Development and Psychometric Testing of the Work Performance Scale of Nurse at Primary Care Units

Karn Chaladthanyagid, Sunee Lagampan, Noppawan Piaseu, Chukait Viwatwongkasem, Naruemon Auemaneekul, OiSaeng Hong*

Abstract: Nurses are a cornerstone in providing care for people at primary care units, so the evaluation of the nurses' work performance is important to improve service quality. Nurses' performance has been assessed in many counties, including the United States of America, Canada, England, New Zealand, South Africa, and South Korea. Currently, there is a scarcity of tools for assessing all aspects of the work performance of nurses in Thai primary care units, so we undertook this study to develop and test the work performance scale of nurses. The study design was instrument development and psychometric testing. Qualitative methods using focus group discussions and expert reviews were applied for the items' construction. Quantitatively we examined the psychometric properties of this scale with 662 nurses working at primary care units in Thailand. Only the quantitative data and results are presented here.

Exploratory factor analysis revealed 71 items comprising ten factors: Basic treatment for common health problems and continuing care, School health care, Self-development, Research and innovation, Women and child care, Health resource management, Planning and budget management, Standard of care and assurance, Health data management, Disease prevention and environmental health care, and Disaster management. The Cronbach's alpha coefficient of the total 71 items and for each domain are in acceptable ranges.

The Work Performance Scale for Nurses at Primary Care Units achieved good validity and reliability scores and can be used to evaluate the work performance of nurse to improve their practices. However, it requires further confirmatory testing with nurses in Thailand at a range of primary care units.

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Introduction

Primary care (PC) is a key component of the health system. It is first contact for improving to ensure accessible, comprehensive, continuous, and coordinated care provided to populations across lifespan. Primary care is providing a broad range of services close to the people in community, including:

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health promotion, health problem identification, disease avoidance, common treatment and care for acute and chronic illness, rehabilitation, supportive and palliative care. Importantly the global strategic direction of nursing has been continued progress in the alignment of policy implementation to ensure the quality of service to the population[1] and this includes primary care.

Thailand has been undergoing health care reform implementing policies of primary care focused to ensure universal health care coverage and emphasis on health promotion and avoidance of acute and chronic of disease over curative care, with the quality of service for all populations across the life span.[2] Because of a shortage of primary care doctors, so much of the primary care work is done by nurses.[3] Thus a primary care unit (PCU) requires highly skilled, individuals performing with mixed skill sets in order to meet the unit goals and deliver the services. Nurses working at the PCUs are not only to provide the direct nursing care to people in clinical settings, but they are also to coordinate care and outreach service with multiple task performances relevant to the organization's goals.[4] Nurses' roles are both autonomous and collaborative in the PCUs.

Nurses' performance is described as the roles, functions, and activities of nurses relevant to the organization outcome.[5,6] Until this present study there was a limitation of tools for assessment or evaluation of the comprehensive roles for both the work and quality of practice nurses' performance at the primary care settings in Thailand. Most previous studies addressed only some specific roles of nurses such as chronic care, clinical activities, and outreach performance,[7,8,9] while other studies focused on coordinating care between nurses with multidis ciplinary teams at the PCUs level.[10] A good performance assessment tool is able to provide reflection on the quality of care services that are performed by nurses to the target population. In addition, the studies of the theory underpinning tool development and psychometric testing to identify the evidence related to nurses' work performance were limited in Thailand.

Conceptual Framework and Literature Reviews

This study applied the Intervention Wheel by Keller, as it is "practice-based" and useful as a framework or model for drafting the initial domain of a scale.[11] The Intervention Wheel is comprised of three elements of equivalent importance. First, the model is population-based. Second, the model circumscribes three levels of health service covering; individual, community, and system.[12] Third, the model distinguishes and describes 17 public health interventions, and each level of practice contributes to population health enhancement.[13]

The practice levels of the 17 public health interventions covering individual, family and community are comprised of surveillance, disease investigation, outreach and continuing care involving community members in decisions affecting health, health screening, case finding, follow up and referral, case management, delegate function, health teaching, consulting, counseling, collaboration, building on strengths and assets of individuals and communities, program planning, implementation, evaluation, advocacy including involvement in community development, social marketing, and policy development.[14,15,16]

The performance, roles and functions of public health nurses (PHNs) within a regional health structure were reviewed by a researcher and the core of PHNs services are initiated to be conveyed within a community-based framework. PHNs work with community groups, build collaborative initiatives as the community leaders, and negotiate partnerships. The PHNs must continue to have local, national and international linkages, which provide direction regarding to the extensive implications of policy to develop common strategies.[17] The PHNs' services

are straight to the general population with priority given to high-risk populations and include illness prevention, health protection, and health promotion. The PHNs aims are to decrease health differences among people and enhance wellbeing of all populations by addressing their determinants of health.[15]

In Thailand, the roles of nurses at the PCUs consist of working as a health care provider, care manager, health facilitator, health educator, counselor, and change agent of population health.[18] With the shortage of physicians in rural areas, nurses play the major roles at the PCUs in providing basic treatment for acute common health problems, refilling medications for people with chronic illness, and referring complicated cases to medical specialists.[3]

In addition, the role of nurses at the PCUs involves resource utilization, planning and implementing evidence-based practice creating innovations for care, conducting case management and coordination, and community engagement and networking.[19] Also, a nurse in a primary care setting also performs the academic role of training and coaching others, and advocating in the community for mobilizing the service quality of primary care services.[20]

According to previous studies, work performance scales were created based with an individual focus such as the Six-Dimension Scale of Nursing Performance (Six-D Scale)[4], the Registered Nurse Performance Appraisal Tool, and the Nurse Competency Scale.[21] Some studies of performance scales focused on inter- and intra-personal performance assessment.[22] Additionally, some scales were developed to measure work capacity, performance and standards based on expected work outcomes.[23] None of them measure the comprehensive work of nurses' performance at the primary care setting. And all of those scales measure only the quantitative of work performance. Until this study, no scale was available that assesses both the quantity and quality of nurses' work performance, suitable for the Thailand context of primary care units.

Study Aim

The objective of this study was to develop the Work Performance Scale for Nurses at Primary Care Units (WPSN-PCUs) for primary care units in Thailand and to evaluate its psychometric properties. Hopefully this tool will be a benefit for the development and improvement of the nurses' performance, which sequential to improve the quality and equity of health services at the PCUs.

Methods

Study Design: This was an instrument development descriptive study, according to DeVellis,[24] and consisted of two phases. First, item and scale development was undertaken through literature reviews; qualitative data obtained from focus groups; and expert reviews. Second, psychometric testing was undertaken.

Sample and Sampling: For the scale development phase there were two groups purposively recruited based on their work characteristics, that is, their expertise in primary care services or research instrument development. The first group consisted of 11 registered nurses (RNs) providing care at 11 PCUs in five provinces both urban and rural areas in Thailand. The second group was nine experts of multi-health disciplines from various health service organisations.

For the content validity the participants were purposively recruited based on their expertise in the primary care service and the research instrument development. There were ten experts asked to give their opinion about content validity including: - five academics in the public health nursing area, two instrument developers, one family medical physician in primary care, and two nurses at the PCUs.

For the psychometric evaluation phase, the sample size of primary care RNs was estimated using 5-10 participants per item. In other words, for power value the participants less than 200 would be poor,

more than 200 participants indicate fair, more than 300 participant indicate good, more than 500 participant indicate very good, and more than 1,000 participant indicate excellent.[25] Therefore, this study used nine participants per item for sample size estimation, giving a sample size of 693. For the estimation of incomplete responses and dropout rate, 50% were added.[26] Finally, 1,040 participants were needed. For sampling, Thailand has 13 health regions. Simple random sampling was employed for one province per each health region. So we used simple random sampling for proportionate 80 PCUs per a province, and at PCU level random sampling one nurse per one PCU.

Ethical Considerations: This research study was approved by the Ethical Committee for Human Research of the Faculty of Public Health, Mahidol University (Approval No.MUPH2014-181). Participants were informed about all steps of the study before they consented to participate in the study, including their right to decline or withdraw from the study at any time. In addition, participant questionnaire code numbers and consent forms were collected separately to ensure confidentiality.

Procedure of the Instrument and Development

The procedure of this research study was organized into two phases with six steps.

Phase 1: Items Development

Step 1: Identifying the pre-specific domains: Based on literature reviewed, the work performance of nurses was categorized into four preliminary domains: clinical performance; outreach and continuing care performance; administrative performance; and academic and research performance.

Step 2: Identifying domain definition, content domains, and generating items: Two focus group discussions (FGDs) were conducted with 11 nurses at Thai PCUs and nine experts in primary care to explore the real situation of nurses performing according to their roles and functions at the PCUs. The questions for open discussion included: *What are the roles and functions of nurses at the Thai PCUs?; What are the main components of performances of nurses under role and function at the PCUs?; What is the scope of nurses' work at the PCUs?; and What are the nurse's activities under each role and function at the PCU?* Secondly, a FGD was performed with nine various experts described above, applying the same previous discussion questions for verifying the information.

Step 3: Item generation: The initial scale was constructed with four domains and used information from the focus groups. The domains, sub-domains, and the items were 1) Clinical Performance, 26 items with four sub-domains of health promotion; prevention of acute and chronic disease; basic treatment for common health problem and rehabilitation; 2) Outreach and Continuing Care Performance, 20 items with four sub-domains of home visits; community outreach; school health; and environmental health and sanitation; 3) Administrative Performance, 20 items with six sub-domains of general management; financial management; health resource management; personal management; health services standards; and information management; and 4) Academic and Research Performance, 12 items with three sub-domains of health education and supervision; preparation of health media, innovation and research; and self-development.

The WPSN-PCUs was designed to assess both quantity and quality characteristics of practices.[27] For the quantity of work practice, a 5-point rating scale was applied (ranging from 1= never to 5 = always). For the quality of work practice, a 4-point rating scale was used (ranging from 1 = need to improve to 4 = very good).[28] The total scores of work performances are calculated from the summation of the rated quantity work practice score multiplied by

the rated quality of work practice score,[29] using the formula:

[Total score of work performances = Σ (quantity score of work practice x quality score of practice)]

To interpret total scores, a higher score indicates the higher work performances. To avoid response bias, the scale was designed for respondents to answer each item separately between the quantity of work practice and the quality of work practice as shown in the following item example:[30]

I assess growth and development of children from newborns to 5 years.

Quantity of work practice

never	rarely	sometimes	frequently	always
1	2	3	4	5

Quality of work practice

need to improve	fair	good	very good
1	2	3	4

Phase 2: Evaluating psychometric properties of the WPSN-PCUs.

Step 4: Content validity assessment: The 78 items of the WPSN-PCUs were reviewed by 10 experts in two rounds. They were examined to determine how an individual item represented the content domain, and to label whether the content domains adequately measured all dimensions of the construct.[31] Additionally, these content experts were examined to determine the clarity of the item structure and wording. The WPSN-PCUs was revised based on the first round of experts' comments. The total of 77 items reassessed by expert judgments on the 4-point rating scale from "strongly agree = 4" to "strongly disagree =1". Content analysis was applied for content items in the construction phase.[32] The item content validity index (I-CVI) revealed of 0.80-1.00, and the content validity index for scale (S-CVI) was 0.89.

The initial draft of the WPSN-PCUs with 77 items was tested for face validity to clarify the understanding about the wording in each item. Three nurses who worked at the PCUs were purposively selected for this testing. After this, a minor revision was performed by adding an option of "no activity".

***Step 5: Tryout the preliminary scale*:** The initial WPSN-PCUs was tried out with 50 RNs from both rural and urban PCUs. This aimed to assess their understanding, the time spent to complete the scale, and the scale reliability. The initial internal consistency reliability testing of the 77 items of the WPSN-PCUs showed a Cronbach's alpha coefficient of 0.97 (a quantity measure of 0.88, and a quality measure of 0.94).

Step 6: Psychometric property testing: The 1,040 packages consisting of the WPSN-PCUs, demographic questionnaires and consent form were distributed to the participants on receipt of receiving the contact address of the PCUs from The National Health Security Office (NHSO). Two envelopes with stamps were prepared for each participant to send the questionnaire and consent forms back separately to the mail box address of the researcher.

A post office box was reserved for collection of the returned and completed questionnaires. The participants were requested to complete the questionnaire within two weeks. If the participants did not return the completed questionnaires within four weeks, the WPSN-PCUs and demographic questionnaires would be sent again to the participant as follow-up.

Data Analysis

Content analysis was done using information from the FGDs.[33] The content of the audio recordings was paraphrased, then, the main ideas were interpreted and were organized into categories. Next, each category was synthesized as the domains and components of nurse's performance. In order to confirm the validity of analysis, the relations between the categories and received data were discussed with the experts.

The last step of this phase involved defining the terms for each category of nurse' performance. Descriptive statistics were employed to explain the general information of samples. Exploratory factor analysis (EFA) was employed to analyze the construct validity of the WPSN-PCUs. A principle component and Varimax methods through orthogonal rotation were administrated to extract and rotate the components. The criterion to evaluate items was scree plot, eigenvalues, percent of variance, and factor loading. The alpha coefficient of 0.7 or over and the loading factors with the level over 0.3 are adequate for acceptance.[26]

Results

A total of 662 nurses from 13 provinces responded, a response rate of 63.6%. Around one third of the nurses (39.4%) were aged between 40-50 years (M 40.7 ±7.9 years; range 23- 65 years). Most were women (90.6%), and married (70.1%). More than two thirds (75.4%) of nurses had completed the nurse practitioner (NP) training program certification. The average length of work experience was 17.4 years (S.D. = 8.86, range 2 to 42 years). Most participants were full-time employees at the PCUs (97.0%).

The Psychometric testing of the WPSN-PCUs

The Kaiser-Meyer- Olkin of EFA reported a sampling adequacy of 0.96. The Bartlett's test for 77 items showed the proper data being statistically significant for structural analysis (KMO= .962, χ^2= 33086.48, *df*=2926, p <. 001). The result of EFA revealed 10 factors with 71 items, the total percentage variance of 64.14% with a communality range of 0.357 to 0.838. Each factor was grouped by factor loading and named based on the characteristic of item content, in congruence with literature reviewed. On the other hand, there were three factors which had only two items: Factor 11 included *Co-design for the system to store health databases at the primary care settings;* and *Re-check the accuracy of health data before storage.* Factor 12 included *Provide counseling to individuals in specific case;* and *Provide clinical teaching for nurse and other students.* Factor 13 included *Analyze health data for planning to develop health projects;* and *Join with academic activities in health care settings such as conferences, storytelling and sharing knowledge.* The correlation coefficient was >0.85, demonstrating multi-collinearity. Therefore, these six items of three factors were not included in the scale because they did not meet the criteria, and indicated redundancy with the remaining items.[26]

The internal consistency reliability of 71 items in 10 domains of the WPSN-PCUs revealed the Cronbach's alpha coefficient of 0.97 ranging from 0.84 to 0.94, and the factor loading scores ranging 0.368- 0.838, as presented in **Tables 1-3.**

Table 1 Factor loading and communality of the WPSN-PCUs scale

Factor and Item number	Factor Loading	Communality (h^2)
Factor 1 Basic Treatment for Common Health Problems and Continuing Care: 20 items		
19. Provide nursing care services to the patient…	.717	.703
21. Prepare for participation in rehabilitation activities…	.676	.730
18. Provide referrals and continuing care…	.621	.543
20. Prepare the patient to be ready for self-care…	.612	.589
15. Report the Standard of Surveillance…	.608	.569
17. Provide nursing procedures …	.605	.645
16. Provide primary medical care…	.601	.645
24. Provide home visits across the lifespan…	.593	.719
22. Evaluate the patient's ability to engage self-care…	.592	.616
23. Coordinate with the multidisciplinary team…	.578	.676
66. Involved to support with national health policy…	.551	.612
8. Provide health promotion activities…	.541	.600
10. Provide health screening exams for patients…	.516	.557
67. Provide health education…	.515	.627
25. Follow up and evaluate continuing care…	.501	.583
26. Provide acute and chronic illness care management…	.462	.556
12. Provide health screenings for women…	.454	.534
33. Evaluate health project…	.379	.538
70. Supervise nurse, health personal, and other…	.373	.607
9. Participate in health mobile clinic at community…	.357	.482
Factor 2 School health care: 7 items		
36. Assess food sanitation, environment…	.800	.751
34. Assess for student health…	.765	.727
37. Provide compulsory vaccines to students at school…	.763	.753
39. Provide counseling/ nursing activities to students…	.696	.695
35. Assess the health of students…	.663	.734
38. Report, provide feedback…	.451	.635
40. Cooperate with school personnel…	.422	.647
Factor 3 Self-development, Research and Innovation: 7items		
75. Apply the findings of research to practice…	.784	.747
74. Act/get involved with research …	.744	.714
73. Develop health innovation in primary care setting…	.718	.729
72. Prepare/ produce health media in…	.696	.699
76. Present academic findings in health forum…	.624	.602
71. Serve as a health modulator/…	.413	.561
64. Use health information technology…	.412	.650
Factor 4 Women and Childcare: 7 items		
2. Provide postpartum care for women	.792	.719
1. Provide antepartum care for pregnant women…	.770	.683

Table 1 Factor loading and communality of the WPSN-PCUs scale (Cont.)

Factor and Item number	Factor Loading	Communality (h^2)
6. Promote breastfeeding ...	.606	.579
3. Provide family planning...	.603	.623
4. Assess growth and development...	.554	.577
5. Provide compulsory immunization...to 5 years...	.484	.546
11. Provide health screenings ...	.470	.537
Factor 5 Health Resource Management: 5 items		
53. Cooperate to manage medication stock...	.767	.719
54. Manage medication use, medical instrument...	.749	.749
52. Cooperate in the evaluation...	.630	.613
47. Help prepare staff and providers...	.608	.538
46. Cooperate with other health agencies/networks...	.473	.524
Factor 6 Planning and Budget Management: 6 items		
49. Cooperate to present health budget ...	.761	.774
48. Assure that medical instruments are available ...	.707	.741
50. Cooperate in managing health project budgets...	.593	.642
31. Collaborate with community members ...	.525	.705
32. Develop health projects/activities ...	.521	.729
51. Cooperate with the delegation of jobs/....	.381	.433
Factor 7 Standard of Care and Assurance: 6 items		
57. Cooperate to set risk management...	.838	.765
58. Participate in self-evaluation...	.823	.758
55. Assure medical instrument before work...	.588	.617
60. Get involved developing primary care standards...	.562	.746
59. Participate in colleague evaluations...	.553	.563
56. Cooperate to set practice guidelines/...	.533	.431
Factor 8 Health data management: 4 items		
28. Provide health assessment...	.645	.654
29. Prepare family and community folders...	.635	.698
27. Provide end-of-life palliative care...	.549	.670
30. Collect information on population ...	.474	.663
Factor 9 Disease Prevention and Environmental Health Care: 6 items		
14. Provide health surveillance...	.746	.714
13. Provide psychiatric health screenings...	.738	.740
7. Promote dental health for all age groups...	.551	.573
42. Assess the sanitation of food	.508	.650
41. Cooperate with environmental assessments ...	.467	.550
65. Link health information settings...	.368	.538
Factor 10 Disaster Management: 3 items		
44. Cooperate in the development of plans...	.635	.697
45. Prepare rescue instruments and plans...	.629	.550
43. Assess, cooperate and eliminate...	.569	.725

Table 2 Internal Consistency of the WPSN-PCUs (n=622)

Factor	Eigen-values	Total variance explained	Number of items	Cronbach's alpha after EFA	Item-total correlation ranges
1: Basic Treatment for Common Health Problems and Continuing Care	24.24	31.89	20	.94	.31-.79
2: School Health Care	4.66	6.13	7	.91	.40-.69
3: Self-development, Conduct Research and Innovation	3.69	4.86	7	.89	.41-.76
4: Women and Child Care	2.95	3.88	7	.84	.29-.65
5: Health Resource Management	2.26	2.97	5	.84	.38-.75
6: Planning and Budget Management	1.84	2.42	6	.88	.40-.78
7: Standard of Care and Assurance	1.59	2.09	6	.87	.44-.62
8: Health Data Management	1.37	1.80	4	.85	.52-.66
9: Disease Prevention and Environmental Health	1.33	1.75	6	.85	.30-.69
10: Disaster Management	1.23	1.62	3	.90	.69-.78
Overall WPSN-PCUs	45.16	59.41	71	.975	.29-.79

Table 3 Principal Component Analysis with Varimax Orthogonal Rotation for the WPSN-PCUs and 10 factors solution, (n=622)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
19	.717									
21	.676									
18	.621									
20	.612									
15	.608									
17	.605				.358					
16	.601				.423					
24	.593							.422		
22	.592									
23	.578							.437		
66	.551									
8	.541									
10	.516									
67	.515									
25	.501							.398		
26	.462									
12	.454			.358						

Table 3 Principal Component Analysis with Varimax Orthogonal Rotation for the WPSN-PCUs and 10 factors solution, (n=622) (Cont.)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
33	.379									
70	.373									
9	.357									
36		.800								
34		.765								
37		.763								
39		.696								
35		.663							.350	
38		.451								.358
40		.422								.365
75			.784							
74			.744							
73			.718							
72			.696							
76			.624							
71			.413							
64			.412							
2				.792						
1				.770						
6	.351			.606						
3				.603						
4				.554						
5				.484						
11				.470						
53					.767					
54					.749					
52					.630					
47					.608					
46					.473					
49						.761				
48						.707				
50						.593				
31						.525				
32						.521				
51						.381				
57							.838			
58							.823			

Table 3 Principal Component Analysis with Varimax Orthogonal Rotation for the WPSN-PCUs and 10 factors solution, (n=622) (Cont.)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
55					.400		.588			
60							.562			
59							.553			
56							.533			
28								.645		
29								.635		
27	.395							.549		
30								.474		
14									.746	
13									.738	
7									.551	
42		.470							.508	
41		.466							.467	
65									.368	
44										.635
45										.629
43		.397								.569

Discussion

To our knowledge, The Work Performance Scale for Nurses at Primary Care Units (WPSN-PCUs) is the first instrument to assess both quantity and quality of the nurse' performance at the PCU in context of Thai health care system. The scale has been generated from the Intervention Wheel, roles, functions, and job description of public health nurse performance as the conceptual framework.[9,13] A literature review was conducted to pool items from the existing instrument and FGD was used to clarify performance of nurses in Thai context. The CVI of the WPSN-PCUs corresponds with nurse performance concepts and specific operational definitions of widely accepted theoretical definition, expert opinions, and interviews with nurses to whom the measurement is targeted. In general, the content validity rests largely on how comprehensively the instrument is encompassing more attributes.[33] Although further refinement is needed, the instrument appears to have acceptable validity and reliability.

The results of the Cronbach's alpha coefficient were higher than the previous studies of work performance conducted in Thailand.[7,8,9] A scale with the Cronbach's alpha coefficient >.80 indicated that the composed items of the WPSN-PCUs had internal consistency reliability.[29,31]

The WPSN-PCUs comprises ten factors. Eight factors are similar to existing scales of pre-specific model and theoretical framework measuring nurses'performance.[9,11] Two factors, *Women and child care* and *Disaster management* were different from the pre-specific factors. These ten factors are described as below:

Factor 1: *Basic treatment for common health problems and continuing care* (20 items) was the

first powerful contributing factor to work performance of nurses at PCUs. This finding was consistent with the roles of PCU nurses and the scope of nursing practice[18] in Thailand including professional characteristics, professional nurse practice, and integrated health care service in health facilities.[7,9,22] Furthermore, these factors were congruent with the Intervention Wheel of PHNs, composed of disease and health investigations, health screening, case finding, monitoring of chronic conditions, referring and continuing care of populations.[11,17,23]

Factor 2: *School health care* (7 items) was different from a previous study.[9] PCU nurses can provide school health assessments at least twice per year to achieve better school health outcomes.[13] The findings indicate that nurses in Thailand can provide nursing services in schools to monitor health for students and school personnel. Furthermore, the sanitation of food and environment needs to be assessed at schools.

Factor 3: *Self-development, research and innovation* (7 items) is consistent with Thai RN competencies in terms of self-development, academics and research.[11,20] While nurses have limited time to conduct research and innovation for improving effectiveness of care in their health facilities,[9] research utilization and innovation could be improving effectiveness of their care outcomes. This performance factor is very important to develop professional activities of nurses at the PCUs. Otherwise, nurses could create routine work to avoid involvement in research to continuously improve their jobs at the PCUs.

Factor 4: *Women and child care* (7 items) was different from the pre-specific domains, and this finding is consistent with the roles competency and the scope of nursing practices at the PCU.[18,20] Although, the birth rate in Thailand has decreased, nurses are still providing health screening for maternal and child care not only for the Thai population but also for migrant workers at PCUs and in local communities. Moreover, the situation of adolescent pregnancy should be considered to prevent problems.[34]

Factor 5: *Health resource management* (5 items) comprises eight aspects of Thai RN competencies in terms of care management competency and health administrative in the health care setting.[7,8,9,20] These indicate that nurses play a major role to manage and facilitate health care resource at primary care.[15 22,35]

Factor 6: *Planning and budget management* (6 items) was congruent with the previous studies that reported moderate levels of nurses' performance in participation with planning health budgets at the PCUs.[10,18] These findings reveal that nurses perform planning and management of health projects to support PCU managers as well as manage human resources and budgets at the PCUs.

Factor 7: *Standard of care and assurance* (6 items) is consistent with the Thai RN competencies in terms of quality improvement.[20,24] As well, good management is an essential part of nurse' performance to improve the quality of nursing care at the PCUs.[8] All nursing processes and interventions have the standards to guide nurses to provide effective care at the primary care settings in Thailand.

Factor 8: *Health data management* (4 items) is consistent with the Thai RN competencies in terms of paper-based and information technology-based management.[20] Nurses can manage up to date databases in the PCUs. In addition, the participants identified health information in making plans for solving community health problems. Effective data management will be useful for providing health care to people by making work plans and utilizing research, information technology, and knowledge to improve quality of services at the PCUs.

Factor 9: *Disease prevention and environmental health care* (6 items) was different from the previous studies. The mobilization of populations and environmental change has caused newly discovered communicable diseases, bioterrorism, violence, and disposal of hazardous wastes around the world in that

those problems increase health issues.[7,36] Furthermore, these factors are congruent with the Intervention Wheel of public health nurses, composed of health screening and surveillance.[9,12] Nurses need to keep up with new knowledge and improve their ability to create programs to promote health, prevent diseases, and manage environmental hazards such as air pollution, waste water, and garbage in the community.

Factor 10: *Disaster management* (3 items) is a new domain that is different from the preliminary sub-domains of sanitation and environment nurses' work performance. Currently, disasters are emerging from both natural and man-made causes. The trend of disaster nursing management has become a critical concern. Disaster management is the newly found domain of nurses' work performance that entails planning, coordinating and managing for emergency response and disaster at the PCUs and the community level.[37]

Conclusion

The newly developed WPSN-PCUs is composed of 10 domains with 71 items, which mostly was consistent with the scope of the Intervention Wheel and the Thai RN competencies. This instrument demonstrated satisfactory content validity and construct validity as well as internal consistency reliability. Psychometric testing revealed new domains covering the comprehensive roles and functions of the nurse at Thai PCUs, who are key in achieving universal health care coverage in the country.

Limitations

This study performed using exploratory factor analysis without performing the confirmatory factor analysis. The result revealed a high Cronbach's alpha coefficient of 0.97 with 71 items but it suggested some redundancy of the items. Thus, the construct validity needs to be further explored with different group of nurses working at Thai PCUs to confirm and refine both the domains and the items. Measurement of quantity and quality of work performance of nurse was limited because it was undertaken only with nurses working at the PCUs in Thailand. Future measurement of nurse' performance needs to be investigated from other aspects such as other managers, peers, stakeholders, and customers to improve their quality of care.

Implications for nursing practice and research

The WPSN-PCUs can be used for assessing and monitoring the performance of nurses working at the PCUs to provide their benefits, and incentives, as well as to develop skill training courses to maximize nurses' potential to encounter the health care needs of people and to achieve the goal of universal health care coverage of the country.

This WPSN-PCUs instrument needs further refinement and development through research to be the standard for use throughout the country. Overlapping of work performance between disciplines at the PCUs needs to be explored for job specification. Online completion of the WPSN-PCUs should be considered as an annual self-assessment method for evaluating overall nurse's performance at Thai PCUs.

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การพัฒนาและทดสอบคุณภาพของมาตรวัดการปฏิบัติงานของพยาบาล ณ หน่วยบริการปฐมภูมิ

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บทคัดย่อ : พยาบาลเป็นกำลังสำคัญในการดูแลสุขภาพประชาชน ณ หน่วยบริการสุขภาพปฐมภูมิ ดังนั้นการประเมินการปฏิบัติงานของพยาบาลมีความสำคัญต่อการพัฒนาคุณภาพการบริการ การปฏิบัติงานของพยาบาลได้มีการประเมินในหลายประเทศ เช่น อเมริกา แคนาดา อังกฤษ นิวซีแลนด์ แอฟริกาใต้ เกาหลีใต้ ปัจจุบันมาตรวัดการประเมินการปฏิบัติงานของพยาบาลหน่วยบริการสุขภาพปฐมภูมิยังมีจำนวนน้อย ไม่ครอบคลุมทุกบริบทในการประเมินการปฏิบัติงานพยาบาลหน่วยปฐมภูมิในประเทศไทย ดังนั้นผู้วิจัยจึงพัฒนาและทดสอบเครื่องมือวัดการปฏิบัติงานของพยาบาล รูปแบบการศึกษาวิจัยเป็นการพัฒนาและทดสอบมาตรวัด ใช้วิธีการเชิงคุณภาพโดยการสนทนากลุ่ม นำข้อคิดเห็นจากผู้เชี่ยวชาญมาสร้างข้อคำถาม ใช้วิธีการเชิงปริมาณในการทดสอบคุณสมบัติทางจิตวิทยาของมาตรวัด โดยศึกษากับพยาบาล จำนวน 662 คน ที่ปฏิบัติงาน ณ หน่วยบริการสุขภาพปฐมภูมิประเทศไทย โดยเฉพาะข้อมูลเชิงปริมาณและผลลัพธ์ได้ถูกนำเสนอในงานวิจัยนี้

การวิเคราะห์องค์ประกอบเชิงสำรวจ พบมี 10 องค์ประกอบ 71 ข้อคำถาม ประกอบด้วย การรักษาโรคเบื้องต้นและการดูแลต่อเนื่อง งานอนามัยโรงเรียน การพัฒนาตน การวิจัยและนวัตกรรม การดูแลสุขภาพสตรีและเด็ก การบริหารจัดการอุปกรณ์สุขภาพ การวางแผนและการบริหารจัดการงบประมาณ มาตรฐานการบริการและการประเมินคุณภาพ การจัดการข้อมูลสุขภาพ การป้องกันโรคและอนามัยสิ่งแวดล้อม และการจัดการอุบัติภัย ค่าสัมประสิทธิ์ความเชื่อมั่นชนิดความสอดคล้องภายในของมาตรวัดทั้ง 71 ข้อ ในแต่ละองค์ประกอบอยู่ในเกณฑ์ที่ยอมรับได้ มาตรวัดการปฏิบัติงานของพยาบาลนี้ มีความตรงตามเนื้อหา มีความเชื่อมั่นอยู่ในเกณฑ์ที่ดี และสามารถนำไปประเมินการปฏิบัติงานของพยาบาลเพื่อการพัฒนาการปฏิบัติงานได้ อย่างไรก็ตามมาตรวัดการปฏิบัติงานของพยาบาลนี้ยังต้องการการทดสอบเชิงยืนยัน กับพยาบาลที่ปฏิบัติงาน ณ หน่วยบริการสุขภาพปฐมภูมิในประเทศไทยต่อไป

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คำสำคัญ: การพัฒนาเครื่องมือ การพยาบาล สุขภาพปฐมภูมิ การทดสอบทางจิตวิทยา พยาบาลวิชาชีพ การปฏิบัติงาน

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