

Development and Psychometric Testing of the Nursing Performance for Patient Safety Scale

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Abstract: In Thailand, patient safety measurement is based on nursing and midwifery standards. In this study we developed the Nursing Performance for Patient Safety Scale to assess individual nurses. The instrument development process involved six steps: 1) Identification of constructs from concept analysis. These included six sub-domains: protection, prevention, mitigation, promotion, interpersonal facilitation, and dedication; 2) Generating 141 items for item pool; 3) Determining format for measurement. Scaling responses were determined using a 6-point Likert-scale; 4) Verification of the 141 items by five experts and 73 items remained after the second round with the S-CVI of 1.00; 5) Determining reliability. The Cronbach's alpha coefficient was 0.95; and 6) Field testing for construct validity.

The study settings were 8 regional and 9 general hospitals governed by Thailand Ministry of Public Health. There were 759 nurses selected using multistage sampling in four regions of Thailand, and simple random sampling was used. Item-total correlation ranged from 0.24 to 0.75. Principal component and oblique rotation by directoblimin was used for exploratory factor analysis. The final Scale had 64 items with 9 domains 1) protection through communication; 2) protection through risk management; 3) prevention through right drug and solution administration; 4) prevention through implementation of practice guideline; 5) prevention emergency adverse events through critical care; 6) prevention through effective patient care process; 7) mitigation; and 8) promotion through team and responsibility and 9) dedication to patient safety. This Scale can be used to produce evidence to helping to improve patient safety performance by nurses in Thailand. However, future studies are needed to refine the Scale.

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Introduction

Patient safety is a major issue supporting quality improvement in healthcare. Many countries have increasingly recognized the importance of improving patient safety. In 2002, the World Health Organization (WHO) member states agreed on a World Health Assembly resolution on patient safety. The WHO then launched the Patient Safety Program

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in 2004, and over 140 countries have worked to address the challenges of unsafe care.¹ Moreover, the Joint Commission established the National Patient Safety Goals program in 2002 and approved a new program in 2013 to help accredited organizations address specific areas of concern in regard to patient safety.² In Thailand the Healthcare Accreditation Institute set the Thai Patient Safety Goal³ with the aim of preventing procedures that could potentially cause harm to hospitalized patients. The goals deal with safe surgery, infection control, medication safety, patient care process safety, avoiding catheterization and tubing misconnections, and emergency response. Additionally, the Ministry of Public Health (MOPH) and the Thailand Nursing and Midwifery Council (TNMC) has set nursing and midwifery practice standards for patient safety goals.^{4,5} Nursing organizations urge all nurses to comply with patient safety practice guidelines in order to save patients from harm.

An essential step for patient safety improvement are specific measures which have achieved high levels of patient safety. These safety measures should recognize hospital efforts toward patient safety and achievements in patient safety. In the nursing literature, the Donabedian's structure-process-outcome framework has been used for evaluating the quality of nursing care.⁶ This evaluation structure consists of material resources, human resources, and organizational structure, and the evaluation process consists of the patient's activities in seeking care and caring it out, as well as the practitioner's activities in making a diagnosis and recommending or implementing treatment. The evaluation of outcomes consists of the effects of care on the health status of patients and populations.⁷ Process and structural measures signal what hospitals have done to improve safety and outcome measures reflect whether a hospital has actually achieved safety goals. These process, structural, and outcome measures should be of equal weights of 50%,⁸ and the measures should address a process proximate to the desired outcome.⁹ Although hospitals are voluntarily seeking

to improve performance on standard sets of measures,⁸ there is little evidence that these sets are focused on process assessment. Most of the evidence has shown outcome assessment¹⁰ but existing measures are incapable of judging the quality of the process.⁹ In Thailand, process measurement for patient safety consists of the rate of incident reports, the application of the nursing process to regular practice, and nursing documentation indicating the quality of nursing care.^{4,5} Outcome measurement is based on 10 indicators for patient safety⁴ and requires six months to one year to see evidence in the decreasing rate of errors.¹¹ In comparison, process measurement may take as little as one month. Thus, process measurement for patient safety can provide accurate and timely information for feedback to nurses to improve patient safety.

In reality, process measurements are faced with the problem of evidence which reflects accurate results. They use the number of incident reports of nurses as indicators, but incidence data are under-reported.¹² Therefore, using the number of incident reports as an indicator of process measurement cannot guarantee that nursing organizations with low reported incidence can control risks and actually practice patient safety. Effective process measurements require evaluation from the nurses performing certain processes that have been demonstrated to achieve desired aims, and avoiding processes that tend to cause harm.¹³ Performance measurement is the most appropriate measurement for assessment by individual nurses to determine whether or not they comply with patient safety procedures.¹⁴ Measurement of performance at an individual level will provide information for human resource managers to design interventions to ensure that nurses strictly adhere to patient safety guidelines and build up a safety culture in the nursing organization. Moreover, nurses can utilize measurement of performance for self-monitoring when providing nursing care to patients and prevent the possible risk. At present, the commonly-existing scales used to measure patient safety focus on the patient safety

culture. These include the Hospital Survey on Patient Safety Culture (HSPSC)¹⁵ and the Safety Attitude Questionnaire (SAQ).¹⁶ These do not include performance measurements and have rarely been applied to the performance concept as a conceptual framework in the healthcare sector. This is the first study known in Thailand to try to address this issue. We developed the Nursing Performance for Patient Safety Scale (NPPSS) to assess nursing performance regarding patient safety at the individual nurse level. This new scale is important for patient safety because nursing organizations require high individual performance which could lead to accomplishing patient safety goals.

Review of Literature

In general, patient safety refers to minimizing risks of harm to patients and providers through both system effectiveness and individual performance.¹⁷ This involves promoting a culture of safety, protecting the patient from hazardous situations¹⁸, minimizing the impact of incidence, and maximizing recovery from adverse events.¹⁹ Therefore, the Joint Commission on Accreditation of Healthcare Organization (JCAHO) in the USA established national patient safety goals to address specific areas of concern regarding patient safety. These consist of: 1) the improvement of accuracy in patient identification, 2) improvement in the effectiveness of communication among caregivers, 3) improvement in the safety of using medications, 4) reducing the risk of health care-associated infections, 5) accurately and completely reconciling medications across the continuum of care, and 6) identifying safety risks inherent in its patient population.²⁰ In 2012, new national patient safety goals of the USA were approved with the intent of reducing the risk of patient harm resulting from falls and pressure ulcers, as well as preventing “wrong site, wrong procedure, wrong person surgery”.²

Nurses are important since they are pivotal to enhancing patient safety improvements and comprise the largest group of healthcare providers. They have more contact with patients than other healthcare provider. Furthermore, healthcare organizations need high performing individual nurses in order to accomplish patient safety goals and thus patient safety needs to be evaluated from the perspective of nurse behaviors. Their behaviour needs to be evaluated to test their degree of effectiveness as it is synonymous with performance.²¹ There are two attributes of the performance concept: task performance and contextual performance.²² Task performance refer to core technical behaviour and activities involved in the job.²³ Contextual performance refers to behaviours that demonstrate an employee’s willingness to participate with another member.²⁴ There are two facets of contextual performance: interpersonal facilitation and job dedication.²⁵

Nursing performance for patient safety refers to the behaviours that individual nurses perform which are relevant to patient safety goals. It is the responsibility of all nurses to perform in a manner that achieves these goals. The dimensions of patient safety performance are nursing task performance for patient safety and nursing contextual performance for patient safety. The details of each dimension are described below:

Nursing task performance for patient safety refers to an individual nurse’s behaviors that accomplish patient safety goals. Nurses’ behaviors include protection, prevention, mitigation, and promotion.

Protection refers to an individual nurse’s behaviors in against harm before reaching the patient. These behaviors consist of identifying risks inherent in the patient population,³ patient assessment,¹³ and identifying the multiple factors involved in failures¹⁹ which could cause incidents.

Prevention refers to an individual nurse’s behaviors that attempt to stop harm before reaching

patients. These behaviors consist of adhering to guidelines for patient safety²⁶ and accurately reporting incidents.²⁷

Mitigation refers to an individual nurse's behaviors in reducing the severity of complications after something goes wrong in the patient's treatment that puts him or her at risk. These behaviors consist of immediately solving the problem,²⁶ improving the effectiveness of communication among caregivers,² patients, and their families, and providing immediate care based on the role of nurses.³

Promotion refers to an individual nurse's behaviors in performing their function and continual responsibility in order to enhance patient safety. These behaviors consist of promoting a culture of incident reporting,²⁸ using patient safety goals as a professional nursing development goal, and continued training in patient safety procedures.¹⁸

Nursing contextual performance for patient safety refers to an individual nurse's behaviors in a cooperative work environment with healthcare providers to care for patients and to enhance patient safety. In this study, these behaviors are classified into two dimensions: interpersonal facilitation for patient safety and dedication to patient safety. Each dimension is defined as follows.

Interpersonal facilitation for patient safety refers to an individual nurse's behaviors in cooperating with and immediately responding to requests from other team members in emergency situations, demonstrate the capacity to help someone without being asked, and participate in patient safety meetings.³

Dedication to patient safety refers to an individual nurse's behaviors that show that he or she is striving for patient safety; such behavior consists of activities that demonstrate effort initiatively to solve patient safety problems, persistence, and self-discipline. These behaviors consist of putting in extra hours to receive training in patient safety, tackling difficult work assignments enthusiastically, and setting patient safety goals as the target behavior that they want to achieve for the day.¹⁷

Study Aim

The purpose of this study was to develop an instrument to measure nursing performance for patient safety for nurses in Thailand.

Methods

Design: This instrument development research was divided into six steps: 1) identification of construct 2) generating an item pool, 3) determining the format for measurement, 4) reviewing for content validity by experts, 5) determining of reliability, clarity, and readability, and 6) field testing for evaluating the items by determination of item analysis and construct validity testing with factor analysis.

Ethical considerations:

This study was approved by the Research Ethics Review Committee of the Faculty of Nursing, Chiang Mai University, Thailand and prior to data collection, permission was also obtained from the ethics committee of each of the selected hospitals. All participants were informed about the purpose, methods, time required for the study, confidentiality, anonymity issues, and the right to withdraw from the study at any time without losing benefits. Finally, the participants who agreed to participate were asked to sign the informed consent form.

Data Collection and Data Analysis:

Step 1: Identification of construct: this was a process of identifying the domains from an analysis of patient safety concepts. A literature search was conducted using several search engines: CINAHL, Medline, PubMed, and Cochrane Review. Key words used were "patient safety", "quality of nursing care", "safer care", and "risk management process". The attributes of the concepts were identified, categorized, and arranged into the construct of the NPPSS. There were two dimensions of nursing performance for patient safety, consisting of: 1) nursing task performance for patient safety including protection, prevention,

mitigation, and promotion, and 2) nursing contextual performance for patient safety, including interpersonal facilitation for patient safety and dedication to patient safety.

Step 2: Generating an Item Pool: This was generated from the specified domains of nursing performance for patient safety, identified during the previous step of construct identification. The number of identified items was at least twice as many as the desired number for the final scale.²⁹ Under the operational definition of 2 dimensions and 6 sub-dimensions, items were identified, and 141 items were generated. These were written in Thai and then translated into English by a bilingual person.

Step 3: Determining the format for measurement: the NPPSS format was composed of two parts: the demographic data form, and the performance assessment scale. The scaling responses were defined with a 6-point Likert-type scale ranging from 0-5, where 0=never done, 1=scarcely done, 2=rarely done, 3=sometimes done, 4=often done, and 5=always done.

Step 4: Reviewing for content validity by experts: the developed items were reviewed for content validity in the first draft of the NPPSS by five experts. These included two faculty members, one was an expert in instrument development and the other was an expert in patient safety, two nurse administrators, experts in patient safety management, and one nurse who was an expert in patient safety practice.

The NPPSS was revised based on the experts' comments. Some items required revision for clarity. The I-CVI of the 141 items ranged from 0.2 to 1.00 and the I- CVI was 0.88. The S-CVI/UA was 0.58. Inter-rater agreement was 0.79, which was less than required by the criteria and thus 62 items were deleted from the scale and 79 items were retained. The second draft of the NPPSS was submitted to the same experts for the second round. The I-CVI of 79 items ranged from 0.8 to 1.00 and

the I-CVI was 0.98. The S-CVI/UA was 0.92, which was less than the criteria (1.00). Thus, 6 items were deleted from the scale and 73 items were retained. The I-CVI of 73 items was 1.00 and the S-CVI/UA was also 1.00. Inter-rater agreement was 0.97, which meet the criteria about I-CVIs should be 1.00 with five experts.³⁰ The accepted value of inter-rater agreement should be at least 0.90.³¹ The third draft was retained.

Step 5: Determining reliability, clarity, and readability; the third draft of the NPPSS development was the determination of the scale's reliability through pre-testing. The sample for the pre-testing was 30 staff nurses. Their recruitment was conducted with multi-stage sampling, beginning with four regions of Thailand, to draw one hospital for pre-testing. Then to draw the nurses who have experience in inpatient unit for at least two years, simple random sampling without replacement was used.

Finding revealed that all of the items were clear (100%), most of the items were understandable (96.7%), all of items were practical (100%), and 100% of the staff nurses agreed that the length of the questionnaire was appropriate. The length of time for filling out the scale ranged from 13-81 minutes, with a mean time of 43.53 minutes. Internal consistency reliability was estimated using Cronbach's alpha coefficient for the six subscales and ranged from 0.76 to 0.97. The scale's overall was 0.95. Therefore 73 items were retained.

Step 6: Field testing for evaluating the item by determination of item analysis and construct validity testing with factor analysis; 730 nurses that should be ten participants for each item being tested³¹ plus the expected attrition rate of 20%, totaling 876 nurses were the participants. Eight regional hospitals and eight general hospitals were selected. The recruitment of participants was the same as Step 5. The third draft of the NPPSS was mailed to the directors of nursing service who then distributed this to the participants. Ten items of the Marlowe Crowne

Social Desirability Scale (10-SDS) was distributed along with the third draft of the NPPSS.

The 10-SDS was also administered because the Thailand Nursing and Midwifery Council, the Ministry of Public Health, and the Bureau of Nursing, Office of Permanent Secretary, Ministry of Public Health (BON) urge all nurses to comply with patient safety practice. The fact that some of the items might have been perceived as socially desirable could have contributed to the nurses giving answers that said “good things” rather than “bad things” about themselves. Ten items of the Marlowe-Crowne Social Desirability Scale were originally written in English, translated into Thai, and back-translated into English by a

bilingual person to assure that no changes in meaning occurred during the translation process.

The third draft of the NPPSS with 73 items were returned 831 case (94.86%) and 72 uncompleted (13.67%). Therefore, there were 759 cases (86.33%) for analysis. The analysis of the psychometric properties of the scale included internal consistency reliability, item analysis. The Kuder-Richardson (KR-20) was used to determined reliability of 10- SDS. The Spearman’s rank-order correlation coefficient was used to describe correlation between the score of individual items and ten items of the 10-SDS. The exploratory factor analysis was used for construct validity. The process of this study was organized in 6 steps, as shown in Figure 1.

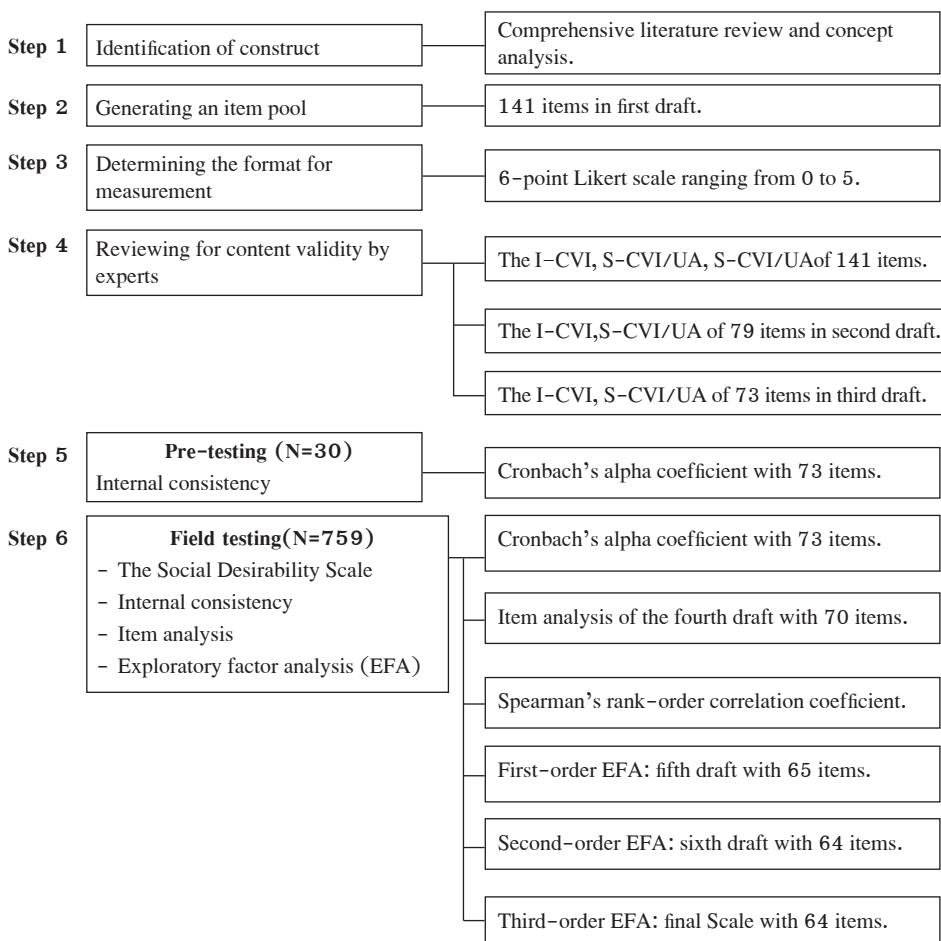


Figure 1 Stages of the development of the Nursing Performance for Patient Safety Scale

Results

The participants ranged from 22 to 60 years, with a mean age of 43.82 years (S.D. = 8.97), and most of them were female (98.16%) and 79.84% had a bachelor degree. Over half (52.17%) worked in a regional hospital and the rest worked in a general hospital (47.83%). Their experience in patient care varied widely, from 2 to 38 years, with an average experience of 13.30 years (S.D.=8.56). Half of the participants (54.15%) had attended a training course in patient safety.

Social Desirability

Kuder-Richardson reliability for the 10-SDS scale was calculated at 0.70, which was acceptable. There was no significance between the overall of the third draft of the NPPSS and 10-SDS ($r = 0.02$, $p<0.05$), which was acceptable for correlation between the score of item and 10-SDS. Therefore it is assumed that the nurses provided truthful data for nursing performance in patient safety.

Reliability Testing

The internal consistency reliability of the 73 items was estimated using Cronbach's alpha coefficient of 0.98, which was an acceptable alpha value for newly-developed instruments.³²

Item means ranged from 4.00 to 4.50, with a standard deviation ranging from 0.51 to 0.71. A mean close to the center of the range of possible scores was desirable. The mean of item variances was 0.23, with a range from 0.26 to 0.50, which was less than the criteria. Since, the statement of items indicated good practices for patient safety. It will not discriminate among individuals with different levels of the construct of patient safety performance being measured.³¹ Therefore, these items are less extreme.

Subscale-subscale correlation and subscale-total correlation: the criteria of the subscale-subscale correlation were more than 0.30. The correlation between subscales of the third draft of the NPPSS

ranged from 0.54 to 0.78. The subscale-total correlation as the correlation between each subscale to the overall scale ranged from 0.86 to 0.95. Thus, all items were considered to be related to the concept within the subscale and accepted for retention in the third draft of the NPPSS.

The corrected item-total correlation of the 73 items ranged from 0.24 to 0.75. One item had low correlation and some items with high correlation. The results of item to subscale correlation indicated that most of items correlations over 0.70 are redundant.³² The Cronbach's alpha coefficient of all items was 0.97. The alpha coefficient, if items deleted, for all items ranged from 0.972 to 0.974. The results revealed that when three items were dropped from the scale, the Cronbach's alpha increased. Therefore, three items in the NPPSS were dropped from the scale. Thus, the fourth draft with 70 items was retained for further factor analysis.

Validity Testing

The principal component analysis with oblique rotation by direct oblimin was selected because it yielded the best possibility to interpret the factor solution. The criteria for retention of an item include in the components with eigenvalues greater than 1, an item loading above .30 on each factor, no or few cross-loading items, determining the number of common factors with a screen test, and any factors with fewer than three items.^{32, 33}

The 70 items of the NPPSS demonstrated that the Kaiser-Meyer-Olkin measure was 0.97, which was acceptable for sampling adequacy.³⁴ The Bartlett's test was significant ($\chi^2 = 38113.494$, $p = .000$), indicating the overall significance of the correlation matrix. Thus, the set of data was appropriate for the factor analysis.

The final draft of the NPPSS was summarized based on the results of the third-order factor analysis. Nine components of the scale with 64 items could explain 63.54% of total of variance. All items retrieved with factor loading ranging from 0.34 to 0.90, eigen values ranged from 1.12 to 25.33. (Table 1 to 5).

Table 1 Factor, Factor loading, Eigenvalue, and % of Variance of Component *Protection*

Item	Description of item	Factor loading
Protection through communication		
PT12	Estimate patients' cooperation to use it for exploration of plausible risks.	0.81
PT13	Promote communication between nurses and patients via many channels to enhance patients' safety.	0.78
PT15	Spend time explaining self-management to patients to promote cooperation in nursing care.	0.75
PT11	Evaluate patients' knowledge to use it for exploration of possible risks.	0.73
PT14	Promote communication in the multidisciplinary team through many channels to enhance patient safety.	0.57
Eigenvalue = 3.60; % of variance = 5.63		
Protection through risk management		
PT1	Explore the risks of patients individually.	-0.78
PT2	Classify risks at work.	-0.75
PT3	Evaluate risk strengths likely associated with patients under care.	-0.75
PT4	Use the data from risk assessment to establish a health plan to protect patients.	-0.73
PT5	Reduce all kinds of risks once they are found.	-0.63
PT6	Provide solutions suitable for each patient risk.	-0.62
PT8	Use the results from risk evaluation of personal information in prior planning to prevent an adverse event.	-0.52
PT7	Carefully evaluate each patient's personal information for any potential risks.	-0.44
PT10	Investigate communication issues in the multidisciplinary team, which can lead to an adverse event.	-0.44
PT9	Seek communication problems between nurses and patients, which can lead to an adverse event.	-0.42
PV1	Understand the important of writing incident reports in the unit.	-0.34
Eigenvalue = 1.12; % of variance = 1.74		

Table 2 Factor, Factor loading, Eigenvalue, and % of variance of component *Prevention*

Item	Description of item	Factor loading
Prevention through right drug and solution administration		
PV7	Use an infusion pump to control the volume of concentrated solution that will flow into patient.	0.76
PV8	Check doctor's prescription before giving medication to patient.	0.61
PV9	Check the quantity of concentrated solution in patients every hour and every time before nursing care.	0.57
PV14	Report the abnormal results of any laboratory examination directly to the responsible physician immediately.	0.54
Eigenvalue = 2.79; % of variance = 4.36		
Prevention through the implementation of practice guidelines		
PV17	Follow hospital guidelines to prevent decubitus ulcers.	-0.84
PV16	Examine the skin of the patient under responsibility with the risk of decubitus ulcers.	-0.80
PV18	Evaluate the patient's risk of falling from fall history, age, and use of antidepressant drugs prior to nursing care.	-0.77
PV19	Follow the hospital guidelines to prevent falling.	-0.57

Table 2 Factor, Factor loading, Eigenvalue, and % of variance of component *Prevention* (continued)

Item	Description of item	Factor loading
PV21	Check every catheterization or tubing from their origin to the connection port to verify attachments before practice and every treatment provision. Eigenvalue = 1.41; % of variance = 2.20	-0.39
	Prevention emergency adverse events through critical care	
PV24	Call the rapid response team once a patient's condition changes into crisis.	-0.90
PV22	Understand the guidelines for requests from team or the rapid response team once a patient's condition changes into crisis.	-0.78
PV23	Evaluate patient symptoms of deterioration, using criteria set by hospital.	-0.46
PV25	Provide immediate nursing care to a patient whose condition changes into crisis.	-0.40
PV27	Explain to patients and relatives about possible risks to prevent incidents. Eigenvalue = 1.33; % of variance = 2.09	-0.35
	Prevention through effective patient care process	
PV12	Never use the bed or room number to identify the patients under care.	0.72
PV11	Prior to nursing care always verify patient identity in a minimum of two ways, asking for name and hospital ID number.	0.62
PV10	Advise patients or relatives about medication and its side effects.	0.56
PV13	Allocate the patient data to the team via SBAR (situation, background, assessment, recommendation).	0.46
PV5	Clean hands effectively as required before and after nursing procedures. Eigenvalue = 1.24; % of variance = 1.93	0.40

Table 3 Factor, Factor loading, Eigenvalue, and % of Variance of Component *Mitigation*

Item	Description of item	Factor loading
Mitigation		
MT7	Provide feasible care instructions to patients and relatives affected by adverse events, with mutual agreement of multidisciplinary team.	-0.87
MT8	Listen to patients and relatives expressions of frustration about an adverse event.	-0.84
MT6	Provide information of any adverse events to patients or relatives, together with the multidisciplinary team, using the hospital's information report guidelines.	-0.83
MT9	Spend time listening to patients and relatives, who have been affected by adverse events.	-0.80
MT5	Provide honest information regarding adverse events to patients or relatives, and the multidisciplinary team, using the hospital information report guidelines.	-0.61
MT10	Use error information as a lesson in finding ways to prevent recurrence.	-0.51
MT3	Interpret unwanted changes in a patient's condition affected by discovered adverse events.	-0.45
MT2	Evaluate symptoms of patients who have been affected by any incident in hospital-based practices.	-0.44
MT4	Give first aid immediately to minimize loss following an adverse event.	-0.41
MT1	Understand the hospital practices stipulated to reduce adverse events. Eigenvalue = 1.57; % of variance = 2.46	-0.35

Table 4 Factor, Factor loading, Eigenvalue, and % of Variance of Component *Promotion through team and responsibility*

Item	Description of item	Factor loading
Promotion through team and responsibility		
PM4	Be aware that nursing practice that focuses on patient safety is a core value of nursing organizations.	0.63
PM6	Practice nursing as an example to the team members so they work to emphasize patient safety.	.063
PM2	Explain details of an adverse event for a common understanding within the team.	0.59
IF3	Coordinate with team members to enhance patient safety.	0.55
PM7	Propose the development of practices to enhance safety.	0.53
IF2	Volunteer to help team members to promote patient safety.	0.53
PM5	Comply with safety practice guidelines that set by unit.	0.52
PM3	Do not predict unknowingly the adverse events information.	0.51
PM8	Apply the concept of safety in all nursing practice.	0.50
IF1	Provide immediate assistance to team members in any emergency situation.	0.48
IF5	Join activities in wards or hospitals, organized to enhance patient safety.	0.47
IF4	Emotionally support team members who experience adverse events.	0.42
Eigenvalue = 25.33; % of variance = 39.58		

Table 5 Factor, Factor loading, Eigenvalue, and % of Variance of Component *Dedication to patient safety*

Item	Description of item	Factor loading
Dedication to patient safety		
DP2	Attend quality development activities even on off-duty days.	0.76
DP1	Spend personal off-duty time attending patient safety training.	0.75
DP4	Develop innovations to enhance patient safety.	0.70
DP3	Develop methods to prevent adverse events and to suit patients under care.	0.65
DP5	Demonstrate eagerness in finding practices that focus on patient safety even though these tasks are complicated and complex.	0.63
PM9	Receive ongoing patient safety training.	0.56
IF6	Share ideas at meetings to target patient safety in wards and nursing departments.	0.48
Eigenvalue = 2.27; % of variance = 3.35		

Reliability Testing. The internal consistency of the NPPSS with 64 items was 0.91, which was high for a new scale. All of the subscale reported sufficient correlation. Moreover, all items revealed sufficient item-total correlations ranging from 0.40 to 0.81.

Discussion

The NPPSS was designed to evaluate the nursing performance for patient safety of nurses in Thailand based on the guidelines for developing a measurement scale of DeVellis.³² There were two dimension and

six sub-dimensions. They were described as follows: Dimension 1: *Nursing task performance for patient safety* consisting of the sub-dimensions of *Protection*, *Prevention*, *Mitigation*, and *Promotion* and Dimension 2: *Nursing contextual performance for patient safety* consisting of the sub-dimensions of *Inter-personal facilitation for patient safety* and *Dedication to patient safety*.

The psychometric properties of the data revealed that nine components were associated with nursing performance for patient safety. They were reorganized from the pre-sub dimension and indicated that the specific nurses' behaviors for patient safety were better than those for the pre-dimension. They provided a better understanding of patient safety performance along with the nursing role for patient safety.

The components *Protection through communication* and *Protection through risk management* came from reorganizing the pre-sub dimension *Protection*. These focused on evaluation of the patient in order to exploring possible risks through communication with the team. These behaviors represent important roles for nurses in term of protecting the patient from harm through communication. Currently, ineffective communication is a factor contributing to most cases of patient harm.³⁵ It is the single biggest cause of nearly 70% of adverse events in the hospital. Therefore, improving the effectiveness of communication among caregivers is a specific area of concern in regards to patient safety.³ Furthermore, patient safety also focuses on exploring risks, reducing risks, and providing treatment suitable for each patient's risk. These behaviors are included in the area of risk management. This consists of risk identification, risk assessment, analysis, understanding, and acting on risk issues in order to reach an optimal balance of risks, benefits and cost.²⁸ Managing risk will help protect providers and patients from becoming involved in legal matters.³⁶ Therefore, protection through communication and through risk management is specific and necessary so that nurses can provide safe patient care.

The components *Prevention through right drug and solution administration*, *Prevention through the implementation of practice guidelines*, *Prevention emergency adverse events through critical care*, and *Prevention through effective patient care process* came from reorganizing the pre-sub dimension *Prevention*. Prevention here means an individual nurse's behaviors that attempts to stop harm before reaching the patient, therefore the use of the five rights of medication administration helps to provide consistent quality care,³⁷ and is critical for preventing medication errors. The nurse role for patient safety also involves to practice guidelines. These guidelines should explicitly define patient safety goals and patient safety solutions,^{2,3} including standardized processes, protocols, and checklists.³⁷ The results of reorganizing the pre-sub dimension of *prevention* was specific nurses' behaviors to prevent harm to patients.

Mitigation all of the items came from the pre-sub dimension of *Mitigation*. These items explained the nurse's behaviors in reducing the severity of complications after errors were identified. These behaviors consist of providing immediate care based on the role of the nurses, communicating hazards and incidents to other team members, patients and their families²⁸ which should be build trust and openness³⁸, and asking immediately for help. The action taken to make better or compensate for any harm after an incident would reduce loss or damage to patients, family, and the organization.²⁸

The component *Promotion through team and responsibility* was a combination of the pre-sub dimension of *Promotion with interpersonal facilitation for patient safety*. It focuses on the nurses' function and continually promotes patient safety through teamwork. Teamwork is functioning effectively within nursing and inter-professional teams, fostering open communication, mutual respect, and shared decision-making to achieve quality patient care.³⁸ As mentioned in the literature review, lack of team work is an important contributing factor to adverse events.²⁷ Furthermore,

the application of teamwork and collaboration among caregivers enhance the achievement of a system-wide culture of patient safety.³⁹ Thus, prevention of harm to patients is based on teamwork and is required for nursing performance for patient safety.

The component *Dedication to patient safety* is a combination of the pre-sub dimension of *Dedication to patient safety*, *Promotion*, and *Interpersonal facilitation for patient safety*. When considering the meaning of the items, the focus is on the nurses' behaviors that demonstrate that they are striving for patient safety through undergoing training on patient safety and sharing ideas about patient safety since patient safety solutions are needed to tackle the underlying causes of unsafe care. These included learning from mistakes in order to improve process and enhance awareness among medical staff.³⁸ Therefore, nurses should explain how to design solutions and implement them based on training which is strongly emphasized in developing countries.³⁶ Continuing training in patient safety procedures causes the practice improvement for patient safety in care settings.³ Dedication to patient safety through continuous learning for patient safety will improve nursing performance for patient safety.

The items of the NPPSS indicated more specific nurses' behaviors for patient safety than the conceptual framework. They also provided a better understanding of the nurses' role regarding patient safety, appropriate for the context of the TNMC and the BON standards. The NPPSS demonstrated adequate reliability and validity for measuring patient safety performance for nurses in Thailand. The NPPSS will additionally provide information which shows the frequency of the patient safety performance of individual nurse.

Limitations

The sub-scale total correlation of the NPPSS ranged from 0.86 to 0.95, which indicated redundancy. Thus items within the subscale may not be distinct

and hence they should be further examined through research. Secondly, the assessment of validity was tested using only one group type and thus a test using contrast group validity is recommended in order to arrive at more accurate validity of the NPPSS. Thirdly, this study was also limited in terms of testing for criterion-related validity because an existing scale was not available to compare it with. Thus, this should also be further examined.

Conclusions

The final version of the 64 items with 9 components is a self-report questionnaire with a 6-point Likert scale. The results indicated an adequate sample, and adequate reliability and validity for measuring nursing performance regarding patient safety. The results of the item- to-subscale correlation indicated that most of the items with a correlation over 0.70 were redundant. The findings and limitations suggested the need for future inquiry. Thus, future studies are needed to refine the instrument and to strengthen its psychometric properties.

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การพัฒนาเครื่องมือวัดการปฏิบัติการพยาบาลเพื่อความปลอดภัยของผู้ป่วย

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บทคัดย่อ: ในประเทศไทย การวัดความปลอดภัยของผู้ป่วยจากมารดูแลสุขภาพและการผดุงครรภ์ การพัฒนาเครื่องมือวัดการปฏิบัติการพยาบาลเพื่อความปลอดภัยในครั้งนี้จึงเป็นครั้งแรกที่ได้พัฒนาขึ้น โดยมีวัตถุประสงค์เพื่อพัฒนาและตรวจสอบคุณภาพของเครื่องมือวัดการปฏิบัติการพยาบาลเพื่อความปลอดภัยของผู้ป่วยสำหรับพยาบาลกระบวนการพัฒนาเครื่องมือว 6 ขั้นตอน คือ การกำหนดโครงสร้าง โดยการวิเคราะห์ฟอนท์คัน ประกอบด้วย 6 องค์ประกอบ คือ การปกป้อง การป้องกัน การบรรเทาความรุนแรง การส่งเสริมความปลอดภัย การช่วยเหลือกัน และการอุทิศตน ขั้นตอนที่ 2 ข้อคำถาม จำนวน 141 ข้อ ขั้นตอนที่ 3 กำหนดมาตรฐาน ซึ่งใช้ลิเคริตสเกล 6 ระดับ ขั้นตอนที่ 4 จำนวน 141 ข้อและตรวจสอบความตรงเชิงเนื้อหาโดยผู้เชี่ยวชาญจำนวน 5 คน ครั้งที่สองเหลือข้อคำถาม 73 ข้อ ได้ค่าความตรงเชิงเนื้อหาทั้งฉบับท่ากัน 1.00 ขั้นตอนที่ 5 ทดสอบความเที่ยงของเครื่องมือ ได้ค่าสัมประสิทธิ์แลฟารอนบากเท่ากับ 0.95 ขั้นตอนที่ 6 คือการทดสอบความตรงเชิงโครงสร้าง

บริบทของการทำวิจัยในครั้งนี้ คือ โรงพยาบาลศูนย์ 8 แห่ง และโรงพยาบาลทั่วไป 9 แห่ง ซึ่งเป็นโรงพยาบาลในสังกัดกระทรวงสาธารณสุข ทดสอบความตรงเชิงโครงสร้างในพยาบาลจำนวน 759 รายได้มาโดยการสุ่มแบบolleyขั้นตอนจากโรงพยาบาลทั้ง 4 ภาคของประเทศไทยและสุ่มอย่างง่าย ความล้มเหลวนี้ของข้อคำถามกับคะแนนรวมของข้อคำถามที่เหลือของแบบประเมินทั้งฉบับมีค่าระหว่าง 0.24 ถึง 0.75 การวิเคราะห์ห้องค์ประกอบเชิงสำรวจน์ที่สัดส่วนค์ประกอบโดยพิจารณาองค์ประกอบจากกลุ่มของตัวแปรที่มีความล้มเหลวนี้และหมุนแกนในลักษณะท่องค์ประกอบไม่เป็นอิสระกัน พบว่า แบบประเมินฉบับลุดท้ายมีจำนวน 64 ข้อ ประกอบด้วย 9 ด้าน ได้แก่ 1) การปกป้องอันตรายต่อผู้ป่วยโดยการล็อคสาร์ 2) การปกป้องอันตรายต่อผู้ป่วยโดยการจัดการความเลี่ยง 3) การป้องกันอันตรายต่อผู้ป่วยโดยการบริหารยาและสารละลายที่ถูกต้อง 4) การป้องกันอันตรายต่อผู้ป่วยโดยการปฏิบัติตามแนวทางปฏิบัติ 5) การป้องกันเหตุการณ์ไม่พึงประสงค์ที่เกิดจากสถานการณ์ฉุกเฉินโดยให้การพยาบาลผู้ป่วยในระยะวิกฤต 6) การป้องกันอันตรายต่อผู้ป่วยโดยการปฏิบัติตามกระบวนการดูแลผู้ป่วยที่มีประสิทธิผล 7) การบรรเทาความรุนแรงจากอันตรายที่เกิดขึ้นต่อผู้ป่วย 8) การส่งเสริมให้เกิดความปลอดภัยแก่ผู้ป่วยโดยการทำางานเป็นทีมและความรับผิดชอบ 9) อุทิศตัวเพื่อความปลอดภัยของผู้ป่วย

แบบประเมินการปฏิบัติการพยาบาลเพื่อความปลอดภัยของผู้ป่วยนี้มีความเชื่อมั่น ความตรงเชิงเนื้อหา และความตรงเชิงโครงสร้าง สามารถนำไปใช้เป็นแบบประเมินการปฏิบัติการพยาบาลเพื่อความปลอดภัยของผู้ป่วย อย่างไรก็ตามควรได้มีการปรับปรุงเครื่องมือนี้ต่อไป

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คำสำคัญ: การพัฒนาเครื่องมือ ความปลอดภัยของผู้ป่วย การปฏิบัติการพยาบาล การทดสอบคุณภาพของเครื่องมือทางจิตวิทยา คุณภาพ ความปลอดภัย

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