantikul M, Pinyopasakul W, Sherwood G. Thai nurses' experiences of providing care in overcrowded emergency rooms in tertiary hospitals. Pacific Rim Int J Nurs Res [Internet]. 2022 May 27 [cited 2023 Nov 17]; 26(3):533-48. Available from: https://he02.tci-thaijo.org/index.php/PRIJNR/article/view/258076
8. Santiprasitkul S, Junlapeeya P, Boonyapak P, Srimanthayamas V. Patient safety culture: Perception of state hospital nurses. J Royal Thai Army Nurses. 2019; 20(2):327-39 (in Thai).
9. Han Y, Kim J-S, Seo Y. Cross-sectional study on patient safety culture, patient safety competency, and adverse events. West J Nurs Res. 2020;42(1):32-40. doi:10.1177/0193945919838990.
10. Goekcimen K, Schwendimann R, Pfeiffer Y, Mohr G, Jaeger C, Mueller S. Addressing patient safety hazards using critical incident reporting in hospitals: a systematic review. J Patient Saf. 2023;19(1):e1-8. doi: 10.1097/pts.0000000000001072.
11. Willman A, Bjuresäter K, Nilsson J. Newly graduated registered nurses' self-assessed clinical competence and their need for further training. Nurs Open.2020;7(3):720-30. doi: 10.1002/nop2.443.
12. Murray M, Sundin D, Cope V. New graduate nurses' understanding and attitudes about patient safety upon transition to practice. J Clin Nurs. 2019;28(13-14): 2543-52. doi: 10.1111/jocn.14839.
13. Thongkaew S, Thongsuk P, Thiangchanya P. Patient safety awareness among novice nurses working in general hospitals in southern Thailand. SCNJ. 2018;5(1):62-73 (in Thai).
14. Ji Y, Lee H, Lee T, Choi M, Lee H, Kim S, et al. Developing an integrated curriculum for patient safety in an undergraduate nursing program: a case study. BMC Nurs. 2021;20(1):172. doi: 10.1186/s12912-021-00694-0.
15. World Health Organization. WHO patient safety curriculum guide. Geneva: World Health Organization; 2011.
16. Supachutikul A, WHO patient safety curriculum guide: multidisciplinary code. Nonthaburi: Healthcare Quality Accreditation Institute (public organization); 2016 (in Thai).
17. Mortensen M, Naustdal KI, Uibu E, Mägi L, Kangasniemi M, Põlluste K. Instruments for measuring patient safety competencies in nursing: a scoping review. BMJ Open Qual. 2022;11(2):e001751. doi: 10.1136/bmjoq-2021-001751.
18. Thailand Nursing and Midwifery Council. Thailand Nursing and Midwifery Council has adopted core competencies for bachelor degree graduates [Internet]. 2018 [cited 2023 Nov 17]. Available from: https://www.tnmc.or.th/images/userfiles/files/004.pdf (in Thai)
19. Kakemam E, Ghafari M, Rouzbahani M, Zahedi H, Roh YS. The association of professionalism and systems thinking on patient safety competency: a structural equation model. J Nurs Manag. 2022;30(3):817-26. doi: 10.1111/jonm.13536.
20. Panthulawan S, Kunaviktikul W, Nantsupawat R, Srisuphan W. Development and psychometric testing of the Nursing Performance for Patient Safety Scale. Pacific Rim Int J Nurs Res [Internet]. 2016 Jan 25 [cited 2023 Nov 17]; 20(1):45-59. Available from: https://he02.tci-thaijo.org/index.php/PRIJNR/article/view/23368
21. DeVellis RF. Scale Development: theory and applications. 5th ed. California: Sage publications; 2022.

22. Polit DF, Beck CT. Nursing research: generating and assessing evidence for nursing practice. 11th ed. Philadelphia: Wolters Kluwer; 2021.
23. Kellar SP, Kelvin E. Munro's statistical methods for health care research. 6th ed. Philadelphia: Lippincott Williams and Wilkins; 2013.
24. Waltz CF, Strickland OL, Lenz ER, editors. Measurement in nursing and health research. 5th ed. New York: Springer Publishing; 2018.
25. Gray J, Grove SK. Burns and Grove's the practice of nursing research: appraisal, synthesis, and generation of evidence. 9th ed. Philadelphia: Saunders; 2021.
26. Ginsburg L, Castel E, Tregunno D, Norton PG. The H-PEPSS: an instrument to measure health professionals' perceptions of patient safety competence at entry into practice. BMJ Qual Saf. 2012;21(8):676-84. doi: 10.1136/bmjqs-2011-000601.
27. Sullivan DT, Hirst D, Cronenwett L. Assessing quality and safety competencies of graduating prelicensure nursing students. Nurs Outlook. 2009;57(6):323-31. doi: 10.1016/j.outlook.2009.08.004.
28. Monroe HA. Nurses' professional values: influences of experience and ethics education. J Clin Nurs. 2019;28(9-10): 2009-19. doi: 10.1111/jocn.14806.
29. Limpanyalert P. Thailand experience in patient safety implementation [Internet]. 2022 Feb 23-24 [cited 2023 Nov 17]. Available from: https://cdn.who.int/media/docs/default-source/patient-safety/policy-makers-forum- 2022/ presentations/who-policy-makers--forum_dr-piyawan-limpanyalert_thailand_23-24-feb-2022.pdf?sfvrsn= 5d0d2413_1
30. Song MO, Kim S. The experience of patient Safety error for nursing students in COVID-19: focusing on King's conceptual system theory. Int J Environ Res Public Health. 2023;20(3):2741. doi: 10.3390/ijerph2003 2741.
31. Fitzgerald A. Professional identity: a concept analysis. Nurs Forum. 2020;55(3):447-72. doi: 10.1111/nuf.12450.
32. Sherwood G, Barnsteiner J. Quality and safety in nursing: a competency approach to improving outcomes. 3th ed. Hoboken, NJ: Wiley-Blackwell; 2021.
33. Alkhaqani AL. Importance of teamwork communication in nursing practice. Nurs Commun. 2022;6:e2022015. doi: 10. 53388/IN2022015.
34. Han Y, Kim JS, Seo Y. Cross-sectional study on patient safety culture, patient safety competency, and adverse events. West J Nurs Res. 2020;42(1):32-40. doi: 10.1177/0193945919838990.
35. Kaihlanen AM, Gluschkoff K, Kinnunen UM, Saranto K, Ahonen O, Heponiemi T. Nursing informatics competences of Finnish registered nurses after national educational initiatives: a cross-sectional study. Nurse Educ Today. 2021;106: 105060. doi.: 10.1016/j.nedt.2021.105060.
36. Vichittragoonthavon S, Klunklin A, Wichaikhum OA, Viseskul N, Turale S. Essential clinical skill components of new graduate nurses: a qualitative study. Nurse Educ Pract. 2020;44:102778. doi: 10.1016/j.nepr.2020.102778.

Appendix

Table 1. Description of the nine instruments of patient safety competency[17]

Researcher/ Year/ Title	Name of the instrument and total items	Country/ Participants	Domain/ Subdomain	Validity	Reliability
1. Schnall R, Stone P, Currie L, et al. /2008/ Development of a self-report instrument to measure patient safety attitudes, skills, and knowledge	Patient Safety Attitudes, Skills and Knowledge Scale (PS-ASK) 26 items	USA/ Nursing students and physicians	Attitude (9 items) Skills (13 items) Knowledge (4 items)	For the attitude scale, Cronbach's alpha was 0.57. For the skills scale, Cronbach's alpha was 0.84. For the knowledge scale, Cronbach's alpha was 0.86.	Cronbach's alpha coefficient for each of the resulting scales and subscales Inter-item correlations were examined and items with a high correlation (>.70).
2.Carruthers S, Lawton R, Sanders J, et al./2009/ Attitudes to patient safety amongst medical students and tutors: developing a reliable and valid measure	The Attitudes to Patient Safety Questionnaire (APSQ III) 30 items	UK/ Medical students	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)	Overall alpha of 0.73	Reliability coefficients ranging from 0.64 to 0.82
3. Chenot TM, Daniel LG./2010/ Frameworks for patient safety in the nursing curriculum	The Healthcare Professional Patient Safety Assessment Curriculum Survey (HPPSACS) 22 items	USA/ Health workers in general	Comfort (5 items) Error reporting (8 items) Denial (4 items) Culture (5 items)	The exploratory factor analysis scores for the entire instrument and the four subscales were considered adequately construct valid.	Alpha coefficients for scores on the comfort, error reporting, denial, and culture subscales were .82, .70, .65, and .64.
4. Ginsburg L, Castel E, Tregunno D, et al. /2012/ The H-PEPSS: an instrument to measure health professionals' perceptions of patient safety competence at entry into practice	Health Professional Education in Patient Safety Survey (H-PEPSS) 23 items	Canada/ Health workers in general	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) Recognize, respond to, disclose adverse events and close calls (4 items) Culture of safety (4 items)	Good internal consistency (Cronbach's alpha = 0.91)	The internal consistency reliability of the factors for the full sample exceeded 0.80.

Table 1. Description of the nine instruments of patient safety competency[17] (Cont.)

Researcher/ Year/ Title	Name of the instrument and total items	Country/ Participants	Domain/ Subdomain	Validity	Reliability
5. Lee N-J, An J-Y, Song T-M, et al/2014/ Psychometric evaluation of a patient safety competency self-evaluation tool for nursing student	The Patient Safety Competency Self-Evaluation (PSCSE) 41 items	Korea/ Nursing students	Attitude (14 items) Skills (21 items) Knowledge (6 items)	The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.861. Bartlett's test of sphericity, the Kaiser-Meyer-Olkin measure of sampling adequacy showed a statistical significance among the variables ($p < 0.001$).	The overall reliability showed Cronbach's alpha of 0.899.
6. Armstrong GE, Dietrich M, Norman L, et al. /2017/ Development and psychometric analysis of a nurses' attitudes and skills safety scale: initial results	The Nurses' Attitudes and Skills around Updated Safety Concepts Scale (NASUS) 24 items	USA / Nursing students	Attitude (17 items) Perceived skills (7 items)	The NASUS Scale was developed using the attitude sections of the HPPSACS Survey (Cronbach alpha = .86, .62. and .63), the error analysis skill subscale of the PS-ASK Survey (Cronbach alpha = .84), and the knowledge subscale of the PS-ASK Survey (Cronbach Alpha = .86), with minor edits.	The Cronbach's alpha of .73, indicating an acceptable level of consistency among items for a new scale
7. Flin R, Patey R, Jackson J, et al./2009/ 'Year 1 medical undergraduates' knowledge of and attitudes to medical error'	The Medical Students' Questionnaire of Knowledge, Skills, and Attitudes Regarding Patient Safety (MSQ-KSA) 34 items	UK/ Medical students	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)	Cronbach's alpha values ranged from 0.59 (Attitudes to patient safety scale) to 0.88 (Knowledge of error and patient safety scale) and three scales showed internal consistencies below the recommended value of 0.70. Exploratory factor analysis showed that the five factors explain 51.7% of variance.	The reliability of the scale (Cronbach's alpha = 0.75)
8. Wang Q. /2018/ Development of the patient safety competency nurse evaluation scale. Peking Union Medical College	The Instrument Patient Safety Competency Nurse Evaluation Scale (PSCNES) 35 items	China/ Nursing students	Patient-centered 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)	KMO value was 0.970, Bartlett χ^2 = 12,112.30 ($p < .01$), which showed acceptable construct validity.	Cronbach's alpha ranged from 0.76-0.91 for the six dimensions, which showed good internal consistency reliability.

Table 1. Description of the nine instruments of patient safety competency[17] (Cont.)

Researcher/ Year/ Title	Name of the instrument and total items	Country/ Participants	Domain/ Subdomain	Validity	Reliability
9. Liao JM, Et chegaray JM, Williams ST, et al./2014/ Assessing medical students' perceptions of patient safety	The Medical Student Safety Attitudes and Professionalism Survey (MSSAPS) 28 items	USA. / Medical students	Safety culture (8 items) Teamwork (6 items) Error disclosure culture (4 items) Experiences with professionalism (7 items) Comfort expressing professional concerns (3 items)	Cronbach's alpha for the six-item factor was 0.81	Good reliability (Cronbach′s alpha > 0.70)

การพัฒนาและการทดสอบทางจิตวิทยาเครื่องมือวัดสมรรถนะความปลอดภัยของผู้ป่วยไทยสำหรับพยาบาลจบใหม่

จุฬาพร ยาพรม เพชรสุนีย์ ทั้งเจริญกุล กุลวดี อภิชาตบุตร อภิรดี นันท์ศุภวัฒน์*

บทคัดย่อ: พยาบาลวิชาชีพต้องมีความเชี่ยวชาญด้านความปลอดภัยของผู้ป่วยไม่ว่าจะเป็นพยาบาลในระดับใด อย่างไรก็ตาม ทักษะด้านความปลอดภัยของผู้ป่วยถือเป็นความสามารถที่สำคัญที่สุดสำหรับพยาบาลจบใหม่ซึ่งจะต้องทำให้สำเร็จก่อนจึงจะสามารถทำงานด้วยตนเองได้ อย่างไรก็ตามการประเมินความสามารถนี้เป็นเรื่องยากเนื่องจากจำเป็นต้องมีเครื่องมือประเมินที่มีคุณภาพเพื่อช่วยพัฒนาความสามารถในการให้การดูแลด้วยความปลอดภัย การศึกษานี้จึงมีวัตถุประสงค์เพื่อพัฒนาและทดสอบเครื่องมือวัดระดับความสามารถด้านความปลอดภัยของผู้ป่วยสำหรับพยาบาลจบใหม่ตามข้อกำหนดของสภาการพยาบาล โดยใช้การวิจัยเชิงบรรยายที่แบ่งเป็น 2 ระยะ และอาศัยการดำเนินการวิจัย 8 ขั้นตอน เครื่องมือที่สร้างขึ้นใหม่ได้ทำการตรวจสอบความตรงเชิงโครงสร้าง ความตรงเชิงจำแนกและความสอดคล้องภายในด้วยสถิติการวิเคราะห์องค์ประกอบ การทดสอบค่าที และการหาค่าสัมประสิทธิ์แอลฟาของครอนบาคตามลำดับ กลุ่มตัวอย่างประกอบด้วยผู้เชี่ยวชาญจำนวน 10 คน พยาบาลจบใหม่ จำนวน 403 คน และพยาบาลวิชาชีพ จำนวน 56 คน

ผลการศึกษาพบว่าเครื่องมือมี 58 ข้อประกอบด้วย 8 ด้านได้แก่ จริยธรรมและกฎหมาย การปฏิบัติการพยาบาล คุณลักษณะเชิงวิชาชีพ การบริหารความเสี่ยงและการปรับปรุงคุณภาพ ทักษะทางวิชาการและการวิจัย การสื่อสารที่มีประสิทธิภาพ การใช้เทคโนโลยีและสารสนเทศ และนโยบายและเครือข่าย นอกจากนี้ การศึกษานี้มีความตรงเชิงโครงสร้างในระดับดี โดยเครื่องมือมีความสามารถในการจำแนกพยาบาลจบใหม่กับพยาบาลวิชาชีพได้เป็นอย่างดี และมีค่าความสอดคล้องภายในและความเชื่อมั่นในระดับดี ดังนั้นจึงสามารถนำไปใช้ในการประเมินและฝึกอบรมพยาบาลจบใหม่เพื่อเพิ่มขีดความสามารถด้านความปลอดภัยของผู้ป่วยได้ อย่างไรเครื่องมือดังกล่าวจำเป็นต้องมีการทดสอบเพิ่มเติมกับพยาบาลกลุ่มอื่น ๆ ต่อไป

Pacific Rim Int J Nurs Res 2024; 28(1) 181-201

คำสำคัญ: สมรรถนะ การพัฒนาเครื่องมือ พยาบาลจบใหม่ การพยาบาล ความปลอดภัยของผู้ป่วย การทดสอบทางจิตวิทยา ประเทศไทย

จุฬาพร ยาพรม *นักศึกษาหลักสูตรปริญญาเอก คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ E-mail: chulaporn_ya@cmu.ac.th*
ติดต่อที่: เพชรสุนีย์ ทั้งเจริญกุล* *รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ E-mail: petsunee.t@cmu.ac.th*
กุลวดี อภิชาตินุบุตร *รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ E-mail: kulwadee.a@cmu.ac.th*
อภิรดี นันท์ศุภวัฒน์ *รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ E-mail: apiradee.n@cmu.ac.th*