

Development of an Oncology Nursing Competency Scale for General Professional Nurses in Thailand

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ABSTRACT

In Thailand, cancer patients and their families are mostly cared for in the hospital by general professional nurses who have limited specialist training and continuing nursing education. To develop their abilities to provide quality care, an oncology nursing competency needs to be assessed by using a valid and reliable scale. This study aimed to develop an Oncology Nursing Competency Scale (ONCS) for Thai general professional nurses and to test its psychometric properties. The scale development includes two phases. In the first phase, a definition of oncology nursing competency was created based on reviewed literature. Then, the dimensions and items were generated in the Thai language, resulting in the initial draft of the ONCS, which is a 5-point rating scale consisting of six subscales with 73 items. The initial scale was reviewed by a panel of experts and then revised as suggested. The CVI of the revised 81-item scale was 0.98; the alpha coefficient of the overall scale was 0.98 and of six subscales ranging from 0.84 to 0.96. In the second phase, the psychometric properties of the revised scale were evaluated with 769 general professional nurses. The item analysis revealed that all items were good discriminators. To test construct validity, factor analysis was performed resulting in ten components with 79 items that explained 74.54% of the variance. The alpha coefficient of the ten components ranged from .87 to .98 and of the entire scale was .98. The final scale with 79 items was tested for construct validity using the contrast group approach. The findings showed significant differences of the mean competency scores between the group of experienced nurses and the group of nursing students ($p < .001$).

Keywords: Scale development, Competency, Oncology nursing, General professional nurses

INTRODUCTION

Care for cancer patients in hospitals should be provided by nurse specialists or advanced practice nurses. However, in Thailand, the number of those nurses is limited. Thai cancer patients and their families are mostly cared for by general professional nurses, of which cancer patients expect that they have sufficient competency for providing quality care (Bureau of Nursing, 2005). However, many countries worldwide including Thailand are facing the problems of the inadequate competency of generalist nurses. Some studies reveal that generalist nurses perceive themselves as having limited knowledge, skill, and competency to provide care specific to the cancer patient (McCaughan and Parahoo, 2000; Mohan et al., 2005). Moreover, training and continuing education in oncology nursing are also of limited availability (Boal et al., 2000; Blunden et al., 2001; Rustoen et al., 2003; Thailand Nursing and Midwifery Council, 2006). Providing care for cancer patients requires nurses who have specialized knowledge, skill, and competency. Therefore, to evaluate the quality of cancer care among general professional nurses, oncology nursing competency should be assessed with the utmost urgency.

Oncology nursing competencies are necessary for general professional nurses who have important roles in supporting cancer patients through diagnosis and ensuring optimum care at all phases of treatment (Mohan et al., 2005) in order to achieve the goals of competent oncology nursing practice as well as improve the health, well-being and quality of life of cancer patients and their families (Magnusson and Robinson, 2000). These nurses also share the responsibilities as members of their multidisciplinary healthcare teams in providing care (Krcmar, 2000). Nurses with appropriate and adequate competency specific to the care of the patient will be accepted as equal members of multidisciplinary oncology care teams. Moreover, these nurses, by virtue of their deeper understanding of cancer diseases and excellent clinical practice; will feel confident of providing care for their patients. Finally, appropriate competencies also offer guidance for nursing organizations in developing assessment tools to evaluate ongoing oncology nursing competency (Kanaskie and Arnold, 1999). The results of an oncology nursing competency assessment will provide baseline information to guide future education in order to improve and maintain oncology nursing competency for quality cancer care among general professional nurses (Wolgin, 1998).

From the literature review, it is apparent that there are some limitations to the use of the existing scales for assessing oncology nursing competency for general professional nurses. Although some existing scales of nursing competency assessment have been developed in western countries (Husband et al., 2000; McCaughan and Parahoo, 2000), those existing scales are not appropriate because of inadequate psychometric properties, including scales which are neither standardized nor specific. Moreover, other existing scales were more relevant to advance oncology nursing practice than to general oncology nursing practice (Kanaskie and Arnold, 1999; American Association of Colleges of Nursing, 2005; Oncology Nursing Society [ONS], 2006). Furthermore, no oncology nursing competency scale specific to Thai nursing culture exists. The development of a new scale for

the assessment of oncology nursing competency will provide a clearer picture of the roles and responsibilities of general professional nurses in Thailand. When nurses complete the developed scale in a self-evaluative way, it will reflect the strengths and weaknesses relative to their own competency. In nursing staff management, this psychometrically sound scale could be used in a variety of ways; for instance, as performance appraisal and job description, for quality improvement and assurance management, as well as the recruitment and deployment of the nursing workforce and nursing staff development. Therefore, a valid and reliable scale is needed in order first to define oncology nursing competency, then to be used to assess oncology nursing competency among general professional nurses in Thailand. This study aimed to develop an Oncology Nursing Competency Scale (ONCS) for general professional nurses and to evaluate its psychometric properties.

METHODS

Participants

The participants were all stakeholders (see Table 1) who were relevant to the competency of oncology nurses and had worked in tertiary health care institutions throughout Thailand which included two cancer centers, one university hospital, and seven regional hospitals. There were four groups of participants as shown in Table 1. Sample sizes and the sampling methods varied in accordance with the objectives of each step of the scale development process. For general professional nurses, the inclusion criteria specified at least two years of experience providing care for cancer patients and family, and a willingness to participate in this study. For adult cancer patients, the criteria consisted of a set of five inclusion criteria namely, 1) being older than 15 years, 2) having been admitted to the hospital for more than one treatment episode, 3) not experiencing a severe co-existing illness or condition such as infection, severe fatigue, or severe pain, 4) being able to understand the Thai language and 5) willingness to participate in this study.

Prior to data collection, the study proposal and a consent form were approved by the Research Ethics Review Committee of the Faculty of Nursing and Faculty of Medicine, Chiang Mai University.

Table 1. Groups, number of participants and sampling methods.

Groups of participants	Number of participants	Sampling Methods
General professional nurses: five subgroups for- Focus group discussion Reviewing for clarity and readability Pre-testing Field-testing for item analysis and construct validity testing with factor analysis Testing of construct validity using a contrast group approach	16 15 82 469 48	Purposive
Group of experienced health care providers: two subgroups for- In-depth interview Reviewing for content validity	11 6	Purposive
Adult cancer patients	15	Purposive
Fourth-year nursing students	51	Systemic

Scale Developmental Procedures

The scale development consisted of two phases as shown in figure 1: 1) the construction of the initial scale and 2) the evaluation of its psychometric properties. The methods for these two phases are described separately.

Phase I: Construction of the ONCS. In this phase, the procedure consists of four steps. First, an item pool for oncology nursing competency was generated which came from the analysis of the data of the reviewed literature, in-depth interviews among 11 oncology nursing experts and focus group discussions with 16 general professional nurses. Second, the items of the ONCS were reviewed for content validity by six experts. The data were used to determine the content validity index (CVI) of each item and of the scale itself. Third, the initial scale was reviewed by 15 general professional nurses and 15 adult cancer patients for clarity and readability of the scale. Finally, pre-testing was conducted with 82 general professional nurses to evaluate the internal consistency reliability of the scale.

Phase II: Evaluation of the psychometric properties of the ONCS. In this phase, the new scale was tested with 769 general professional nurses for field testing to evaluate the performance of the individual items by using item analysis and to test construct validity with exploratory factor analysis. Before factor analysis was performed, item analysis was conducted, including descriptive statistics for items, discrimination power of items and item correlation. Item correlation was used to identify the functions of items in the entire scale. Four criteria were employed to determine whether or not an item was retained in the scale (Ferketich, 1991; Nunnally and Bernstein, 1994). These four criteria were: 1) inter-item correlation value between .30 and .70, 2) item to subscale correlation to be equal or more than 0.5, 3) item-total correlation value to be above .40 and 4) Cronbach's alpha did not increase substantially if an item was dropped. The items

which did not meet the four criteria would strongly be considered to be deleted from the scale. To determine the factors underlying the set of items of the scale, three methods of factor extraction were conducted (Hair et al., 1998; Costello and Osborne, 2005) including: 1) maximum likelihood factor analysis with direct oblimin rotation method, 2) principal components analysis with varimax rotation method and 3) principal components analysis with direct oblimin rotation method. Four criteria for determining the best factor solution of factor extractions (Burn and Grove, 2001; DeVellis, 2003; Costello and Osborne, 2005) consisted of 1) a minimum eigenvalue of 1, 2) item loading above .30 on each factor, 3) no or few cross-loadings or secondary loading items and 4) no factor with fewer than three items. The number of factors or components and the items on each factor from the best factor solution of factor extraction were determined. Moreover, construct validity was tested using a contrast group approach and an independent sample t-test was used to analyze the different mean scores of oncology nursing competency between the 51 fourth-year nursing students and 48 general professional nurses.

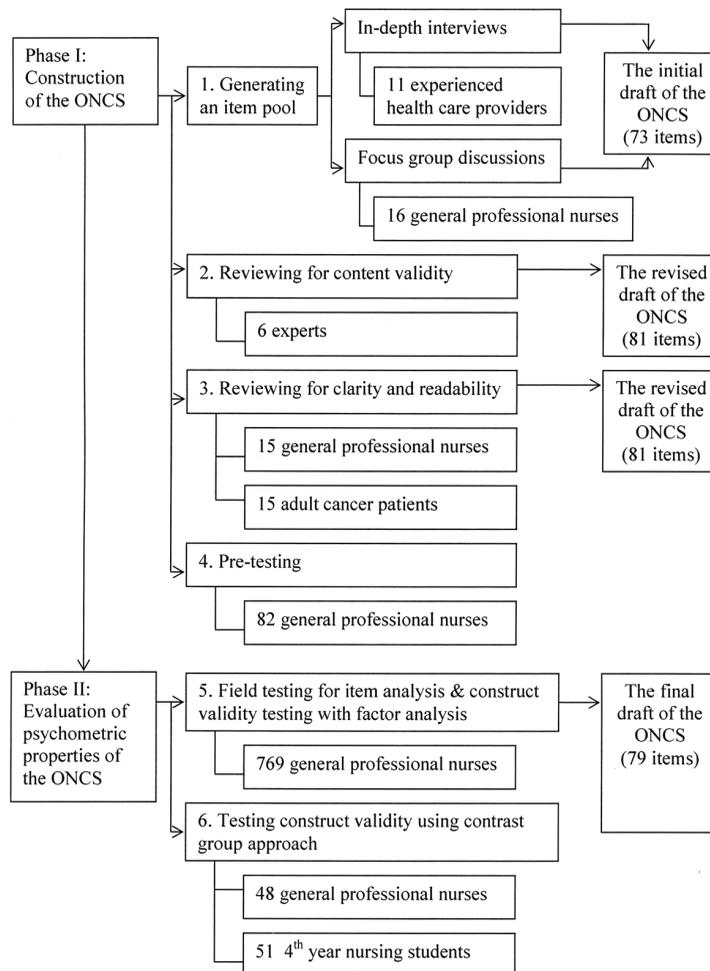


Figure 1. Flow chart of the data collection procedures.

RESULTS

The Development of the ONCS

Generating an item pool. The concept of oncology nursing competency was defined as the ability of the general professional nurses to encompass his/her knowledge, clinical skills, and attitudes in practising oncology nursing effectively for persons at risk and with experience of cancer in all phases of the disease and their families. Seventy-three items with six subscales were generated from a categorized theme emerging from the literature review, in-depth interviews, and focus group discussions. A 5-point rating scale was chosen as the format of the ONCS. The response alternatives ranged from no competency (0) to high competency (4). The initial draft of the ONCS was developed in the Thai language. The subscales of oncology nursing competency and its definition are presented in Table 2.

Table 2. Subscales and its definition of oncology nursing competency.

Subscales	Definitions
Preventing and screening of cancer	The ability of general professional nurses in disseminating knowledge to the people on how to avoid risk behaviors leading to cancer disease, observing abnormal symptoms, checking health status, counseling, and referring in case with symptoms introducing cancer disease.
Managing and supporting during cancer diagnosis	The ability of general professional nurses in assessing patients' needs and health problems, providing psychosocial care, managing the initial symptoms, and teaching and providing information during the diagnosis phase of a cancer patient.
Managing the treatment of side effects	The ability of general professional nurses in assessing patients' needs and health problems, providing psychosocial care, integrating complementary therapy, teaching and providing information related to treatment modalities, observing and preventing side effects which may occur during the treatment, and managing the side effects which occur in the three treatment modalities consisting of 1) operation, 2) chemotherapy, and 3) radiation.
Facilitating cancer survivorship	The ability of general professional nurses in teaching and providing information, providing psychosocial care at the stage of the cancer disease with no apparent evidence of active disease.
Providing end-of-life care	The ability of general professional nurses in assessing the needs and health problems, managing the symptoms of the disease and the treatment of side effects, integrating complementary care, teaching and providing information, providing psychosocial and spiritual care for cancer patients and their families at the end-of-life stage.
Providing other care throughout the entire cancer trajectory phase	The ability of general professional nurses in providing nutritional care, coordinating and communicating, negotiating for the right protection of cancer patients, and understanding and facilitating activities relevant to the beliefs and cultures of cancer patients and their families throughout the entire cancer trajectory phases, from the disease's diagnosis stage until the end of life.

Reviewing items by experts. There were two rounds of content validity review by six experts. This resulted in three deleted items and the addition of eleven items. The CVI of 81 items ranged from 0.83 to 1.00 and the CVI of the overall scale was 0.98.

Reviewing for clarity and readability. Item reviewing by 15 general professional nurses and 15 adult cancer patients revealed that the clarity of language in the instructions and items of the ONCS was acceptable. Four nurses and two cancer patients came to a consensus that the length of the overall ONCS was too long. Three cancer patients indicated some questions using academic terminology which were difficult for them to understand, for instance, “*multidisciplinary team*”, “*complementary care*” or “*psychosocial changes*”. In addition, words used in some questions were upsetting for cancer patients such as “*breaking the bad news*” or “*end-of-life stage*”. However, the words or terminology used within the items of the ONCS were retained since this scale would be used by general professional nurses, not by patients, and will be revised with further research.

Pre-testing. The Cronbach’s alpha coefficients of the ONCS for six subscales ranged from 0.84 to 0.96 and the overall scale was 0.98.

Construct Validity of the ONCS

To determine the discrimination power of items, the scores of 769 general professional nurses on the ONCS were ranked from low to high score, and then, the participants were split into two groups by using the 25% technique: a low (193 nurses) and a high (195 nurses) score group. The item mean score of each group was computed and a mean comparison using t-test statistic was conducted. The findings revealed that the t-values of 81 items were significant ($p < .001$). The significant findings indicates that the low score group responded to the items of the ONCS differently from the high score group. Thus, all 81 items had good discrimination power and should be retained.

The results of item correlation which consists of inter-item correlation, item-subscale correlation, corrected item-total correlation, subscale-subscale correlation and subscale-total correlation, illustrated that most items of the ONCS were good discriminators. However, there were three parts to manage the treatment of side effects subscale, comprising managing the side effects of operations, managing the side effects of chemotherapy and managing the side effects of radiation, of which all 18 items showed the inter- item correlation higher than criteria required (.70), reflecting potential redundancy of the items. When considering the description of those items, it is apparent they assess oncology nursing competencies that are continuous processes of nursing care for cancer patients, such as assessing and diagnosing side effects, identifying the causes of cancer suffering, monitoring and preventing side effects, providing nursing care and evaluating the effectiveness of nursing interventions for treatment of side effects. Those items were generated based on steps of evaluating the effectiveness of nursing interventions to manage the treatment of side effects for cancer patients. They were expected to be highly interrelated. However, if these items were deleted, the theoretical soundness of the ONCS would be adversely affected. Thus, although inter-item correlations

were high and showed redundancy, these items were retained for further factor analysis.

To determine the components underlying the set of items of the scale, three methods of factor extraction were conducted. The results of employing a maximum likelihood factor analysis with the direct oblimin rotation method yielded 10 extracted components. Seven items had factor loading of less than .30 and were under consideration for deletion. The 74 remaining items had factor loading ranging from .32 to 1.00 and five items loaded on two components or had secondary loading. Among 10 components, one component contained only two items and the remaining nine components contained as many as 5-11 items. However, components consisting of less than three items were considered weak and unstable (Costello and Osborne, 2005). Thus, this method could not provide a statistically-sound solution. A principal component analysis with the varimax rotation method was then conducted. The results from this analysis showed that 10 components were extracted and all 81 items remained. The 81 items had factor loading ranging from .39 to .89, for which 34 items loaded on two components and other 13 items loaded on three components. All 10 components contained the number of items ranging from 5-12 items. However, the picture of the factor loading in each component was unclear and several items were not singly loaded in the component. Finally, for principal component analysis with direct oblimin rotation, the results showed that 10 components were extracted and two items had factor loading of less than .30 and were under consideration to be deleted. The 79 remaining items had factor loading ranging from .32 to 1.00, and eight items loaded on two components. All 10 components contained the number of items ranging from 6- 10 items. For this method, the picture of factor loading on each component seemed to be clearer and more stable than those from the other two methods of factor extraction. In this study, the principal component with oblique rotation by the direct oblimin method was finally selected for further factor analysis because it yielded the best likelihood of interpreting the factor solution.

The results of the first-order factor analysis of the 81-item scale indicated that all 10 components explained 74.13% of variance. In this step, two items were deleted because of factor loading of less than .30. Among the 79 remaining items, there were eight items loading on two components. However, these items had to be retained since they underwrote the theoretical soundness of the ONCS. Thus, 79 items were used for the second-order factor analysis. That analysis yielded all the items which remained in 10 components and explained 74.54% of variance. Components, the number of items, factor loading and Cronbach's alpha of each component and the overall scale for the final draft of the ONCS are shown in Table 3.

Table 3. Components, number of items, factor loading and Cronbach’s alpha of each component and the overall scale for the final draft of the ONCS (79 items).

Components	No. of items	Factor loading	Cronbach’s alpha
Preventing and screening of cancer	8	.40 - .79	.911
Assessing psychological state after cancer diagnosis	5	.50 - .67	.892
Providing psychosocial care after cancer diagnosis	10	.38 - .68	.933
Managing side effects of operation	6	.84 - .98	.961
Managing side effects of radiation	6	.96 - 1.00	.981
Managing side effects of chemotherapy and providing continuing care	10	.36 - .77	.958
Communicating and providing nutritional care	10	.36 - .72	.956
Working with multidisciplinary team in providing care with consideration of clients’ beliefs and culture	8	.39 - .72	.943
Integrating and supporting the use of complementary care	6	.30 - .53	.879
Providing end-of-life care	10	.53 - .73	.962
The entire scale	79	.30 - 1.00	.985

Moreover, testing of construct validity using a contrast group approach was conducted. An independent sample t-test was performed to analyze the differences of the ONCS in group mean on each subscale and on the total mean score. The results indicated that there was a significant difference ($p < .001$) of mean scores between general professional nurses and fourth-year nursing students in each subscale and the total scale. As expected, general professional nurses had higher scores of oncology nursing competency compared to that of fourth year nursing students in all subscales and total scale scores.

DISCUSSION

The ONCS has demonstrated promise as an instrument to assess oncology nursing competency among general professional nurses for adult cancer patients and their families in all phases of disease acuity. The ONCS supports the provision of cancer care throughout the continuum of the cancer disease trajectory, from prevention and screening to end-of-life care. Providing care throughout the disease continuum trajectory indicates how oncology nurses are wholly concerned with holistic care and how cancer patients are a focus of their care (Brant et al., 1996, Krcmar, 2000). Moreover, the ONCS illustrates how the physical, psychosocial and spiritual needs of cancer patients and family are inter-related

through the descriptions of the items.

The findings of this study reveal that ten components support the multidimensional construct of oncology nursing competency. The multidimensional construct includes (1) preventing and screening of cancer, (2) assessing the psychological state after a cancer diagnosis, (3) providing psychosocial care after cancer diagnosis, (4) managing the side effects of an operation, (5) managing the side effects of radiation, (6) managing the side effects of chemotherapy and providing continuing care, (7) communicating and providing nutritional care, (8) working with the multidisciplinary team in providing care with consideration for clients' beliefs and culture (9) integrating and supporting the use of complementary care and (10) providing end-of-life care. In addition, oncology nursing competency reflects the three attributes of the nursing competency concept: knowledge, skills and attitudes, that are emphasized as an integration of the three clusters rather than focusing on each separately, as mentioned by Alspach (1992).

As regard to the identified dimensions from the data gleaned from the qualitative methods and factor analysis, it was found that most themes of all dimensions were similar with the dimensions from the conceptual framework, with the exception of the dimension of facilitating cancer survivorship. Although the number of dimensions increased from four to ten, they remained in the similar framework of this study.

Most of the dimensions of oncology nursing competency identified in this study are similar to the dimensions of competency of general professional nurses as described by the Thailand Nursing and Midwifery Council (TNC), particularly in the competency of providing nursing care (TNC, 2009). This competency integrates the general professional nurses' practice of the concept, the nursing science and art, and related sciences, to provide holistic nursing care in an effective and high quality way to promote health, prevent disease and provide supportive nursing care and rehabilitation for people afflicted with disease.

For the judgment qualification of content validity, the values of CVI of 81 items and the entire scale indicate that the scale is acceptable for content validity since the expected value for a new scale is a minimum I-CVI of 0.78 for 6 experts, and the S-CVI of 0.90 (Lynn, 1986; Polit and Beck, 2006). Item review indicates that participants found the clarity of language in the instruction and all associated items clear and unambiguous, so there was no need to revise.

For testing the construct validity of the ONCS, two approaches were used in this step: exploratory factor analysis and the contrast group approach. For the first approach, exploratory factor analysis, the results demonstrated that the construct of the ONCS was composed of ten components with 79 items. The final principal factor extraction procedure supported the multidimensionality of the ONCS which displayed a high percentage of variance, accounting for 74.543% of total variance. This value was above the expected value of 60% of explained variance for factor (Hair et al., 1998).

For the second approach to construct validity, the contrast group approach, the results revealed that all mean score values of oncology nursing competency were significantly different. Moreover, the result demonstrated the discrimina-

tive functionality of the overall scale and the ten dimensions which are used to differentiate the oncology nursing competency levels among general professional nurses, based on their scale score (DeVellis, 2003).

To show evidence of reliability, the ONCS demonstrated sufficient alpha coefficient both in the overall scale and in each dimension and surpassed the expected value for a new-developed instrument (.70) (Hair et al., 1998; Burns and Grove, 2001). Reliability indicates the high internal consistency of the scale (Polit and Beck, 2004). This high internal consistency indicates that items of the ONCS measure high consistency in the same construct and show high inter-correlation (Hair et al., 1998). These reliability results indicate that the ONCS is quite a good scale to assess the oncology nursing competency among general professional nurses.

The discussion demonstrated that the ONCS had adequate reliability and validity. As a result, the ONCS offers a promising way of assessing oncology nursing competency among general professional nurses.

CONCLUSION AND IMPLICATION

The ONCS is a new self-assessment scale whose purpose is to assess the ability of general professional nurses in practising oncology nursing effectively in the Thai context. In this study, the ONCS demonstrated evidence of the content and construct validity and adequate internal consistency reliability. Total scale score is obtained by summing raw scores across 79 items on ten components and the total score can range from 0 to 316. A high score indicates a high competency to provide care for adult cancer patients and their families. However, critical items need to be further identified to assess whether the scale can be shortened because the length of the ONCS may also serve as a barrier to its use.

Since oncology nursing competency reflects the ability of general professional nurses in their nursing care practice, assessment of the ten components relevant to the scale could be useful in discriminating the competency level in different stages of cancer care throughout the disease experience, from prevention and screening through to end-of-life care. The ONCS can help general professional nurses identify their relative strengths and weaknesses of competency to provide nursing care for cancer patients and family, to improve their overall competency for effective care, to promote clinical excellence and to measure changes in oncology nursing competency over time. Moreover, the ONCS is useful for nursing administrators in evaluating staff competency for performance appraisal and job specification, recruitment or promotion guidance. Nurse administrators can use the ONCS for identifying areas of educational needs and professional development, providing insight into areas of professional practice and clarifying allocation of educational resources for training and development needs. In addition, the ONCS can be used to show accomplishment of a learning program either by nursing students for self-assessment or by the instructors for evaluation. It can also be used as a guideline for development of a nursing curriculum for nursing schools or a training program in oncology nursing for nurses already

out of school. Finally, this study indicates that the ONCS is a reliable and valid instrument. Thus, it can be used in research that aims to study oncology nursing competency.

LIMITATION

Limitations in this study are related to data collection and the research instrument itself. First, data collection was conducted in tertiary cancer care settings where nursing participants provided their nursing care wholly dependent on what stage of cancer treatment the patient was experiencing, such as chemotherapy, radiation or palliative care, not the entire trajectory of cancer. This may be a limitation to use of the scale in practice. Second, this study could not test concurrent or predictive criterion-related validity, since there are no existing scales for comparison.

RECOMMENDATION

Although the ONCS shows promising psychometric properties, it still needs more testing to be considered rigorous enough to be the standard nursing competency scale in the future. The scale should be developed as a normative reference for interpreting the raw score among general professional nurses who have received a four-month training course in oncology nursing. The findings will be useful for nursing organizations in improving and developing the competency of general professional nurses who have little or no training in oncology care. To further assess the validity of the ONCS, it should be tested for predictive or concurrent criterion-related validity with existing scales. The ONCS needs to be employed in further research in order to test other psychometric properties such as the efficiency or sensitivity of the scale.

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