CHAPTER 3

Methodology

This chapter includes the methodology used in the study. It addresses the research design, setting, population and sample, research instrument, data collection procedures, data analysis, and protection of research subjects.

3.1 Research Design

The instrument developmental research design was used to develop the Nursing Performance in Patient Safety Scale (NPPSS) for nurses in Thailand. The study 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) pre-testing for determining of reliability, clarity, and readability, 6) field-testing for evaluating the item by determination of item analysis and constructing validity testing with factor analysis.

3.2 Research Settings

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The settings for pre-testing and field-testing of this study were eight regional hospitals and nine general hospitals governed by the Thailand Ministry of Public Health. One general hospital was randomly selected for pre-testing and eight regional hospitals and eight general hospitals were randomly selected for field-testing.

3.3 Population and Sample

The population of this study was divided into three groups. The first group of five experts reviewed the development item pool for content validity. The experts included two faculty members, one was an expert in instrument development and the

other was an expert in patient safety, two nurse administrators who were experts in patient safety management and one nurse who was an expert in patient safety practice.

The second group were nurses who worked in one general hospital governed by the Thailand Ministry of Public Health. They were experts in the area of reliability, clarity, and readability determination through pre-testing.

The third group included nurses who worked in 26 regional hospitals and 76 general hospitals governed by the Thailand Ministry of Public Health. They were the population used for the construct validity and reliability determination through field testing step.

The recruitment of the sample was conducted by multi-stage sampling starting with four regions of Thailand, to draw two regional hospitals and two general hospitals from every region of Thailand. One hospital was used for pre-testing and eight regional hospitals and eight general hospitals were used for field-testing. Then to draw the nurses who worked in inpatient units from the selected hospitals for pre-testing and field-testing, simple random sampling without replacement was used.

The samples were divided into two groups. The first group included 30 nurses randomly selected for reliability determination through pre-testing. The second group included 876 nurses for testing in the construct validity and the reliability determination through field testing stage. The estimated sample size was based on the criteria for factor analysis. The statistics requires a ratio of the participants per item (Burns & Grove, 2009). Eight hundred seventy six nurses were randomly selected.

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3.4 Research Instruments, Data Collection Procedures, and Data Analysis

According to the guidelines by DeVellis (2003) the instrument development process involves six steps.

3.4.1 Step1: identification of construct; identifying the domains from the integration of the patient safety came from an analysis of the concept by researcher, the nurse role for patient safety and performance concept came from the comprehensive literature review.

Two concepts of performance consisting of; 1) task performance 2) contextual performance. They include interpersonal facilitation and dedication. Further, four attributes emerged from the concept analysis in terms of patient safety by researcher. They include protection, prevention, mitigation, and promotion.

These four attributes were then categorized and arranged into the construct of the NPPSS. There are two dimensions of nursing performance in patient safety namely: 1) Nursing task performance in patient safety including protection, prevention, mitigation, and promotion, and 2) nursing contextual performance in patient safety. These include interpersonal facilitation for patient safety and dedication to patient safety. The definitions of the six sub-dimensions are described as follows:

1) Protection refers to an individual nurse's behaviors against harm before reaching patient by finding incidents that might occur to patients.

2) Prevention refers to an individual nurse's behaviors that attempts to stop harm before reaching patients.

3) Mitigation refers to an individual nurse's behaviors in reducing the severity of complications after something goes wrong caused by making incidents in patient treatment that could put patients in risky situations.

4) Promotion refers to an individual nurse's behaviors to perform the nurse function and continually enhance patient safety.

5) Interpersonal facilitation for patient safety refers to an individual nurse's behaviors to cooperate and immediately respond to requests from other team members in emergency situations

6) Dedication to patient safety refers to an individual nurse's behavior that shows striving for patient safety.

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3.4.2 Step2: Generating an item pool

Four attributes of patient safety and two components of performance were used to generate the item pool. Item were generated to reflect the meaning of patient safety performance that was defined as an individual nurses behaviors while caring for patient in order to save patients from dangers arising from healthcare providers, surrounding environments, and hazardous situations.

Under the operational definition of each dimension and sub-dimension, items were identified. The concern for item construction is the number of items. Nunnally and Bernstein (1994) recommend developing an item pool at least twice the size of that desired for the final scale. Initially, the researcher generated 141 items for the draft of items pool with six subscales. This item pool was reviewed by the panel of experts.

3.4.3 Step 3: Determining the format for measurement

The format of the NPPSS is composed of two parts: the demographic data form and the performance assessment scale. After the item pool generation, scaling responses were defined with a six point Likert-type scale ranging from no practice to highly practice (0 = no practiced, 1 = slightly practiced, 2 = somewhat practiced, 3 = moderate practiced, 4 = most practiced, and 5 = highly practiced).

3.4.4 Step 4: Reviewing for content validity by experts

1) Reviewing the initial item pool. The developed items were reviewed for content validity of the first draft of the NPPSS by five experts. The experts included two faculty members, one was an expert in instrument development and the other was an expert in patient safety, two nurse administrators who were experts in patient safety management and one nurse who was an expert in patient safety practice. The package reviewed by the experts included the first draft of the NPPSS, and the content evaluation form for experts consisting of a four-point rating scale: 1= not relevant, 2= somewhat relevant, 3= quite relevant, and 4= very relevant. After the first round, the NPPSS was revised based on the expert's comments and suggestion. Then, the second draft of the NPPSS was submitted to experts for the second round.

2) Data collection procedure

2.1) The researcher individually contacted the five experts. Then, the first draft of the NPPSS and a content validity evaluated form were sent to each expert.

2.2) The experts were asked to independently rate the relevance of each item to the construct, and appropriately measure all dimensions of the construct. In addition, experts were asked to evaluate the items' relevance, ambiguous items,

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readability, possibility of implementation, the scale format, and suggest or comment for item revisions. After the first round of the review, the NPPSS was revised and items deleted according to the comments of the experts, and then the second draft of the instrument with 79 items was submitted to experts for the second round. After the second round of the experts review, the third draft of the NPPSS with 73 items was constructed.

2.3) The researcher used content validity index to test the content validity of the developed scale and inter-rater agreement to test reliability.

3) Data analysis. The item content validity index (I-CVI) and the scale content validity index (S-CVI) were computed. The I-CVI was calculated as the proportion of items given a rating of 3 or 4. Scale content validity index (S-CVI) is the average of the I-CVI for all items on the scale. For five experts' rating the relevance of each item, the accepted value of I-CVI should be 1.00.

The inter-rater reliabilities were computed based on the rating of five experts for content validity as a function of agreements. The inter- rater reliability is a measure used to examine the agreement of different raters in assigning scores to same objects in the same measurement situation using the same tool (Waltz et al, 2003). The statistical measure of inter-rater reliability is the average of inter-rater agreement (Polit & Beck, 2004). The accepted value of inter-rater agreement should be at least 0.90 (Burns & Grove, 2009).

3.4.5 Step 5: Determining reliability, clarity, and readability

1) Pre-testing the initial instrument. The third draft of the NPPSS was to determine the scale's reliability through pre-testing before it was tested in the field. The sample included 30 nurses from one general hospital. Simple random sampling without replacement was used to select the sample.

2) Data collection procedure

2.1) The researcher asked for permission from the Research Ethics Review Committee at the Faculty of Nursing Chiang Mai University and of the selected hospital and directors of nursing service of the hospitals.

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2.2) After receiving permission from the Research Ethics Review Committee and the directors of nursing service, the third draft of the NPPSS was mailed to the directors of nursing service. Following this, these documents were distributed to 30 nurses. The participants were asked to assess their performance for patient safety and rate in the scale. Moreover, they were asked to evaluate clarity of language, length of the scale, ease of understanding, continuous of item, the possibility of implementation, and time for completing the scale.

2.3) After two weeks, the participants returned the third draft of the NPPSS to the researcher. Following this, the researcher tested for clarity of language, length of the scale, ease of understanding, continuous of item, the possibility of implementation, and time for completing the scale. The researcher then revised the instruments according to the comments and suggestions, and created the fourth draft of the instruments.

3) Data analysis

3.1) Descriptive statistics were used to describe the demographic data of participants including frequencies, percentages, means, range and standard deviations.

3.2) The internal consistency reliability was used to consider the reliability of the scale in each domain. Cronbach's alpha coefficient was used to assess the internal consistency reliability of the scale and of each domain. A scale reliability coefficient value for a new scale should be .80 to .90 or .70 (Burns & Grove, 2009).

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3.4.6 Step 6: Field testing for evaluating the item by determination of item analysis and construct validity testing with factor analysis.

1) Field-testing. The fourth draft of NPPSS with 73 items was evaluated for construct validity. The sample size of 876 nurses would be acceptable to meet the criteria often subjects per item (Burns & Grove, 2001; Hair, Black, Babin, Anderson, &Tatham, 2006; Nunnally, 1978). Eight regional hospitals and eight general hospitals were selected randomly from four regions of Thailand. Seven hundred and thirty nurses plus the expected attrition rate of 20%, were recruited in this study, totaling 876 nurses from each of the selected hospitals, were administered

for field-testing. The questionnaires were distributed to 876 nurses, and 831 were returned (94.86%). Among 831 returned questionnaires, 72 were incomplete (13.67%). Therefore, 759 (86.33%) were used for analysis.

2) Data collection procedure

2.1) The researcher asked for the permission of the Research Ethics Review Committee of each of the selected hospitals and directors of nursing service of the hospitals.

2.2) After receiving permission from the Research Ethics Review Committee and the directors of nursing service, the fourth draft of the NPPSS was mailed to the directors of nursing service. The documents were then distributed to 876 nurses. The participants were asked to assess their performance for patient safety and rate in the scale.

2.3) Ten items of the Marlowe - Crowne Social Desirability Scale (10-SDS) was distributed to subjects along with the fourth draft of the NPPSS. Since nursing organizations urge all nurses to comply with patient safety practice, some items may be perceived as socially desirable and could have contributed to the nurses giving answers that offer positive rather than negative attributes about themselves. The 10-SDS was originally written in English, translated into Thai and then back translation into English. This was conducted to assure equivalence in meaning occurred during the translation process.

The 10-SDS back translation consisted of four stages. For stage one, two bilingual teachers working as English language teachers in a university, translated the original English version of the 10-SDS into Thai. For stage two, two other bilingual teachers back translated the Thai version of the 10 - SDS into an English version. In the third stage, the original English version and translated English version were compared by an American English language teacher at the university, to confirm that the versions had the same meaning. The fourth stage involved the researcher and the back translator in stage one identified any flaws in the Thai version of the 10-SDS.

2.4) Once the documents were returned, the researcher analyzed the data using item analysis, internal consistency reliability and construct validity based on the objectives of the study. The correlation between the fourth draft of the NPPSS and the 10-SDS were analyzed.

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3) Data analysis. Frequencies, percentages, means, range, and standard deviations were used to describe demographic data of the participants. The analysis of the psychometric properties of the scale included item analysis, internal consistency reliability, and construct validity with exploratory factor analysis. The Kuder-Richardson (KR-20) was use to determined reliability of 10- SDS. The Spearman's rank-order correlation coefficient was use to describe correlation between the score of individual items of the fourth draft of the NPPSS and ten items of the 10-SDS.

3.1) Item analysis. Inter-item correlation, corrected item-total correlation, item-subscale correlation, subscale-subscale correlation, and subscale-total correlation were examined using Pearson product-moment correlation. The criterion for selecting qualified items to constitute a consistent scale included item-total correlation and a corrected item-subscale correlation of .30 or higher (Nunnally, 1978), inter-item correlations ranged from .30 to .70 (Ferketich, 1991; Mishel, 1998).

3.2) Internal consistency reliability. The internal consistency and reliability was analyzed by Cronbach's alpha coefficient. This study is a new scale, so, reliability coefficient above .70 is considered acceptable (DeVellis, 2003; Hair et al., 2006; Knapp & Brown, 1995).

3.3) Kaiser-Meyer-Olkin and Bartlett's test. Before conducting factor

analysis, the Kaiser-Meyer-Olkin (KMO) measured the sampling adequacy and Bartlett's test of sphericity were employed to determine the appropriateness of proceeding to factor analysis with the NPPSS, values must exceed .50, Bartlett's test of sphericity (sig. $\leq$ .05) (Hair et al., 2006).

3.4) Exploratory factor analysis. Construct validation and selected item were estimated by exploratory factor analysis. Factor extractions were employed using three methods: maximum likelihood factor analysis with direct oblimin, principal components analysis with varimax, and principal components analysis with direct oblimin. The criteria for determining factor solution of factor extraction included; 1) a factor with an eigenvalue of 1.00 or above, 2) item with a factor loading of .30 or above, 3) no or few cross loading items, and 4) no factor with fewer than three items.

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3.5) Social desirability. The reliability of 10-SDS was calculated using Kuder-Richardson (KR-20) since the scale was a binary format. The minimum acceptable KR-20 score was 0.70 (Wood & Haber, 2006). The Spearman's rank-order correlation was used to examine the correlation between the score of individual items of the fourth draft of the NPPSS and the 10-SDS. The criteria for determining Spearman's rank-order correlation values were; 0.01 to 0.30 is considered as a weak relationship, 0.31 to 0.50 is considered as a moderate relationship, and > 0.50 is considered as a strong relationship (Burns & Grove, 2009).

3.5 Protection of Research Subjects

This study was approved by the Research Ethics Review Committee at the Faculty of Nursing, Chiang Mai University and the Review Committee of each of the selected hospitals. All participants were given a detailed explanation about the purpose, methods, and time used in study. They were informed that participation in this study was voluntary; they could refuse to participate and could withdraw from the study at any time without losing benefits. In addition, there was no harm or risk in participating in this study. The researcher reassured the participants that the answers would be kept confidential. Finally, participants who agreed to participate in this study were asked to sign the informed consent form.

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