Research Paper

Development and psychometric testing of a competency of nursing process questionnaire

Virya Koy [a, b], Jintana Yunibhand [a, *], Andrew Rauth [c], Nicholas Bircher [c], Manila Prak [d], Richard Henker [c]

[a] Faculty of Nursing, Chulalongkorn University, Bangkok, Thailand
[b] Department of Hospital Services, Ministry of Health, Phnom Penh, Cambodia
[c] School of Nursing, University of Pittsburgh, Pittsburgh, PA, USA
[d] Cambodian Association of Nurses, Phnom Penh, Cambodia

ARTICLE INFO

ABSTRACT

Objectives: This study aimed to develop and evaluate a competency of nursing process questionnaire (CNPQ) for registered nurses in Cambodia.

Methods: Guided by the nursing process, an initial questionnaire was generated through focus group discussion, literature review, and the expert consultation. Finally, the validity and reliability of the questionnaire were validated through a questionnaire survey online of 260 registered nurses selected from Complimentary Package Activities 1, 2, 3, and national hospitals from January to February 2022 in five geographic areas of Cambodia.

Results: The content validity index was 1.00. The Cronbach's α coefficient for the whole questionnaire was 0.963, and the range for the five dimensions was 0.963—0.964, which shows that the questions were consistent. The test-retest reliability was 0.769. The exploratory factor analysis led to a list of 24 items that were grouped into five dimensions: assessment, diagnosis, planning, implementation, and evaluation. The cumulative variance contribution rate was 70.08%.

Conclusions: The CNPQ developed in this study showed good reliability and validity and can be used to assess the competency of registered nurses by themselves and help nursing managers to develop the relevant policies.

What is known?

- The five steps of the nursing process have been implemented globally.
- Competency of the nursing process improves outcomes in critical illness, patient well-being, nursing care quality, and patient safety.

What is new?

- This study developed the Competency of Nursing Process Questionnaire (CNPQ) and proved its reliability and validity.
- The CNPQ can help registered nurses evaluate their skills and provide baseline data that can be used to help spread best practices.

1. Introduction

Nursing competency comprises the core abilities required to fulfill the role of a nurse. Therefore, it is essential to define nursing competency to develop a principle for the nursing education curriculum. In addition, nursing competency is vital for improving care quality and patient safety [1]. Moreover, the registered nurses' core competence has been attributed to the ability to apply knowledge, attitudes, and skills that enable them to exercise efficiently and

* Corresponding author. Faculty of Nursing, Chulalongkorn University. 254 Phayathai Road, Pathumwan, Bangkok 10330, Thailand.
E-mail address: yuni_jintana@hotmail.com (J. Yunibhand).

effectively [2]. Evaluating nursing competency is an essential step in clinical practice and may not overestimate as a proper clinical competency assessment negatively affects patients' outcomes [3]. In recent years, surgical procedures have encountered heavy changes because of increasingly advanced technologies, the complexity of diseases, and advanced medical equipment. Therefore, assessing nursing competency based on validated and reliable questionnaires is necessary for complex surgical situations [4].

The nursing process is fundamental to professionalism in modern nursing practice. This analytical method uses scientific reasoning, critical thinking, and problem-solving to guide nurses in providing effective patient care [5]. It includes five steps: 1) assessment, 2) diagnosis, 3) planning, 4) implementation, and 5) evaluation [6]. Numerous studies have provided strong evidence that the nursing process (NP) competency improves outcomes in critical illness, patient well-being, nursing care quality, and patient safety [7,8]. By using the nursing process, nurses play a significant role in identifying the patient's health problems, providing interventions, and evaluating the outcomes of nursing care [9–11].

Despite the centrality of the nursing process, not all cultures have the necessary instruments to assess it. The nursing process has gained acceptance globally, and while registered nurses (RNs) agree on its beneficial effects, it is not widely used in practice [12,13] due to a lack of competence among RNs [14]. One reason the widespread use of the nursing process has not emerged is that nurses lack competence and, consequently, lack confidence in their ability to use it [15,16]. Applying the nursing process is connected to critical thinking and goal-oriented tasks. The Kingdom of Cambodia is making a concerted effort to further modernize and enhance professionalism in nursing. The standards of nursing care developed in Cambodia were approved in 2015 [17], and it explains the application of the steps of the nursing process within the nursing practice [18]. However, over a few decades in Cambodia, the RNs use of the nursing process has not progressed as hoped due to a high nurse-patient ratio, 24-h working shifts, lack of knowledge of the nursing process, and the pandemic [19].

A reliable and valid instrument designed specifically for Cambodian nursing is needed to improve competency in the nursing process at the Department of Hospital Services, Ministry of Health, Cambodia. In this study, competency of the nursing process refers to the extent to which the RN perceives their ability to practice the five steps of the nursing process to meet the patient's needs by using critical thinking and specific skills. Based on the need for a competency assessment with respect to the nursing process, there were at least three reasons that a new instrument had to be developed despite that there were existing instruments: 1) existing instruments did not focus on competency, 2) available instruments were not based on the entire nursing process, and 3) the existing instruments lacked construct validity.

Cambodia's healthcare system was classified from the community level to the national level. The lowest level is Complimentary Package Activity 1 (CPA1). This level provides health services such as minor surgery without anesthesia and maternity services. The CPA2 level provides medium surgery with anesthesia, emergency, maternity, and laboratory services. The CPA 3 level adds specialty surgery to the CPA2 level. Finally, the national hospitals have multiple specialists in surgery that a CPA3 cannot help.

Over the past three decades, a few studies in the west have focused on measuring nursing process. One such study developed an instrument to measure the attitudes of RNs, focusing on the nursing diagnosis step of the nursing process. The Positions on Nursing Diagnosis scale comprises 20 pairs of adjectives (e.g., easy/difficult, important/unimportant), one of which reflects an attitude favoring the nursing diagnosis concept [18]. A seven-point Likert scale was used to respond to the items, assigning a value of one to the most negative position on each pair and seven to the most positive. In 2018, a study measured the implementation of the nursing process using a five-point Likert scale (i.e., never, sometimes, do not know, usually, and continuously). The degree of implementation of the five parts of the competency of nursing process (CNP) ranged from 36% to 57% [20]. These two examples illustrate that the measures of CNP mainly reflected western cultures and did not focus on RNs' perceptions of CNP. Given gaps in instruments available to assess the nursing process, we developed an instrument to measure the perceptions of registered nurses' competency in the clinical application of the nursing process in Cambodia. Our study aimed to develop the Competency of Nursing Process Questionnaire (CNPQ) and assess the reliability and validity of this new instrument.

2. Methods

2.1. Theoretical framework

This study guided by Nursing Process [21], which was the relationship between patient and nurse. This theory stressed that what the RNs did was find out about and meet the patient's immediate need for help. With these, the RNs' tasks are to know how to deal with those adverse effects so the patient can continue to get better well-being. The nursing process helps nurses develop a good plan for caring for a patient that can be easily changed if something goes wrong. Competency in the nursing process means that an RN has the confidence to use the knowledge, skills, attitude, and clinical judgment needed to do nursing tasks within the scope of their practice at an acceptable skill level. Based on this theory, this study made the competency items for each concept, such as assessment, diagnosis, planning, implementation, and evaluation.

2.2. Development of the first item pool

The item pool was created in the following ways. First, creating items for the scale, three focus group discussions (FGD) resulted in 44 items. In the first FGD, there were ten nurses with a associate degree in nursing: four men (40.0%), and six women (60.0%). The age range was 35–59 years; the average working experience was 27.5 years. In the second FGD, there were ten RNs with a bachelor's degree: five men (50.0%) and five women (50.0%). The age range was 30–45 years, and the working experience was 21 years. Finally, in the last FGD, there were ten nurses with an master's degree: six men and four women. The age ranged from 30 to 38 years, and the working experience was 12 years. The FGD was kept separate from the different levels of education of the participants because each group could freely talk about CNP. The average work experience of the RNs ranged from more to fewer years because the master's-prepared nurses were younger than those with Associate Degree and Bachelor's Degree.

During the FGD, the authors ensured the trustworthiness by observing participants, taking notes of their opinions, and reviewing the verbatim compared with national and international findings to ensure transferability. In addition, the saturation method was followed for data collection and analysis. Last, the results were returned to participants' feedback to ensure the validation of the findings. Second, the literature review produced 20 items from the relevant literature on competency of nursing process, competency of nursing diagnosis, attitude of implementation in nursing process, and Deliberative Nursing Process theory were initial generated; therefore, the total items were 64.

2.3. Primary questionnaire development

Considering the different participants' contexts, the eight experts were invited to join the consultative workshop, including two nurse managers (one female and one male RNs), three nurse clinicians with a Bachelor of Nursing Science degree (two female and one male RNs), and three nurse educators with a Master of Nursing Science degree (two female and one male RNs). The age ranged from 30 to 55 years, and the average working experience was 25 years. At this stage, the eight experts were different from the FGD participants because of the input from many other points of view would benefit to obtain the experts' content validity.

The consultative workshop and research team deleted similar 32 items, including American experts who had experience in developing the standard of nursing practice. However, the last phase, systematic assessment, was based on the interpretation and textual material according to the operational definition. It was found that eight items did not reflect the competency of the nursing process; thus, these eight items were deleted. Consequently, 24 items composed the preliminary scale.

The Khmer version of the item pool was used by eight of the experts. The eight experts judged the items on a scale of 1 = not relevant to 4 = very relevant. Microsoft Excel was used to calculate the content validity index (CVI) at both the item and scale levels. The acceptable values are >0.79 and > 0.80, respectively [22].

2.4. Formal investigation

2.4.1. Participants

Participants were recruited from five geographic (Phnom Penh-Kandal, Kampong Cham, Kampot, Battambang, and Stung Treng) areas in Cambodia who worked in Complimentary Package Activity (CPA) 1, 2, and 3 hospitals, national hospitals, and private hospitals. The sample size criterion was 10 participants per item for Exploratory Factor Analysis (EFA) [23]. The initial CNPQ consisted of 24 items; therefore, the total estimated sample size was 264 participants (240 + 10%).

2.4.2. Ethical considerations

The National Ethic Committee for Health Research approved this study (no. 021—2022 NECHR). All participants signed consent forms before data collection. They were informed of their right to withdraw from the study at any time.

2.4.3. Instruments

2.4.3.1. General data questionnaire. The demographic data age, gender, working experience, educational levels, nurse leadership status, healthcare settings, were included.

2.4.3.2. Competency of nursing process questionnaire. The CNPQ is used to evaluate the level of competency of nursing process among RNs across 5 dimensions: assessment (4 items), nursing diagnosis (5 items), planning (5 items), intervention (7 items), and evaluation (3 items). In this step, the level of CNPQ was created based on the CNPQ total score; the higher the score, the higher the perceived competency of the nursing process.

The CNPQ was written in the form of a questionnaire. We used a five-point Likert scale response format for the items, where 1 = feel not confident at all, 2 = feel not confident, 3 = feel that I need more practice, 4 = feel confident, and 5 = feel proficient at that skill.

2.5. Data collection

The Google form was created for data collection between January and February 2022. The questionnaire was shared through the Khmer and English Google questionnaire platform, and researchers shared the online link with the nursing division at each hospital. The Google questionnaire included the no. 021—2022 NECHR, the consent form, the participant information sheet, the contact details of the research members, and an anonymous platform. Each questionnaire took about 30 min for a nurse fulfill in. Only the research team could access and check at the end of the survey with confidentiality and anonymity for the participants.

2.6. Data analysis

The IBM SPSS version 26 (SPSS, IBM, 2016, Armonk, New York, USA) was used for data processing and statistical analysis. The main key statistical analysis methods included descriptive statistics (frequency, mean, and standard deviation) and inferential statistics (factor analysis and Pearson correlation analysis). Statistical significance was set at $P < 0.05$.

An exploratory factor analysis (EFA) principal component analysis was computed on the inter-correlations among CNPQ items. The reliability was evaluated using Cronbach's α coefficient for the CNPQ and its dimension. The items scoring ≥0.3 were kept, and Cronbach's α coefficient greater than 0.70 was accepted as internal consistency [24]. The larger the correlation coefficient, the more the item represented the content of the evaluation tool.

Expert validity was used to reflect content validity, represented by the content validity index (CVI). A factor analysis was used to test the structural validity of the questionnaire. The content validity index was calculated using Microsoft Excel, including the content validity index, S-CVI/Ave >0.80, and I-CVIs >0.78 [25]. The item-total correlations were suggested to be higher than 0.30 by previous authors [22]. Pearson correlation coefficient between the two measurements was calculated to verify reliability of the questionnaire: two weeks later, the test-retest reliability was checked by asking fifty RNs who had already filled out the self-administered questionnaire to do it again to verify the repeatability of the CNPQ.

3. Results

3.1. Participant demographic characteristics

A high response rate of 98.0% was achieved as 260 out of the 264 questionnaires were returned. More than half of the participants were men (58.0%), and the average age was 28.83 years ($SD = 5.87$). The years of work experience as an RN were ranked from 1 year to 30 years. Most participants had an associate degree in nursing (50.0%), 46.0% had a bachelor's degree, and 4.0% had a master's degree. Most were RNs (91.0%), and team leaders and nurse managers accounted for 4.5% each. The participants were drawn from national hospitals, CPA 3, CPA 2, and CPA 1 hospitals, and private hospitals (21.2%, 21.2%, 20.0%, 16.8%, and 20.8%, respectively).

3.2. Content validity and item analysis

The Khmer version of the item pool was used by eight of the experts. The 24-item of CVI value resulted that the scale-level CVI average was ranged 1.0, and the scale-level CVI universal average was ranged 1.0, and item-level of CVI was ranged 1.0. Therefore, the CNPQ demonstrated excellent content validity because an item CVI greater than 0.80 is considered excellent.

3.3. Construct validity

The Kaiser-Meyer-Olkin (KMO) test result was 0.926, which indicates that the sample size was adequate for EFA, and Bartlett's test result was significant ($\chi^2 = 4477.17$, $P < 0.001$), which

demonstrated that all items were significantly correlated. The varimax rotation method's principal component analysis (PCA) extraction was not used for EFA because there were five steps in the nursing process. The findings of EFA for five dimensions (24 items) included eigenvalues that ranged from 1.04 to 11.62, and the total variance explained was 70.08% (Tables 1 and 2). The item-total correlations for the 24 items ranged from 0.42 to 0.78. The correlation coefficients among the five dimensions ranged from 0.58 to 0.66 ($P < 0.05$).

3.4. Reliability test

The Cronbach's α coefficient of CNPQ for the total scale was 0.963, with dimensions values were 0.964, 0.964, 0.964, 0.963, and 0.963 for assessment, diagnosis, planning, intervention, and evaluation, respectively (Table 1). Fifty participants were invited randomly to complete the CNPQ again two weeks after the first time. The intraclass correlation coefficient of the total questionnaire was 0.769, and the five dimensions ranged from 0.695 to 0.801 ($P < 0.01$).

4. Discussion

4.1. The validity and reliability of the questionnaire

Content validity Index: the item CVI value was 1.0, the scale-level CVI average was 1.0, and the scale-level CVI universal average was 1.0. Therefore, the CNPQ demonstrated excellent content validity because an item CVI greater than 0.80 is considered excellent [26]. The reason was that the CNPQ was a good test of how nurses do their jobs in all settings, according to those who answered the questionnaire.

Internal consistency reliability was used to figure out how well all the questions on the CNPQ measure the same thing in the same way. Throughout the pilot study, the results were consistent (Cronbach's α coefficient for the total scale and each subscale ranged from 0.93 to 0.94). A well-known and widely used tool needs a scale with Cronbach's α coefficient of at least 0.80 [27]. In addition, the correlations between items and totals ranged from 0.45 to 0.78. Because it is reliable, the CNPQ is a great way to measure CNP in all clinical nursing practices.

Our statistical analysis on construct validity, the CNPQ, indicated scientific validity. The EFA principal component analysis was used to investigate dimensionality. For good factor analysis, a KMO value greater than 0.600 is required [22]. We adopted a maximum variance method and varimax with Kaiser normalization. EFA showed that KMO = 0.926 (>0.60), and the five factors explained more than 70% of the total variance of the CNPQ. It was required by previous scale development experts [21].

Pearson's correlation coefficients were computed for the total scores. Correlations can be classified as very weak, weak, moderate, strong, and very strong associations (r range: 0.000—0.190, 0.200—0.390, 0.400—0.590, 0.600—0.790, and 0.800, respectively).

The CNPQ received $r = 0.58$—0.66, indicating moderate to strong correlation levels; as a result, the CNPQ is an excellent scientifically validated questionnaire for measuring the CNP in clinical settings [28].

Choosing the appropriate assessment questionnaire is critical for measuring CNP in various settings for RNs to maintain individual nurses' competencies. In addition, this will also let the nursing staff figure out how well they understand the nursing process and where they need more education and training.

4.2. The practicality and scientificity of the questionnaire

In this study, we developed and evaluated the psychometric properties of an instrument to measure CNP, which has its roots in Cambodia's culture and healthy environment. The development of the CNPQ has taken a different path than those taken by the several existing nursing process instruments in other countries. First, a literature review of current instruments was conducted, and the items related to the nursing process were pooled. Second, a review of the standards of nursing practice documentation was performed. Thus, the items included in this instrument were generated from the two sources.

It is also possible to relate this study to the nursing process approach because the items were relevant to each construct [13]. The instrument was designed to measure perceived CNP and highlight the need for targeted competence improvement within Cambodian healthcare facilities. It is an essential first step in a developing country where advanced nursing techniques and nursing research are yet to make their mark [29]. However, further psychometric testing of the CNPQ and possible refinement are needed. Instruments measuring CNP must be validated, reliable, and acceptable in the cultural context.

4.3. Limitation

The CNPQ was developed across practical nursing settings. Therefore, the scale items reflect the nature of the nursing process nurses implements. It is an excellent questionnaire to help with a precise understanding of the implementation of nursing processes in the clinical setting.

The first possible limitation with respect to generalizability was that 91% of the participants had an associate degree in nursing, and they may have different perceptions of the CNP compared with RNs with a bachelor's or Master of Science in nursing degree. The second limitation is convenience sampling, which limits the findings from being generalized to the nursing population in Cambodia. The last, a lack of experts' opinions on scale development may impact the appropriate number of clear and simple items. The CNPQ will need to be evaluated using a larger and more diverse sample of nurses to further support the measure's validity and reliability.

Table 1
The description 24-item of CNPQ after EFA ($n = 260$).

Dimensions	Eigen-values	Total variance explained	Number of items	Cronbach's α coefficient	Item-total correlation ranges	Mean	SD
Assessment	11.62	48.43	4	0.964	0.45—0.71	4.82	0.61
Diagnosis	1.54	6.43	5	0.964	0.42—0.75	4.84	0.53
Planning	1.40	5.87	5	0.964	0.63—0.78	4.79	0.64
Intervention	1.24	5.18	7	0.963	0.50—0.75	4.89	0.54
Evaluation	1.04	4.17	3	0.963	0.67—0.76	4.78	0.75
Overall CNPQ	16.84	70.08	24	0.963	0.45—0.78	4.61	0.61

Note: CNPQ = Competency of Nursing Process Questionnaire. QEFA = exploratory factor analysis.

Table 2
Principal component analysis with varimax orthogonal rotation for CNPQ and 5-factor solution ($n = 260$).

Items	Factors					Extraction
	1	2	3	4	5	
Assessment						
4. I actively try to involve the patient, family, and other healthcare providers, when appropriate, in assessing and caring for my patient.	**1.00**	0.45	0.05	0.28	−0.21	0.67
1. I feel as though I have the form and knowledge to accurately assess my patient's health status.	**0.97**	0.33	0.44	0.14	0.18	0.71
2. I feel as though I can utilize my knowledge and resources to complete a full patient assessment consistently.	**0.93**	0.22	0.78	−0.37	0.33	0.72
3. I can take into consideration the patient's values, preferences, needs, and knowledge of the healthcare situation when implementing my care.	**0.88**	0.23	0.29	−0.17	0.08	0.52
Diagnosis						
8. I feel confident that I am able to report important findings to the appropriate healthcare team.	0.76	**0.99**	0.07	0.16	0.21	0.60
7. I am able to identify and properly document/record normal and abnormal patient assessment findings.	0.35	**0.95**	0.19	0.27	0.21	0.73
6. I have ability to prioritize my patient's problems.	0.43	**0.83**	0.19	0.26	−0.16	0.66
9. I understand how to implement nursing diagnoses into the process of identify the appropriate nursing interventions in the planning for my patients.	0.45	**0.65**	0.04	0.60	0.14	0.72
5. I have ability to identify the signs and symptoms of my patients.	0.32	**0.63**	0.44	0.47	−0.12	0.68
Planning						
12. I am able to identify the expected outcomes for my patients.	0.59	0.15	**1.00**	0.18	0.13	0.74
10. I can identify, implement, and document appropriate nursing care plans.	0.28	0.37	**0.84**	−0.23	0.07	0.68
14. I feel confident in my ability to modify plans according to changing assessments throughout my shift.	0.48	0.51	**0.83**	0.14	0.31	0.80
11. I am able to individualize care plans for the needs of each patient.	0.23	−0.02	**0.76**	0.03	0.05	0.82
13. I can effectively prioritize care needs throughout my shift.	0.36	0.21	**0.63**	0.10	0.05	0.55
Intervention						
17. I am able to implement my plans in a way that makes my patients, and their family members feel respected and their needs are met.	0.38	−0.27	0.23	**1.00**	−0.05	0.76
19. I am knowledgeable of the technological resources available to me in the hospital setting.	0.48	−0.12	0.42	**0.88**	0.30	0.81
20. I feel confident in my ability to utilize these technological resources in my daily patient care.	0.25	0.50	0.29	**0.73**	0.30	0.80
16. I feel comfortable incorporating the patient, their family members, and additional healthcare teams in the implementation of my care.	0.36	0.35	0.04	**0.66**	0.44	0.76
18. I am able to implement cultural and social understanding into the care I provide to my patients.	0.61	0.23	0.11	**0.64**	0.03	0.56
21. I am confident in my ability to communicate with colleagues effectively.	0.01	0.35	0.01	**0.59**	−0.39	0.61
15. I feel comfortable assuming responsibility for implementation of my care plans throughout my shift.	0.21	0.51	−0.13	**0.45**	0.13	0.77
Evaluation						
22. I am able to evaluate my nursing care based on the expected I have identified in the planning for my patients.	0.19	0.28	−0.27	0.15	**0.95**	0.72
23. I am able to utilize ongoing assessment data to revise the patient's problems and change the plan of care if necessary.	0.75	−0.22	−0.17	0.03	**0.84**	0.67
24. I can document/record my evaluations of care and any changes that these evaluations may precipitate.	0.32	−0.07	−0.17	−0.32	**0.81**	0.63

Note: CNPQ = Competency of Nursing Process Questionnaire.

5. Conclusion

The final version of the CNPQ comprises five dimensions. The internal consistency of the instrument was good. Satisfactory levels of construct validity imply that this scale can be used in clinical nursing practice to measure the nursing process. The next step is to use the instrument to compare the perceptions of RNs before and after the implementation of the nursing process in both public and private healthcare facilities in Cambodia.

The challenge for the health sector in any country, including Cambodia, is to ensure that nurses' practice is of a high standard. Improving the standards of nursing practice requires reliable methods to assess baseline practice outcomes. The challenge continues for nurse administrators and RNs alike to demonstrate the effect of CNP on patient outcomes.

The results of this study provide nurse administrators and policymakers with empirical evidence of a measure that can be used to improve CNP in both public and private hospitals in Cambodia. When using instruments such as the CNPQ, nurse educators, mentors, and students can better understand nursing assessment, evaluation, and recording of relevant information related to the nursing process steps. This will increase novice nurses' awareness of the nursing process in hospitals and help educators and mentors assess the competence of nursing students as well as their competence. Nursing institutions should consider reviewing or revising the curriculum to emphasize CNP, preparing the nursing process for new natural settings.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2023.03.009.

References

[1] Fukada M. Nursing competency: definition, structure and development. Yonago Acta Med 2018;61(1):1–7. https://doi.org/10.33160/yam.2018.03.001.
[2] Weeks KW, Pontin D. Modelling the landscape of professional nursing competence - a global perspective. Nurse Educ Pract 2020;44:102738. https://doi.org/10.1016/j.nepr.2020. 102738.
[3] Anim-Boamah O, Dela Christmals C, Armstrong SJ. Clinical nursing competency assessment: a scoping review. Front Nurs 2021;8(4):341–56. https://doi.org/10.2478/fon-2021-0034.
[4] Abbassi Z, Douglas Sgardello S, Chevallay M, Toso C, Ris F, Jung M, et al. The modified competency assessment tool in surgical training. Am J Surg 2021;221(4):777–9. https://doi.org/10.1016/j.amjsurg.2020.09.011.
[5] Patiraki E, Katsaragakis S, Dreliozi A, Prezerakos P. Nursing care plans based on NANDA, nursing interventions classification, and nursing outcomes classification: the investigation of the effectiveness of an educational intervention in Greece. Int J Nurs Knowl 2017;28(2):88–93. https://doi.org/10.1111/2047-3095.12120.
[6] Molla M, Aseratie M, Murugan R, Molla M. Assessment of factors affecting implementation of nursing process among nurses in selected governmental hospitals, Addis Ababa, Ethiopia; Cross Sectional Study. J Nurs Care 2014;3(3):1–8. https://doi.org/10.4172/2167-1168.1000170.
[7] De Marinis MG, Piredda M, Pascarella MC, Vincenzi B, Spiga F, Tartaglini D, et al. 'If it is not recorded, it has not been done!'? consistency between nursing records and observed nursing care in an Italian hospital. J Clin Nurs 2010;19(11–12):1544–52. https://doi.org/10.1111/j.1365-2702.2009.03012.x.
[8] Gershater MA, Pilhammar E, Roijer CA. Documentation of diabetes care in home nursing service in a Swedish municipality: a cross-sectional study on nurses' documentation. Scand J Caring Sci 2011;25(2):220–6. https://doi.org/10.1111/j.1471-6712.2010.00812.x.
[9] Zegers M, de Bruijne MC, Spreeuwenberg P, Wagner C, Groenewegen PP, van der Wal G. Quality of patient record keeping: an indicator of the quality of care? BMJ Qual Saf 2011;20(4):314–8. https://doi.org/10.1136/bmjqs.2009.038976.
[10] Koy V, Yunibhand J, Angsuroch Y, Turale S. Development and psychometric testing of the Cambodian nursing care quality scale. Pac Rim Int J Nurs Res Thail 2017;21(4).
[11] de Melo Vellozo Pereira J, Cavalcanti ACD, de Oliveira Lopes MV, da Silva VG, de Souza RO, Gonçalves LC. Accuracy in inference of nursing diagnoses in heart failure patients. Rev Bras Enferm 2015;68(4):603–9. https://doi.org/10.1590/0034-7167.2015680417i. 690-609.
[12] Lotfi M, Zamanzadeh V, Valizadeh L, Khajehgoodari M, Ebrahimpour Rezaei M, Khalilzad MA. The implementation of the nursing process in lower-income countries: an integrative review. Nurs Open 2020;7(1):42–57. https://doi.org/10.1002/nop2.410.
[13] Semachew A. Implementation of nursing process in clinical settings: the case of three governmental hospitals in Ethiopia, 2017. BMC Res Notes 2018;11(1):173. https://doi.org/10.1186/s13104-018-3275-z.
[14] Baraki Z, Girmay F, Kidanu K, Gerensea H, Gezehgne D, Teklay H. A cross sectional study on nursing process implementation and associated factors among nurses working in selected hospitals of Central and Northwest zones, Tigray Region, Ethiopia. BMC Nurs 2017;16:54. https://doi.org/10.1186/s12912-017-0248-9.
[15] Parvan K, Hosseini FA, Jasemi M, Thomson B. Attitude of nursing students following the implementation of comprehensive computer-based nursing process in medical surgical internship: a quasi-experimental study. BMC Med Inf Decis Making 2021;21(1):10. https://doi.org/10.1186/s12911-020-01378-6.
[16] Alberto Camargo-Figuera F, Alejandra Ortega-Barco M, Rojas-Plata MC, Marín-Rodríguez D, Alarcón-Meléndez LJ, Villamizar-Carvajal B. Measurement of practices-knowledge-attitudes of the nursing process: systematic review. Invest Educ Enfermería 2021;39(3):e15. https://doi.org/10.17533/udea.iee.v39n3e15.
[17] Henker R, Prak M, Koy V. Development and implementation of cornerstone documents to support nursing practice in Cambodia. Online J Issues Nurs 2015;20(2):5. https://doi.org/10.3912/OJIN.Vol20No02Man05.
[18] Krenz M, Lunney M. A tool that measures attitudes toward nursing diagnosis. Nurs Diagn: ND: the Official Journal of the North American Nursing Diagnosis Association 1992;3(1):44. https://www.researchgate.net/publication/21594125.
[19] Koy V, Yunibhand J, Turale S. Comparison of 12 and 24-hours shift impacts on ICU nursing care, efficiency, safety, and work-life quality. Int Nurs Rev 2022;69(1):38–46. https://doi.org/10.1111/inr.12715.
[20] Miskir Y, Emishaw S. Determinants of nursing process implementation in north east Ethiopia: cross-sectional study. Nurs Res Pract 2018;2018:7940854. https://doi.org/10.1155/2018/7940854.
[21] Moraes PS, Chiarelli R, Costanzi AP, Rabelo ER. Nursing process: from literature to practice. Rev Latino-am Enfermagem. 2009:302–7. https://doi.org/10.1590/S0104-11692009000300004.
[22] Polit DF, Cheryl Tatano Beck. Essentials of nursing research: appraising evidence for nursing practice. ninth ed. Wolters Kluwer; 2018.
[23] Guadagnoli E, Velicer WF. Relation of Sample Size to the Stability of Component Patterns. Psychol Bull 103: 265-275. https://doi.org/10.1037/0033-2909.103.2.265.
[24] Hair JF, Anderson RE, Babin BJ, Black WC. Multivariate data analysis: a global perspective (Vol. vol. 7): Pearson Upper Saddle River.
[25] Hwang Y, Jang SH, Lee HJ, Lee SY. Reliability and validity of the Korean version of health anxiety questionnaire. Psychiatry Investig 2018;15(10):976–83. https://doi.org/10.30773/pi.2018.07.25.
[26] Lynn MR. Determination and quantification of content validity. Nurs Res 1986;35(6):382–5. https://doi.org/10.1097/00006199-198611000-00017.
[27] Kapoor M. Spearman's rank correlation and factorial analysis: socio-demographic characteristics of diabetic hypertensive patients presenting to a tertiary care hospital. Indian J Pharm Pract 2020;13(2):125–31. https://doi.org/10.5530/ijopp.13.2.19.
[28] Spearman C. The proof and measurement of association between two things. Int J Epidemiol 2010;39(5):1137–50. https://doi.org/10.1093/ije/dyq191.
[29] Koy V, Yunibhand J, Angsuroch Y. The quantitative measurement of nursing care quality: a systematic review of available instruments. Int Nurs Rev 2016;63(3):490–8. https://doi.org/10.1111/inr.12269.