

CHAPTER 4

Results and Discussion

The purpose of this study was to develop a competency assessment scale and examine the psychometric properties of a competency assessment scale for head nurses in community hospitals in Thailand. The first part of this chapter illustrates the characteristics of all participant groups in this study. The second part describes the results of scale development from the first step to the fifth step.

Results

Part 1: The Characteristics of Participants

There were four groups of participants. The first group included directors of nursing service and head nurses who provided information for conceptual definition through individual interviews and focus group discussions. The second group composed of 30 head nurses who participated in pre-testing the initial instrument. The third group composed of 614 head nurses who were the targeted samples participating in field testing the constructed questionnaires for item evaluation. The last group consisted of 68 staff nurses who had nursing experience of less than one year, and who participated in the contrasted group approach for testing the constructed questionnaires. The characteristics of the participants in each group are described below.

The first group, was divided into two subgroups. Subgroup I, three directors of nursing service and one head nurse from the 30-to 90-bed community hospitals, who participated in individual interviews. Their ages ranged from 48 to 55 years, and the average age was 50.3 years old ($SD = 3.3$). All of them had earned a masters degree. Their experiences as a head nurse ranged from 2 to 12 years, with the average experience of 6.5 years ($SD = 4.2$). Their work positions were head nurses (25%) and nurse directors (75%). Subgroup II, one director of nursing service and five head

nurses from the 30-to 90-bed community hospitals, who participated in focus group discussions. Their ages ranged from 38 to 55 years, and the average age was 46.7 years old (SD = 5.5). All of them had earned a bachelor degree and had experience as a head nurse ranging from 6 to 13 years, with an average of 8.5 years (SD = 2.2). Most (83.3%) were head nurses and 16.7% were nurse directors.

The second group, 30 head nurses, participated in pre-testing of the initial instrument. Their ages ranged from 35 to 51 years with an average age of 44.0 years old (SD = 4.7). All participants were female; most (70.0%) had earned bachelor degrees and the rest (30.0%) master degrees. Their experiences as a head nurse ranged from 2 to 26 years, with an average experience of 10.6 years (SD = 6.0). Only one-fifth (20.0%) of participants attended the 4 months administrative course. Their characteristics are presented in Table 4.1.

Table 4.1 Characteristics of Head Nurses who were Engaged in Pre-Testing Step

Characteristics	Number (n = 30)	Percentage (%)
Age (years)		
Range = 35-51 years, \bar{x} = 44.0, SD = 4.7		
31-40	7	23.3
41-50	22	73.4
51-60	1	3.33
Educational level		
Bachelor degree	21	70.0
Master degree	9	30.0
Hospital		
30 bed community hospitals	13	43.3
60 bed community hospitals	17	56.7

Table 4.1 (continued)

Characteristics	Number (<i>n</i> = 30)	Percentage (%)
Unit		
Emergency room	19	33.3
Outpatient department	8	26.7
Inpatient department	6	20.0
Labor room	6	20.0
Experiences as a head nurse (years)		
Range = 2-26 years, \bar{x} = 10.6, SD = 6.0		
< 5	5	16.7
5-10	11	36.6
> 10	14	46.7
Attended 4-month administrative course		
No	24	80.0
Yes	6	20.0

The third group, 614 head nurses, participated in field-testing, and their ages ranged from 25 to 58 years, with an average age of 44.5 years old (SD = 6.1); most were female (98.9%); and had earned a bachelor degree (87.1%). In addition, most (65.5%) worked in 30 bed community hospitals for >10 years (62.7%) with their average experience being 14.6 years (SD = 8.9). They worked in outpatient department (24.6%), inpatient department (30.6%), emergency room (24.9%), or labor room (19.9%). Only 23.9% had attended an administration training course. Their characteristics are presented in Table 4.2.

Table 4.2 Characteristics of Head Nurses who were Engaged in Field-Testing Step

Characteristics	Number (<i>n</i> = 614)	Percentage (%)
Age (years)		
Range = 25-58 years, \bar{x} = 44.5, SD = 6.1		
21-30	12	2.0

Table 4.2 (continued)

Characteristics	Number (n = 614)	Percentage (%)
31-40	158	25.7
41-50	337	54.9
51-60	107	17.4
Sex		
Female	607	98.9
Male	7	1.1
Educational level		
Bachelor degree	535	87.1
Master degree	79	12.9
Hospital		
30 bed community hospitals	402	65.5
60 bed community hospitals	184	30.0
90 bed community hospitals	28	4.6
Unit		
Inpatient department	188	30.6
Emergency room	153	24.9
Outpatient department	151	24.6
Labor room	122	19.9
Experiences as a head nurse (years)		
Range = 1-36 years, \bar{x} = 14.6, SD = 8.9		
1-5	126	
6-10	103	20.5
11-15	101	16.8
16-20	130	16.4
> 20	154	21.2
Attended 4-month administrative course		
No	467	
Yes	147	76.1
		23.9

In the last group, the age of all participants ranged from 21 to 25 years with their average age being 22.8 years old ($SD = .80$). Most participants were female (95.6%); 52.9% worked at 30; 39.7% at 60; and 7.4% at 90 bed community hospitals. All worked in the outpatient department (8.8%), inpatient department (54.4%), emergency room (29.4%), and labor room (7.4%). Their characteristics are presented in Table 4.3.

Table 4.3 Characteristics of Staff Nurses who were Involved in the Contrast Group

Characteristics	Number ($n = 68$)	Percentage (%)
Age (years): Range = 21-25 years, $\bar{x} = 22.8$, $SD = .80$		
Sex		
Female	65	95.6
Male	3	4.4
Hospital		
30 bed community hospitals	36	52.9
60 bed community hospitals	27	39.7
90 bed community hospitals	5	7.4
Unit		
Inpatient department	37	54.4
Emergency room	20	29.4
Outpatient department	6	8.8
Labor room	5	7.4
Attended 4-month nursing course		
No	68	100

Part 2: The Results of Scale Development

Step 1) Specifying the construct of the measure

After a comprehensive literature review, the concept of competency for head nurses in community hospitals was defined in this study as a set of work behaviors of head nurses resulting from knowledge, skills and personal characteristics that enabled them to carry out their work effectively and to achieve organizational goals. These

competencies include five domains taken from the competency framework for head nurses from Thailand Nursing and Midwifery Council [TNC] (2013), individual interviews, focus group discussions, and literature reviews which are displayed in Table 4.6.

Individual interviews and focus groups discussion were conducted with ten nurse administrators from community hospitals to explore their opinions of the essential competencies for head nurses in community hospitals. From, the qualitative content analysis emerged five domains and ten sub-domains. Each domain and subdomain is described below.

Domain 1: Leadership: Most participants believed that head nurses in community hospitals require the ability to lead groups of people such as subordinates, healthcare teams and network, and the community workforce driving toward goal achievement. The participants proposed that leadership is concerned with a shared vision, systemic thinking, being a change agent, negotiation, and model of caring. The participants said that leadership is:

...a large domain. Leadership competency is a team leader who thinks with systemic perspective for goal achievement. A head nurse must be a leader in the community, and coordinate with healthcare network and other organizations. The potential of innovative nursing is applied by head nurses in complex problems. (Participant 1 (P1), p.1)

...defined as the ability of the head nurse to regulate goals, visions, and systematic procedure and negotiate, to be a change agent and consultant in nursing of subordinates. (P2, p.1)

...defined as head nurses can use knowledge, skill and ability to motivate and lead other people to participate and share their vision in the work until they reach their goals. (P3, p.1)

Subdomain 1: Share vision. Participants shared their idea that if a head nurse actually helps achievement in their organization, they should have knowledge, experience and characteristics to help them view the organization widely as a whole, and set a vision into the future, for example:

Head nurses who want to reach goal achievement, must have a view of all the organization which was integrated with knowledge, experience and

internal characteristics indicating a wide perspective of head nurses. Moreover, they should discuss and pass on knowledge to their members. (P2, p.1)

In achievement of the work ... they have to set and share the vision for the future, and plan both short and long term continuously. (FG, p.3)

Subdomain 2: Systematic thinking. Participants proposed that head nurses

or leaders need to think logically and deliberately on situations and problems to create good decision making, and problem solving so that clients, providers and the organization receive the overall benefits. Examples are:

In a community hospital, head nurses must think deliberately by themselves about decision making and problem solving in the unit. (P2, p.2)

Systematic thinking and analytical thinking are essential for a leader. Before making decisions, head nurses should strongly consider this. Analytical thinking is breaking things down into smaller components or the parts of situation, and then understanding how these things work together to create new things in the unit and organization. (P4, p.1)

Understanding the issue and problem, classifying each situation and problem in a step by step way are essential for analysis. (P1,p.7)

Subdomain 3: Change agent. Head nurses who want to be a leader should be a representative of change, explain the information for accepting any alteration, and energize team efforts to participate in the desired changes. Participants presented below:

Now the essential of leadership competency is being a change agent. The leader must rapidly access the change events and accept them. Head nurses ought to motivate the team to reach the goals of changes, to shift the nursing care for achievement. (P2, p.1)

Head nurses must be a leader in managing the process of change. ...they have to plan and make efforts for subordinates to participate in the desired changes, especially in the clients' care. (FG, p.3)

Explaining the information to subordinates who are faced with the change events until they accept and follow head nurses is important. ...they facilitate and provoke their team to work for achievement. (P4, p.2)

Subdomain 4: Negotiation and conflict management. In the negotiation process, head nurses need have strategies for giving in on some points and standing firm on others to satisfy on both sides. Head nurses manage a dispute through sharing the needs of each group for agreement consensus. Two participants said:

Leaders should negotiate and manage the conflict through using strategies for giving some points and standing firm. Both providers and clients can see that the result is satisfied on both sides. (P2, p.1-2)

I think if head nurses have leadership competency, they can change the disagreement to share and consensus of agreement. (P1, p.4)

Subdomain 5: Model of caring. Most participants offered the view that leaders need to be experts in nursing care and consultants in nursing for the team, as well as good role models of caring. For example:

Collecting knowledge and experience in management and facilitating the team for caring in a unit and community has to be demonstrated in the head nurse position and model of nursing care. (P3, p.3)

The expertise of leaders must show broad knowledge of nursing service in community hospitals. They ought to be the consultants in nursing care team, and solve the problems when the subordinates face with the difficult situation. (P2, p.3)

Domain 2: Management: Most participants proposed that to be competent in management, head nurses should manage resources, quality of nursing, and nursing knowledge in the unit and in the community. In this sense, management means:

...that resource management which is both human and supplies in the unit and community, and covers the quality of nursing management. (P2, p.2)

...that head nurses can manage the human resources, supplies, and knowledge for quality improvement management.. (P3, p.6, FG, p7)

Subdomain 1: Resources management. Regarding management competency, head nurses need to plan, organize, direct, and coordinate, control appropriately and sufficiently the human resources, funding, and materials through

planning long and short range strategies, and cost containment in a unit and the community to meet the organization's objectives. Participants presented that resources management means:

...plan, organize, direct, coordinate and control the manpower, money, and material management in units and the communities. For effective management, they must analyze the job and plan the strategy and participate with subordinates and networks. (P2, p.2)

...that head nurses can manage human resources planning the appropriate workforce using, human development for career path, the process of retaining and performance assessment. For budget management, head nurses have to plan the budgets for long-range planning and the cost estimation to meet the organization's objectives. For the supplies management, they should prepare and forecast sufficiently for the month. (P1, p.2)

...the human resources, budget, and supplies are used effectively cost wise both in the unit and community. (P3, p.6, FG, p7)

Not only head nurses must plan the resources but also they must plan for effective performance and cost containment. ... The strategic planning must cover in community and network. (P4, p.3)

Subdomain 2: Quality management. Head nurses must be leaders in quality management collaborating with subordinates and the healthcare team in the unit and community through description all activities related to establishing; maintaining and assuring high quality care, and setting the standards and process of evaluating and monitoring the quality of care given in a unit and community. This was explained as:

...head nurses lead the subordinates to assure and improve the quality of service. Setting the goals and standards are discussed by brainstorming. The criteria must be determined that will indicate if the standards are being met and to what degree they are met. Data collection for interpretation is essential for implementation improvement. Monitoring nursing care should use several methods. Head nurses send subordinates

to collaborate with other organizations for quality improvement. (P1, p.2, FG, p.4)

...head nurse should be the leader in quality improvement. ... They collaborate with healthcare team to analyze and plan the expected outcome result to the standards and process of outcome management. They should integrate the standards to practice in a unit and community. (P4, p.3)

Subdomain 3: Knowledge management. Some participants considered that

head nurses should have the ability to organize, collect, share, and analyze the information in nursing care effectively, and to be a facilitator and consultant of subordinates, networks, and a community for information management. For example:

Facilitate subordinates to attend knowledge management and share information with healthcare team and other organizations. Head nurses should be the supervisor in the process of knowledge management in a unit and community to share their knowledge and problems with each other. (P1, p.2, P4, p.3)

Head nurses must have the ability to organize, collect, share, and analyze the information in nursing care effectively, and to be the consultants of subordinates, networks, and the community for information management. (P3, p.5, FG, p.6)

Domain 3: Communication. Most participants proposed that head nurses should establish relationships; the ability to transfer the information and understanding from one person to another by both verbal and nonverbal communication in order to collaborate in nursing care achievement; and use technologies to access the available information and communicate nursing knowledge effectively. For example:

Head nurses should establish relationships and trust for effective communication both in unit and other organization in order to collaborate with healthcare for achievement. They ought to use the technologies in data investigation and communication effectively. (P4, p.4, FG, p.4)

Effective communication is based on the skills and strategy of head nurses to build up relationships. They have to transfer the information and understanding from one person to another. (P3, p.5)

Now this competency is significant. Head nurses ought to have a relationship with other people in the unit, other organizations, and other disciplines. They should communicate with two ways both, verbal and nonverbal as well as technologies using for the quality service. (P2, p.3)

Domain 4: Professional ethics. The participants said that head nurses should work appropriately with moral behavior, ethics, law, especially in provider and patient rights through informed data, and facilitating subordinates to advocate for recipients of healthcare.

Head nurses engaging in law, ethics, and code of professional conduct are their roles. They must work with honesty, justice, and sacrifice, and understand to how advocate for patient and provider rights. Moreover, facilitation of the human and patient rights is essential competency of head nurses for successful nursing care. (P3, p.5, P2, p.4)

Patients' right must be informed to all clients, and facilitate subordinates to advocate for providers and patients' right completely. (P1, p.5, FG, p.5)

Domain 5: Policy and healthcare environment. Participants presented the behaviors of head nurses needed in this domain, which were categorized separately with two subdomains such as policy implementation, and healthcare environment management.

Subdomain 1: Policy implementation. Head nurses ought to transfer a policy to subordinates, and move the unit toward its goals by assigning activities for members to perform. They should have the ability to prevent and control the determinants causing the problems which can be forecasted for preparing in unit and community. For example:

Participating in policy regulation of subordinates in the unit is essential. Head nurses have to transfer related policy to subordinates. One leg steps on the community and the other steps on the unit. (P1, p.6, P2, p.4)

Head nurses have to move unit toward their purpose or goals by assigning activities that organization or member perform. They need the

ability to forecast the impacts of diseases, and then prepare to prevent and control the determinants to decrease problems. (P3, p.4)

Subdomain 2: Healthcare environment management. Head nurses are required to effectively plan, implement, control and evaluate the healthcare environment for client and healthcare team with safety and healthy. They should facilitate sufficiently the supplies used for safety and healthy environment. The examples are as follows:

Criteria of the healthy workplace are required for head nurses that can manage the environment for patient and provider safety. (P4, p.5)

Head nurses need to have the proficiency to plan, implement, control and evaluate the healthcare environment, and they should facilitate sufficiently the supplies for safety and healthy client and providers. (P1, p.6, P2, p.5)

Now every hospitals have to have the Healthy Workplace Projects which is consistent with the policy of Ministry of Public Health. So, head nurses need the ability to participate with subordinates and facilitate the environment for good health workforce and healthy environment. (P4, p.5, P2, p.5)

In summary, the domains and subdomains of competencies for head nurses in community hospitals were identified by individual interviews and focus group discussions including leadership, management, communication, professional ethics, and policy and healthcare environment. Some domains and subdomains differ from competency structure of TNC (2013): share vision, and model of caring in leadership; management categorized into three subdomains as resources, quality, and knowledge management; policy means head nurses should transfer the strategies to action plan in a unit; and healthcare environment means the climate and environment of workplace, and health of workforce. However, the meaning of each domain was defined based on TNC (2013), individual interviews and focus group discussions as well as the reviewed literature, which are described in Table 4.4.

Table 4.4 Summary of Domains and Definitions of Competencies for a Head Nurse in Community Hospitals

Domain	Subdomain	Definition
Leadership (TNC, Interview, Focus group)	<i>Share vision</i> (Interview, Focus group)	Ability or skills to lead and influence groups of people such as subordinates, healthcare team, networks, and community workforce to drive toward a goal achievement. Ability to view widely the whole organization, and set a vision into the future.
	<i>Systematic thinking</i> (TNC, Interview, Focus group)	Ability to think logically and deliberately on situation and problems for creation the innovation, decision making, and problem solving so that clients, providers and the organization receive the overall benefits.
	<i>Change agent</i> (Interview,	Ability to be representative in changing for continuous improvement, describe the reasons

Table 4.4 (continued)

Domain	Subdomain	Definition
	Focus group)	for acceptance of the alteration, and to energize team to participate in making desired changes.
	<i>Negotiation and conflict management</i> (TNC, Interview, Focus group, Literature review)	Ability to give into the alternatives of others to achieve desired outcomes and satisfy mutual needs, and share the needs of each group for agreement consensus and solve problems creatively.
	<i>Model of caring</i> (Interview, Focus group)	Ability to be an expert and consultant in nursing care for the team, and to be a model of good care.
Management (TNC, Interview, Focus group)	<i>Resource management</i> (TNC, Interview, Focus group)	Ability for planning, organizing, directing, coordinating, and controlling the human resources, funding, and materials; plan strategies; and set objectives needed to achieve goals.
	<i>Quality management</i> (TNC, Interview, Focus group)	Ability to be the leader of quality improvement; set standards; design the process and its measurement, evaluation, monitoring, and continuous improvement assuring high quality of care given through collaboration with subordinates, healthcare team, and community.
	<i>Knowledge management</i> (TNC, Interview, Focus group)	Ability to organize, collect, share, and analyze the information against an evidence-based criteria for nursing care in unit and community.

Table 4.4 (continued)

Domain	Subdomain	Definition
Communication and relationships (TNC, Interview, Focus group)		Ability to transfer clearly and concisely the information and understanding from one person to another with two way communication, both verbal and nonverbal; build relationships with the workforce and other disciplines to collaborate in healthcare service achievement; and use technologies to investigate the information and communicate nursing knowledge effectively.
Professional ethics (TNC, Interview, Focus group)		Ability to work appropriately with moral, ethics, law; advocate the human and patient rights; solve the problems based on ethics and law; and facilitate subordinates, and healthcare team to advocate the healthcare recipient.
Policy and Healthcare environment	<i>Policy implementation</i> (Interview, Focus group)	Ability to transfer a policy to subordinates, and move a unit toward their goals by assigning activities that members perform; prevent and control the determinants causing problems which can be forecasted for preparing in unit and community.
	<i>Health healthcare environment management</i> (TNC, Interview, Focus group)	Ability to plan, implement, control and evaluate the healthcare environment for client and healthcare team with safety and healthy; and control the environmental factors affecting the health of a community including biological, physical and chemical factors.

Step 2) Generating an item pool

The operationalized definition of each domain was specified from the head nurse competency framework of TNC (2013), individual interviews, focus group discussions, and the reviewed literature. It reflected the meaning of head nurse competencies in community hospitals that was used to generate an item pool. The initial draft of the item pool included 125 items.

Step 3) Determining the format for measurement

A five point Likert-type of scale format was used in this scale. It is used in instruments measuring opinions, beliefs, and attitudes. This instrument is expressed in the choice of response option. The response choices ranged from never done to always done (1 = hardly never done or never done (80.01-100% of practice), 2 = seldom done (60.01-80.00% of practice), 3 = occasionally done (40.01-60.00% of practice), 4 = almost always done (20.01-40.00% of practice), 5 = always done (0-20.00% of practice).

Step 4) Having the initial item pool reviewed by experts

Reviewing the items by experts.

An item pool reviewed for content validity was conducted by a panel of six experts. One hundred and twenty five items were sent to experts for review in two rounds. In the first round, the experts returned the item pool package with their comments and suggestions for two parts evaluation including the relevance of items to the concept and the scale format. Four experts suggested that a CASHNCH was too long scale. After two rounds of review by the dissertation advisory committees and experts, the result consisted of five domains, 10 subdomains, and 55 items as follows:

Domain 1: leadership was generated with 5 subdomains and 14 items (L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14).

Domain 2: management was generated with 3 subdomains and 13 items (M1, M2, M3, M4, M5, M6, M7, M8, M9, M10, M11, M12, M13).

Domain 3: communication and relationships was generated with 2 subdomains and 10 items (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10).

Domain 4: professional ethics was generated with 8 items (E1, E2, E3, E4, E5, E6, E7, E8).

Domain 5: policy and healthcare environment was generated with 2 subdomains and 10 items (P1, P2, P3, P4, P5, P6, P7, P8, P9, P10).

The results of the reviews are as follows: The evaluation of the relevance of items to the concept, the panel experts commented that most of the items in the initial draft of a CASHNCH were quite and very relevant to the concept. Some items needed revision for clarity, the correct domain and subdomain, and the appropriate number of scale. The rating of the relevance of each item was computed on the content validity index (CVI) at the item level (I-CVI) and at the scale level (S-CVI). The values of I-CVI ranged from .67 to 1.00. Forty items of scale had an I-CVI less than the criteria (.78): fifteen items in leadership; sixteen items in management; four items in communication and relationships; one item in professional ethics; and four items in policy and healthcare environment. Thus, they were deleted from the scale. Thirty items of scale were similar with other items: fourteen items in leadership; and sixteen items in management. So, they were excluded, and some items were combined with similar items. Therefore, the remaining 55 items were utilized in the CASHNCH and were sent to all experts for the second round. All experts rated the item package in the second round as quite and very relevant to the concept. The values of I-CVI ranged from .83 to 1.00. The S-CVI of a CASHNCH was .94.

In conclusion, 40 items were deleted and 30 items were integrated with similar items. Most of items deleted, were represented in leadership and management domains. The remaining 55 items consist of 14 items in leadership, 13 items in management, 10 items in communication and relationships, 8 items in professional ethics, and 10 items in policy and healthcare environment. These items were utilized to construct the CASHNCH for the pretesting.

Pre-testing the initial instrument.

After revising the CASHNCH, the revised scale with five domains and 55 items was reviewed by 30 head nurses in community hospitals for readability and clarity, and reliability.

Readability and Clarity.

The CASHNCH was evaluated in terms of clarity, understandability and length of the scale. The results revealed that the instruction and items were clear and understandable by most participants. Most of them (80%) agreed that the length of

the CASHNCH was appropriate. Time spent by head nurses to complete the scale ranged from 2 to 30 minutes and average 14.8 minutes. Twenty three participants commented that the response scale was appropriate to select. However, 4 and 3 participants commented that the response scale was not difficult and difficult in selection had conflicting comments respectively. Since these problems were recommended and rated by few participants, thus, the CASHNCH have been sustained in the study. In addition, most participants (96.7%) commented the sequence of items was easy to follow. The results are shown as follows.

Table 4.5 The Demonstration Readability and Clarity of CASHNCH (n = 30)

Indicators	Number (n = 30)	Percentage (%)
Clarity of language in instruction part		
Clear	29	96.7
Unclear	1	3.3
Clarity of language in items and descriptors		
Clear	27	90.0
Unclear	3	10.0
Length of the scale		
Appropriate	24	80.0
Too long	6	20.0
Duration of completing the scale (minutes)		
Range= 2-30 minutes, $\bar{x} = 14.8$, SD= 8.9		
< 10	5	16.7
10-20	19	63.3
21-30	6	20.0
Difficulty in selection the responses		
Appropriate	23	76.7

Table 4.5 (continued)

Indicators	Number (<i>n</i> = 30)	Percentage (%)
Not difficult	4	13.3
Difficult	3	10.0
Sequence of items easy to follow		
Yes	29	96.7
No	1	3.3

Reliability.

The pretesting of the CASHNCH with 55 items examined the internal consistency. The Cronbach's alpha coefficient of five domains ranged from .94 to .96 and of the scale was .99 as presented in Table 4.6.

Table 4.6 Cronbach's Alpha Coefficient of Each Domain and Overall Scale of a Competency Assessment Scale for a Head Nurse in Community Hospitals Evaluated from Pretesting Samples (*n* = 30)

Domains	Number of Items	Cronbach's Alpha
Leadership	14	.96
Management	13	.94
Communication and relationships	10	.94
Professional ethics	8	.96
Policy and healthcare environment	10	.96
The overall scale	55	.99

In conclusion, after pretesting, the CASHNCH was examined and the internal consistency reliability was tested with Cronbach's alpha of each domain and the overall scale was higher than .90. Then, this scale was used for further examination of construct validity to evaluate its psychometric properties.

Step 5) Administering items to a development sample and evaluate the items

Field-testing.

Field testing of the CASHNCH with 55 items examined the validity and reliability. The results are described by descriptive statistics of items, discrimination power of item, item analysis, and exploratory factor analysis.

Descriptive statistics of items.

The number of items, Cronbach's alpha, mean score, variance and standard deviation of each domain and the overall scale were calculated. The Cronbach's alpha of the CASHNCH with 55 items was .98. The overall mean score ranged from 3.27 to 4.36 and a standard deviation ranged from .61 to .93.

All domains returned a high Cronbach's alpha value ranging from .93 to .96. The mean score of five domains include leadership domain ranging from 3.43 to 3.80; management domain ranging from 3.47 to 3.67; communication and relationships domain ranging from 3.27 to 3.92; professional ethics domain ranging from 3.89 to 4.36; and policy and healthcare environment and management domains domain ranging from 3.58 to 3.97. Item mean close to the center of possible score range is desirable.

Table 4.7 Descriptions Statistics of Each Domain and The Overall Scale of CASHNCH with 55 Items (n = 614)

Domains	No. of Items	Cronbach's Alpha	Mean	Variance	SD
Leadership	14	.96	50.37	79.22	8.90
Management	13	.96	46.40	63.19	7.95
Communication and relationships	10	.93	36.05	37.71	6.14
Professional ethics	8	.93	33.21	20.53	4.53
Policy and healthcare environment	10	.95	38.74	31.43	5.61
The overall scale	55	.98	204.77	875.84	29.60

The normality test is necessary for a statistical test, but factor analysis desires the multicollinearity test which identifies the interrelated sets of variables (Hair et. al., 2006). Therefore, the normality was not performed in this study.

Discrimination power of items.

The high score group and the low score group were divided equally 25%. The item mean scores of the low score group (154 participants) were computed with those of the high score group (155 participants). In the high score group, item means of 55 items ranged from 3.90 to 4.87, with standard deviation ranging from .34 to .71. In the low score group, item means of 55 items ranged from 2.42 to 3.97, with standard deviation ranging from .59 to .93. The mean comparisons between two groups of each item were analyzed using the t-test independent statistic. The finding revealed that all t- values ranged from 11.87 to 25.08, significant at p-value < .001 (Appendix J). The results indicated that the low score group responded to all items of this scale differently from the high score group. Therefore, 55 items of a CASHNCH had good discrimination power and statistically worthy to be retained.

Item analysis.

Item analysis was conducted to determine 1) inter-item correlation and item-subscale correlation, 2) item-total correlation and Cronbach's alpha if items deleted, and 3) subscale-subscale correlation and subscale-total correlation. The results of the item analysis are described as follows:

Inter-item correlation and item-subscale correlation.

The criteria of the inter-item correlation and item-subscale correlation in this study was $r = .30$ to $.70$ (Mishel, 1998). The results of inter-item and item-subscale correlation on each subscale are summarized below and presented in Appendix K.

In the subscale of leadership, inter-item correlation of all fourteen items ranged from .47 to .77. The ratio of the item to item correlation meeting the criteria ranged from 9/13 to 13/13 which all the inter-item correlation were more than .30. Among fourteen items of this subscale, all items met the criteria of item to subscale correlation and ranged from .70 to .83. Therefore, all items of this subscale were retained.

In the subscale of management and quality improvement, inter-item correlation of all thirteen items ranged from .32 to .90. The ratio of the item to item correlation meeting the criteria ranged from 8/12 to 12/12 which all the inter-item correlation were more than .30. Among thirteen items of this subscale, all items met

the criteria of item to subscale correlation and ranged from .61 to .84. Therefore, all items of this subscale were retained.

In the subscale of communication and relationship, inter-item correlation of all ten items ranged from .47 to .80. The ratio of the item to item correlation meeting the criteria ranged from 7/9 to 9/9 which all the inter-item correlation were more than .30. Among ten items of this subscale, all items met the criteria of item to subscale correlation and ranged from .69 to .79. Therefore, all items of this subscale were retained.

In the subscale of code of professional conduct and ethical and legal practice, inter-item correlation of all eight items ranged from .41 to .78. The ratio of the item to item correlation meeting the criteria ranged from 5/7 to 7/7 which all the inter-item correlation were more than .30. Among eight items of this subscale, all items met the criteria of item to subscale correlation and ranged from .68 to .82. Therefore, all items of this subscale were retained.

In the subscale of policy implementation and healthcare environment management, inter-item correlation of all ten items ranged from .48 to .85. The ratio of the item to item correlation meeting the criteria ranged from 5/9 to 8/9 which all the inter-item correlation were more than .30. Among ten items of this subscale, all items met the criteria of item to subscale correlation and ranged from .68 to .83. Therefore, all items of this subscale were retained.

Item-total correlation and Cronbach's alpha if items deleted.

The corrected item-total correlation of 55 items ranged from .43 to .82 and are displayed in Appendix K. All items were above .30 (Nunnally, 1978; Polit & Beck, 2008). Thus, they were accepted as good discriminating items. Furthermore, Cronbach's alpha for all items were .98 indicated that when each of those item was dropped from the scale, Cronbach's alpha was not increased. Therefore, the results of the analysis, all items were retained.

Subscale-subscale correlation and subscale-total correlation.

The results of subscale correlation ranged from .61 to .83. Besides, the correlation between each subscale to overall scale ranged from .81 to .94. These indicated that the criteria of correlation were met ($r > .30$) (Mishel, 1998). The results were demonstrated in table 4.8.

Table 4.8 Subscale-Subscale Correlation and Subscale-Total Correlation (55 Items)

Scale/Subscales	L 1	M 2	C 3	E 4	P 5
Leadership (L 1)	1.00				
Management (M 2)	.83	1.00			
Communication and relationships (C 3)	.79	.83	1.00		
Professional ethics (E 4)	.61	.70	.67	1.00	
Policy and healthcare environment (P 5)	.63	.75	.76	.81	1.00
The entire scale	.90	.94	.91	.81	.86

In conclusion, most items had inter-item correlation higher than .30, and all items had corrected item-total correlation and item-subscale correlation higher than .30. The results indicated that Cronbach's alpha of each of five subscales was higher than .90. However, if the items had inter-item correlation higher than .70 can be deleted, because it indicates the redundancy item (Mishel, 1998; Polit & Beck, 2008). Some experts recommended the higher item correlations are more desirable than lower ones (DeVellis, 2003; Polit & Beck, 2008). The conceptual soundness of a CASHNCH was not complete when the items were deleted. Therefore, all 55 items were retained for the further factor analysis.

Exploratory factor analysis.

Factor analysis was conducted to test construct validity of scale including testing by Measure of Sampling Adequacy (MSA) which values must exceed .50, Bartlett's test of sphericity ($\text{sig.} \leq .05$) (Hair et al., 2006), and using principle components analysis and maximum likelihood with orthogonal rotation by varimax and oblique rotation by direct oblimin. In this study, principle components 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 included in the components with eigenvalues greater than 1, item loading above .30 on each other were considered, no or few cross-loading items, and determining the number of common factors with scree test (Devellis, 2003; Hair et al., 2006). The results of factor analysis are presented below respectively.

Results of the first-order exploratory factor analysis.

The results demonstrated that MSA was .98, which indicated the sample adequacy for factor analysis. Bartlett's test of sphericity was significant

($X^2=34357.88$, $p=.000$), rejection the hypothesis. It means that the variables were in linear relationship. Thus, the results of both MSA and Bartlett's test met criteria and verified further use of factor analysis for the data.

The results of the first-order factor analysis revealed that 55 items consist of six components which accounted for 71.39% of the total variance with eigenvalues ranging from 1.04 to 29.12, percent of variance ranged from 1.89% to 52.95%. However, the scree plot indicated that three factors may be appropriate. In viewing the variance for the third factor, its low value (3.62%) . Moreover, communalities of all variables were more than .60. 55 items retrieved with factor loading ranging from .29 to .90. The results are presented in table 4.9.

Table 4.9 Six Components, Eigenvalues, Percent of Variance Accounted for, and Cumulative Percent of Variance of CASHNCH (55 Items)

Component	Eigenvalue	Percent of Variance Accounted for (%)	Cumulative Percent of Variance (%)
1	29.12	52.95	52.95
2	4.44	8.07	61.02
3	1.99	3.62	64.63
4	1.45	2.64	67.27
5	1.23	2.23	69.50
6	1.04	1.89	71.39

However, item of management 13 loading on the fourth component had a factor loading of less than .30. It was considered for deletion. Therefore, 54 items were retained, and then the factor analysis was performed again (Hair et al., 2006).

Results of the second-order exploratory factor analysis.

The results demonstrated that MSA was .98, which indicated the sample adequacy for factor analysis. Bartlett's test of sphericity was significant ($X^2=33579.99$, $p=.000$), rejection the hypothesis. It means that the variables were in a linear relationship. Thus, the results of both MSA and Bartlett's test met criteria and verified further use of factor analysis for the data.

The results of the second-order factor analysis revealed that 54 items consist of six components which accounted for 71.46% of the total variance with eigenvalues ranging from 1.03 to 28.49, percent of variance ranged from 1.90% to 52.76%. Moreover, communalities of all variables were more than .60. Among 54 items retrieved with factor loading ranging from .32 to .91. The results are presented in table 4.10.

Table 4.10 Six Components, Eigenvalues, Percent of Variance Accounted for, and Cumulative Percent of Variance of CASHNCH after Deletion M13 (54 Items)

Component	Eigenvalue	Percent of Variance Accounted for (%)	Cumulative Percent of Variance (%)
1	28.49	52.76	52.76
2	4.43	8.20	60.95
3	1.97	3.66	64.61
4	1.45	2.68	67.29
5	1.23	2.27	69.56
6	1.03	1.90	71.46

However, item of management 11 loaded on the sixth component which there was only one item. The items of each component should have at least four items (Polit & Beck, 2008). Therefore, it was considered for deletion and then perform the factor analysis again.

Results of the third-order exploratory factor analysis.

The results demonstrated that MSA was .98, which indicated the sample adequacy for factor analysis. Bartlett's test of sphericity was significant ($X^2=32427.90, p=.000$), rejection the hypothesis. It means that the variables were in a linear relationship. Thus, the results of both MSA and Bartlett's test met criteria and verified further use of factor analysis for the data.

The results of the third-order factor analysis revealed that 53 items consist of five components which accounted for 69.60% of the total variance with eigenvalues ranging from 1.21 to 27.86, percent of variance ranged from 2.29% to 52.56%. Moreover, communalities of all variables were since more than .60. Among

53 items retrieved with factor loading ranging from .29 to .90. The results are presented in table 4.11.

Table 4.11 Five Components, Eigenvalues, Percent of Variance Accounted for, and Cumulative Percent of Variance of CASHNCH (53 Items)

Component	Eigenvalue	Percent of Variance Accounted for (%)	Cumulative Percent of Variance (%)
1	27.86	52.56	52.56
2	4.42	8.34	60.90
3	1.96	3.69	64.59
4	1.44	2.72	67.32
5	1.21	2.29	69.60

However, item of communication and relationships 4 loading on the first component had a factor loading of less than .30. It was considered for deletion, then to perform the factor analysis again.

Results of the fourth-order exploratory factor analysis.

The results demonstrated that MSA was .98, which indicated the sample adequacy for factor analysis. Bartlett's test of sphericity was significant ($X^2=31763.38, p=.000$), rejection the hypothesis. It means that the variables were in a linear relationship. Thus, the results of both MSA and Bartlett's test met criteria and verified further the use of factor analysis for the data.

The results of the fourth-order factor analysis revealed that 52 items consist of five components which accounted for 69.89% of the total variance with eigenvalues ranging from 1.21 to 27.33, percent of variance ranged from 2.33% to 52.55%. Moreover, communalities of all variables were more than .60. Among 52 items retrieved with factor loading ranging from .33 to .90. The results are presented in table 4.12.

Table 4.12 Five Components, Eigenvalues, Percent of Variance Accounted for, and Cumulative Percent of Variance of CASHNCH (52 Items)

Component	Eigenvalue	Percent of Variance Accounted for (%)	Cumulative Percent of Variance (%)
1	27.33	52.55	52.55
2	4.41	8.47	61.02
3	1.96	3.76	64.79
4	1.44	2.77	67.56
5	1.21	2.33	69.89

However, among them, six items exhibited cross-loadings. First, one item (L13) “Practice nursing care applied in medium community hospital” in the subscale of leadership loaded on leadership and professional ethics. Second, two items (M12, M10) “Plan systematically knowledge management of the unit, network and community efficiently” and “Participate in evaluating nursing outcomes with the healthcare team and network continuously” in the subscale of management loaded on communication and relationships and management. Third, one item (M8) “Encourage the subordinates and healthcare team to participate in continuous quality improvement” in the subscale of management loaded on management and leadership. Fourth, one item (P1) “Identify basic or fundamental nursing service guideline in consistency with hospital policy” in policy and healthcare environment loaded on professional ethics and leadership. Last, one item (P3) “Transfer the nursing service policy to subordinates clearly understandable for appropriately practice” in the subscale of communication and relationships loaded on communication and relationships, policy and healthcare environment, and professional ethics. Each item loaded on few components, but they indicated the conceptual soundness of a CASHNCH. Therefore, these items had to be retained. The results of factor analysis are presented in Table 4.13.

Table 4.13 Items and The Values of Factor Analysis on Each Component (52 Items)

Item	Component				
	1	2	3	4	5
Lead 4	.90				
Lead 3	.86				
Lead 5	.84				
Lead 6	.80				
Lead 1	.78				
Lead 7	.74				
Lead 2	.73				
Lead 8	.64				
Lead 10	.59				
Lead 12	.53				
Manage 2	.52				
Lead 9	.51				
Lead 13	.47				
Lead 11	.47				
Lead 14	.36				
Policy 9		.77			
Policy 10		.74			
Policy 8		.72			
Policy 7		.70			
Policy 5		.69			
Policy 4		.64			
Policy 6		.53			
Com 8					-.85
Com 9					-.81

Table 4.13 (continued)

Item	Component				
	1	2	3	4	5
Com 10			-.71		
Com 6			-.68		
Com 5			-.61		
Com 7			-.57		
Policy 2			-.55		
Com 1			-.47		
Manage 12			-.40	.36	
Com 2			-.40		
Policy 3		.32	-.34		-.32
Com 3			-.34		
Manage 10			-.34	.33	
Manage 6				.83	
Manage 7				.79	
Manage 5				.78	
Manage 4				.51	
Manage 8	.32			.49	
Manage 3				.49	
Manage 9				.46	
Manage 1				.41	
Ethic 3					-.90
Ethic 5					-.86
Ethic 4					-.84
Ethic 6					-.71
Ethic 2					-.69
Ethic 7					-.62
Ethic 1					-.45
Policy 1	.33				-.40
Ethic 8					-.36

All 52 items remained in five factors which are presented in Table 4.15 and described each component below.

The first component was composed of 15 items with factor loading ranging from .36 to .90 with an eigenvalue 27.33, accounting for 52.55% of variance. The Cronbach's alpha was .96. One item came from the subscale of management. This component was named "Leadership".

The second component was composed of 7 items with factor loading ranging from .53 to .77 with an eigenvalue 4.41, accounting for 8.47% of variance. The Cronbach's alpha was .94. All items came from the subscale of policy and healthcare environment, but most of them came from healthcare environment. Therefore, this component was named "Healthcare environment management".

The third component was composed of 13 items with factor loading ranging from .34 to .85 with an eigenvalue 1.96, accounting for 3.76% of variance. The Cronbach's alpha was .95. Most items came from the subscale of communication and relationships, and some items came from policy and healthcare environment. Thus, this component was named "Policy implementation and communication".

The fourth component was composed of 8 items with factor loading ranging from .41 to .83 with an eigenvalue 1.44, accounting for 2.77% of variance. The Cronbach's alpha was .93. All items came from the subscale of management which was the name of this component.

The fifth component was composed of 9 items with factor loading ranging from .36 to .90 with an eigenvalue 1.21, accounting for 2.33% of variance. The Cronbach's alpha was .94. All items came from the subscale of professional ethics which was the name of this component.

Table 4.14 Dimension Associations and Item Statement of Factor Analysis of CASHNCH (52 Items)

Item Number	Item Statement	Factor Loading
Dimension 1: Leadership		
L 1	Analyze the problems and situations of the whole unit, network and community clearly	.78
L 2	Forecast the future of nursing services in the hospital and community	.73
L 3	Make systematic decisions through participation of related persons/ partners	.86
L 4	Use negotiation strategies for mutual agreement for the achievement of their practice	.90
L 5	Monitoring and evaluation the practice as mutual agreement	.84
L 6	Collaborate with the workforce to regulate the practice guideline of confliction for achievement	.80
L 7	Manage conflicts in the unit and community to satisfy both sides	.74
L 8	Persuade team members and network to develop quality and effective innovation in nursing services	.64
L 9	Motivate the team members to use new nursing service in unit and community	.51
L 10	Encourage the team members to provide nursing services using evidence based practice	.59
L 11	Transfer the new knowledge of nursing care to the team members, network and community for application in their practice	.47
L 12	Apply the body of nursing knowledge and related sciences for quality care development appropriately	.53
L 13	Practice nursing care applied in medium community hospital	.47

Table 4.14 (continued)

Item Number	Item Statement	Factor Loading
L 14	Supervise the nursing service to team members and network for goal achievement	.36
L 15 (M2)	Plan for the objective, vision, and mission setting with team members in unit, workforce in the network and community	.52
Eigenvalues= 27.33 ; Percent of variance= 52.55 Cumulative percent of variance= 52.55		
Dimension 2: Healthcare environment management		
Env 1 (P4)	Manage the physical, chemical and biological environment affecting health providers and clients in unit and community for a safe physical, psychological and social environment	.64
Env 2 (P5)	Manage the workplace environment in unit and community supporting efficient and safe work	.69
Env 3 (P6)	Create an atmosphere of encouragement for team members, healthcare team, network and community for collaboration	.53
Env 4 (P7)	Organize the environment in the unit to promote good health of providers and clients	.70
Env 5 (P8)	Consult and advise team members, network, community and clients regarding the prevention and transmission of disease	.72
Env 6 (P9)	Manage supplies and equipment for infectious prevention and transmission in the unit and community sufficiently	.77
Env 7 (P10)	Identify the action plans for infectious prevention and controlling in the unit and community efficiently	.74
Eigenvalues= 4.41 ; Percent of variance= 8.47 Cumulative percent of variance= 61.02		

Table 4.14 (continued)

Item Number	Item Statement	Factor Loading
Dimension 3: Policy implementation and communication		
P 1 (P2)	Improve the proactive nursing service in unit and community that is appropriate with healthcare trend	-.34
P 2 (P3)	Transfer the nursing service policy to team members clearly understandable for appropriately practice	-.55
P 3 (C1)	Coordinate with other units, network and community effectively Communicate verbally and non-verbally with team members	-.47
P 4 (C2)	concisely to achieve planned objectives Use two-way communication with honesty and an open mind with	-.40
P 5 (C3)	team members, network and the community Investigate the information for nursing improvement from	-.34
P 6 (C5)	technology effectively Present information to team members, healthcare team, network	-.61
P 7 (C6)	and community by technology effectively Encourage team members to explore the information for nursing	-.68
P 8 (C7)	improvement with the use of technology efficiently Organize an extra hour for informal meetings within a unit, and	-.57
P 9 (C8)	with other units, network and community consistently Party with other units, network and community continuously to	-.85
P 10 (C9)	maintain a good relationship Supervise and monitoring the team members in referring systematic	-.81
P 11 (C10)	within and outside the unit and other hospitals efficiently Participate in evaluating nursing outcomes with the healthcare team	-.71
P 12 (M10)	and network continuously Plan systematically knowledge management of the unit, network	-.34
P 13 (M12)	and community efficiently	-.40

Table 4.14 (continued)

Item Number	Item Statement	Factor Loading
Eigenvalues= 1.96 ; Percent of variance= 3.76		
Cumulative percent of variance= 64.79		
Dimension 4: Management		
M 1	Analyze the strengths, weaknesses, opportunities, and threats of the organization	.41
M 2 (M 3)	Develop the action plan of the unit and network in consistence with organizational policy	.49
M 3 (M 4)	Monitoring and evaluating the performance of team members as indication in the plan correctly and continuously	.51
M 4 (M 5)	Allocate the budget and supplies in unit and community effectively	.78
M 5 (M 6)	Allocate the human resource in the unit and community effectively	.83
M 6 (M 7)	Plan continuous education related to the core of performance for team members in the unit and community	.79
M 7 (M 8)	Encourage the team members and healthcare team to participate in continuous quality improvement	.49
M 8 (M 9)	Identify goals, indicators of nursing care quality, and nursing outcomes in unit and community completely	.46
Eigenvalues= 1.44 ; Percent of variance= 2.77		
Cumulative percent of variance= 67.56		
Dimension 5: Professional ethics		
E 1	Identify the guideline for provision information and knowledge of human rights to patient and client efficiently	-.45
E 2	Advocate patients' and providers' legal right appropriately	-.69
E 3	Manage as unit with honesty, transparency, and as a good role model to their team members	-.90
E 4	Behave as the professional code of conduct and nursing service	-.84
E 5	Be punctual and responsible in unit, network and community	-.86

Table 4.14 (continued)

Item Number	Item Statement	Factor Loading
E 6	Making a decision to resolve problems of unit, network, and community under justice, morality and ethics	-.71
E 7	Develop understanding among the team members to advocate the benefits in organization and professional organizations	-.62
E 8	Consult and advice for team members, healthcare team and network regarding ethics, code of professional conduct and law	-.36
E 9 (P1)	Identify basic or fundamental nursing service guideline in consistency with hospital policy	-.40
Eigenvalues= 1.21 ; Percent of variance= 2.33 Cumulative percent of variance= 69.89		

Alpha coefficient of each component of the final CASHNCH after exploratory factor analysis was more than .90. The items in each subscale had item-total correlation more than .30 (.62-.86) which are shown in Table 4.15.

Table 4.15 Cronbach's Alpha Coefficient of CASHNCH After Factor Analysis (52 Items)

Components	No. of Items	Item-total correlation	Cronbach's Alpha
Leadership	15	.70 - .83	.96
Healthcare environment management	7	.79 - .86	.94
Policy implementation and communication	13	.71 - .78	.95
Management	8	.62 - .83	.93
Professional ethics	9	.67 - .83	.94
The overall scale	52		.98

The subscale-subscale correlation and subscale-total coefficients are displayed in Table 4.18. Each pair of the five components was moderately to highly correlate with Pearson correlation coefficients ranging from .54 to .82. The subscale-total correlation coefficients ranged from .79 to .94, signifying high correlation.

Table 4.16 Subscale-Subscale and Subscale-Total Correlations of a CASHNCH
After Factor Analysis (52 items)

Dimension	L	Env	P	M	E	TS
Leadership (L)	1.00					
Healthcare environment management (Env)	.54**	1.00				
Policy implementation and communication (P)	.81**	.72**	1.00			
Management (M)	.79**	.68**	.82**	1.00		
Professional ethics (E)	.64**	.77**	.72**	.69**	1.00	
Total scale (TS)	.91**	.79**	.94**	.90**	.84**	1.00

** $p < .01$

In conclusion, the final draft of a Competency Assessment Scale for Head Nurses in Community Hospitals (CASHNCH) was performed by principle components analysis with oblique rotation by direct oblimin. After four times for factor analysis, a CASHNCH was composed of five components with 52 items which was explained eigenvalue ranging from 1.21 to 27.33, 69.89% of total variance. Moreover, Cronbach's alpha of the final scale was .98, and Cronbach's alpha for five components ranged from .93 to .96 that are displayed in Table 4.16.

Contrast group approach.

Contrasted group testing was conducted in 68 staff nurses and 64 head nurses in community hospitals. The data of head nurse group was the same data collected in field-testing. Before t-test for contrasted group approach, the normality test was performed. The results of normality test, the score of staff nurses had skewness = .82, kurtosis = 1.78 and Kolmogorov-Smirnov $p = .07$, and head nurses had skewness = .36, kurtosis = -.82 and Kolmogorov-Smirnov $p = .08$. The results indicate that two groups of participants had normal distribution accepted the assumption of t-test.

Independent sample t-test was performed to analyze the difference of the CASHNCH in group mean on each component and on the total mean score. The results indicated that there was a significant difference in subscales and the overall scale mean scores between two groups of participants as presented in Table 4.17. As expected, the head nurse group had higher scores of competency for head nurse in

community hospitals than the staff nurse or new nurse graduate group in all subscales and the overall scale scores.

Table 4.17 Subscale of CASHNCH, Mean Score, Standard Deviation, and Results of T-Test Between Head Nurses and Staff Nurses or New Nurse Graduate Group

Component	Staff nurse (n=68)	Head nurse (n=64)	t	df
	Mean SD	Mean SD		
Leadership	43.03 (7.80)	59.25 (5.65)	13.38**	130
Healthcare environment management	20.24 (3.49)	29.97 (3.29)	16.47**	130
Policy implementation and communication	37.56 (7.07)	51.28 (5.66)	12.26**	130
Management	21.40 (4.19)	31.97 (3.71)	15.32**	130
Professional ethics	29.16 (5.65)	40.28 (3.78)	13.36**	117.55
Total scale	151.38 (24.70)	212.75 (18.56)	16.06**	130

** $p < .001$

In conclusion, A Competency Scale for Head Nurse in Community Hospitals was developed and tested the psychometric property following the steps based on the instrument development of DeVillis (2003). The conceptual framework was derived from the data in the first stage of research finding. The content validity was conducted by rating of six panel experts with an average S-CVI = .94. In pretesting, the Cronbach's alpha coefficient of five domains with 55 items was .99. Then, an item analysis was performed on with 55 items in the a CASHNCH, and exploratory factor analysis for four times of factor solution. As a result, 3 items were deleted, and

five factors with 52 items were retained. After factor solution, the overall Cronbach's alpha was .98. Another method of scale construct validity, the contrasted group testing was performed, and the finding revealed that the mean comparisons between new nurse graduates and head nurses was significantly different ($p < .001$).

Discussion

Discussions are described in two parts including the characteristics of the competency assessment scale for head nurses in community hospitals, and the psychometric properties of the CASHNCH as follows.

The Characteristics of a CASHNCH

As proposed by Burn and Grove (2009) and Waltz et al., (2005), measurement rule is a precise procedure used to assign numbers to phenomena or the kind of a specified attribute possessed. The CASHNCH was developed based on guidelines of developing measurement scales of DeVellis (2003) concerning across a broad range of social research context which are useful for constructing questionnaires of measurement. The guidelines are offered clearly step by step, easy to follow, and reliability and validity for measurement. However, this process did not recommend about the pretesting with representative samples which determines the readability and clarity of measurement, and address many early questions in measurement before using in the field-testing (Mishel, 1998). Therefore, the CASHNCH was developed by pretesting before testing in a large participant group based on the recommendation of Mishel (1998).

The operational definition of each domain and the generated items for scale development were constructed by the head nurse competency framework of TNC (2013), the reviewed literature, and the qualitative data consisting of individual interviews and focus group discussions. This inductive approach resulted in clarification of the attributes to be incorporated with framework of TNC (2013). The competency framework from content analysis includes leadership, management, communication, professional ethics, and policy and healthcare environment. Some of which are differ from those of TNC such as model of caring, and they focused on the

competency of head nurses in both in the unit and communities. Especially, they worked with healthcare team, multidisciplinary, and used new technology. Since nurses administrators in community hospitals gave the data based on their direct experiences, and the present context. So, the competency framework in this study was appropriate and specific for a head nurse in community hospitals. Moreover, the competency framework of TNC was identified for head nurses in all hospital levels. From the reviewed literature, competencies of head nurses in 30-to 90-bed community hospitals is both a complex and dynamic phenomenon that differ from those of a head nurse in a bigger and more complex hospitals, like general and regional hospitals. The expertise in health care, the context and innovative technologies differentiate the capability of healthcare services (Boyle, 2011; French, Old, & Healy, 2001; Hilless & Healy, 2001). As a result, the competency framework of head nurses in community hospitals differs from other hospitals. Therefore, this new CASHNCH is appropriate for head nurses in community hospitals in Thailand, since the policy of Ministry of Public Health focused on participation between the community and healthcare providers (Faramnuayphol et al., 2011), and health service should be provided with a seamless network and existing resource sharing in order to provide high quality service and cost-effective (Bureau of Health Administration, 2012). As a result, head nurses have to continuously develop their competencies for quality of nursing services and goal achievement.

The initial item pool of the CASHNCH included 125 items, which was more than two times as large as the final scale. The number of the initial item pool was appropriate to study, and consistency with the report by Nunnally (1978). These items were considered by the dissertation advisory team and the panel experts. Most of them recommended that the scale should be shortened, integrating similar items, and revising the wording of items. As a result, the CASHNCH was composed of five domains with 55 items to retain five subdomains including leadership, management, communication and relationship, professional ethics, and policy and healthcare environment. The finding demonstrated the names of the major competency as similar to those in TNC (2013) and the studies from Aphinyanon (2006), Nursing Division (2005), and Promsorn (2007). Accordingly, this agrees with the results of Eldridge and Judkins (2003) in that a head nurse in community hospitals should be

capable of cross-disciplinary management, and integration of need-based community services. This implies that the essential competencies of head nurses should depend on the context and competence level of each hospital.

A Likert scale format was used for the CASHNCH that measured opinion, beliefs, and attitudes. Likert scaling is widely used in instruments and often useful for statements of instrument to be fairly strong (DeVellis, 2003) . The CASHNCH expressed a five-point response choice which can be used for a self-assessment scale. The scale had the midpoint labeled as done and never done equally. As a result, respondents were not to be ambivalent to rate (Polit & Beck, 2008). The benefits of this approach include the cost-effectiveness, identification of strengths and areas for development with individual conscious (Evans, 2008). The total scores were obtained by adding raw scores across 55 items on the five domains and offering a range from 0 to 275. A high and low score means a high and low competency for a head nurse in community hospitals, respectively.

Content validity is the determining on the adequacy of the items to represent the domain of content (Waltz et al., 2005). The suggestions obtained from five experts were used to determine for retaining and deleted items. The content validity of the final CASHNCH with 55 items presented that I-CVI ranged from .83 to 1.00, and S-CVI was .94. Regarding, Lynn (1986) noted that the accepted value of I-CVI, a content validity index at the item level should be at least .78, and Polit and Beck (2008) and Waltz et al. (2005) suggested that the value of S-CVI, the scale content validity should be at least .90. Therefore, a CASHNCH, both of which met an acceptable content validity index, and then processed through the pretesting.

The pretesting of the CASHNCH with 55 items was performed with 32 head nurses in community hospitals. A sample size of a pretesting should be 15 to 30 participants (Burns & Grove, 2009). Thirty head nurses returned the questionnaires (93.75%). The purpose of pretesting focused on clarity, ease of understanding, and appropriateness of length of the overall scale. The finding revealed that most participants rated that the instruction and items were clear, understandable, and of appropriate length of scale. Few participants rated unclear language of the instruction and items, too long scale, difficulty in selection the responses, and difficulty to follow the items; but they did not suggest the problems. Therefore, the format and items of a

CASHNCH were retained to study. Furthermore, the result of a CASHNCH's overall internal consistency reliability was .99, and five domains ranged from .94 to .96 as Burns and Grove (2009) advised .80 to .90 of the Cronbach's alpha coefficient value of scale accepted. The results of this study indicated a strong relationship to their latent variable, and concerned with the homogeneity of the items within a scale as result to a strong relationship to each other (DeVellis, 2003). Thus, a CASHNCH with 55 items was determined for further field-testing.

The Psychometric Properties of A CASHNCH

The participants in field-testing were selected by multistage sampling approach to draw head nurses in 30-to-90-bed community hospitals from four health regions in Thailand. The CASHNCH with 55 items was distributed to 660 participants, which were more than the most conservative ratio of 10 participants per item (Burns & Grove, 2009; Hair et al., 2006, Nunnally, 1978), and was considered sufficient for the subsequent data analysis. Six hundred and forty head nurses returned the questionnaires (96.97%), and resulting in 614 completed questionnaires (93.03%). Therefore, they represent a more than adequate response rate.

Characteristics of scores on the CASHNCH. The total scores of the scale with 55 items ranged from 0 to 275. The total mean score was 204.77 with a variance of 875.84, and a standard deviation of 29.60. A high total mean score indicated a high level of overall competency of a head nurse in community hospitals. Reliability would be conceptualized as the proportion of the variance in the observed score distribution. The alpha coefficient is the preferred index of internal consistency reliability that a value of .80-.90 is interpreted as very good consistency (Burns & Grove, 2009; DeVellis, 2003). All domains of the CASHNCH with 55 items obtained a high Cronbach's alpha value which ranged from .93 to .96. Results of more than .90 which are considered redundancy scale (DeVellis, 2003). However, the items in each domain are adequate examples of content in each domain.

Item analysis. The performance of each item on the preliminary scale needs to be evaluated empirically. The items have to correlate with one another which means a high correlation of an item with the true score of the underlying construct (Polit & Beck, 2008). The discrimination power of items between the low score group and the

high score group of each item revealed that all t- values ranged from 11.87 to 25.08, significant at p-value of .000. This indicated that the low score group responded to all items of this scale differently from the high score group (Nunnally, 1978). Among 55 items, the correlation matrix reveals that inter-item and item-subscale correlation were more than .30 with significant at the .01 level. Moreover, all 55 items had more than .30 item-total and item-subscale correlations, and if each item deleted Cronbach's alpha was still .98. These results agree with Polit and Beck (2008) and Ferketich (1991) recommended inter-item and item-total correlations accepted ranging from .30 to .70. However, some were more than .70 which Mishel (1998) and Polit and Beck (2008) suggested a high correlation which would be considered as redundancy items. DeVellis (2003) proposed that an item with a high correlation is more desirable than an item with a low value. Therefore, all 55 items were retained for further analysis process.

The results of subscale-subscale correlation revealed the correlation coefficient among five domains ranged from .51 to .79 which means the criteria of correlation were met (Mishel, 1998). The analysis of subscale-total correlation indicated correlation between subscales and total scale from .81 to .94. These results statistically verify the conceptual framework of the scale, and each subscale contributes to overall competency with a convincing correlation.

Construct validity. Construct validity is directly concerned with the theoretical relationship of a variable to other variables (DeVellis, 2003). This study used two approaches to test the construct validity of a CASHNCH including exploratory factor analysis and the contrast group approach. The first, exploratory factor analysis was used to determine the nature of latent variables underlying an item set (DeVellis, 2003). There were 614 final participants which was considered sufficient for factor analysis which Hair et al. (2006) recommended that the number of observations per variable should have at least 10 or a minimum of 5 observations per variable. In this study, most of subscale-subscale correlations, and all item total correlations obtained a high coefficient over .70 which DeVellis (2003) noted that oblique rotation method is best suited to the goal of obtaining several conceptual meaningful factors or constructs. Therefore, the principle component method with oblique factor rotation

by direct oblimin was appropriate to extract factors, and it yielded the best possibility to interpret the factor solution. For interpretation, the factor loadings of .30 or more are accepted (Hair et al., 2006). The exploratory factor analysis in this study was performed four times.

The first time, the results demonstrated that the CASHNCH was composed of six components with 55 items, the scales accounted for 71.39% of variance, and more than .60 of communality of all items. One item (M 13) had a factor loading .29 which was unacceptable to interpret the structure. Hair et al. (2006), and Polit and Beck (2008) suggested the factor loading less than .30 considered to delete it. Therefore, it was determined to delete this item.

The second time, the results demonstrated that the CASHNCH was composed of six components with 54 items, the scales accounted for 71.46% of variance, and more than .60 of communality of all items. One item (M 11) was single item, factor loading .35. Polit and Beck (2008) proposed that each factor should have at least four items. Therefore, it was considered to delete this item.

The third time, the results demonstrated that the CASHNCH was composed of five components with 53 items, the scales accounted for 69.60% of variance, and since more than .60 of communality of all items. One item (C 4) had a factor loading .29 which was unacceptable to interpret the structure. Therefore, it was considered to delete this item (Hair et al., 2006; Polit & Beck, 2008).

The fourth time, the results demonstrated that the CASHNCH was composed of five components with 52 items, the scales accounted for 69.89% of variance, and since more than .60 of communality of all items. Five items (M 8, M 10, M 12, L 13, P 1) exhibited cross-loading in two factors. One item (P 3) exhibited cross-loading in three factors which Hair et al. (2006) noted that item loading should have no or few cross-loading items. Polit and Beck (2008) recommended that the items load on multiple factors may indicate the need for rewording. Furthermore, Hair et al. (2006) offered that the analysis should be considered the conceptual underlying. These items were considered to be retained for a conceptual soundness of scale.

The second, the contrast group approach. As stated by Polit and Beck (2008) the scale should be administered to groups hypothesized to differ on the critical attribute. As known characteristics of new nurse graduates who were group hypothesized to achieve the lowest in the head nurse competencies. Seventy-six new nurse graduates were randomly selected for this study with 68 returned. Overall mean scale scores and mean on each subscale score of the CASHNCH were significant between group differences ($p < .001$). The results demonstrated the discriminative function ability of the overall scale, and each domain can be used to differentiate the head nurse competency levels between head nurses and new nurse graduates in community hospitals.

Reliability of a CASHNCH. The reliability coefficient indicates a scale's quality that provides an estimate of the proportion of variance in the scale scores that is attributable to the true score (Polit & Beck, 2008). Alpha coefficient value should be acceptable with more than .70 (DeVellis, 2003). After Factor analysis of the CASHNCH, Cronbach's alpha coefficient of the overall scale was .98 and of five subscales ranging from .93 to .96 which indicated the scale was 98%, 93%, and 96% reliable with 2%, 7%, and 4% random error, respectively (Burn & Grove, 2009). Thus, each item in this scale can be measuring exactly the same thing, and reflects more richly the discriminations of the construct (Polit & Beck, 2008). In personal note of DeVellis (2003), he suggested that Cronbach's alpha coefficient which is more than .90 should be considered shortening the scale, but some experts suggested that longer instrument tend to be more reliable than shorter ones (Polit & Beck, 2008). Since five subscales exhibited a moderate to high item-total correlation ranging from .62 to .86, the subscale-total correlation coefficients ranged from .79 to .94. Therefore, the CASHNCH indicated high internal consistency or homogeneity that Polit and Beck (2008) noted all items in the scale consistently measure the construct. Therefore, they are all essential constructions of scale.