가정간호학회지 제26권 제1호, 2019년 4월
J Korean Acad Soc Home Care Nurs Vol.26 No.1, 81-90, April, 2019
ISSN :1738-7590
https://doi.org/10.22705/jkashcn.2019.26.1.81

Development of Educational Components of Managerial Cost Accounting for Nurses*

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Introduction

Nurse managers engage in a range of cost-reducing management programs using cost accounting knowledge and methods, for example, downsizing hospital material stocks, analyzing nurse labor costs, and enhancing the efficiency of cost resources utilization [1]. Cost management, including accurately determining costs, and comparing them with outcomes, can provide insights for efficiently managing organizational performance by improving outcomes at lower costs. As the healthcare environment becomes more complex and more competitive, Korea is following the United States and other countries in showing interest in managing organizational performance through efficient cost management. Moreover, costing systems such as activity-based costing (ABC) and time driven activity-based costing (TDABC) can facilitate cost efficiency in healthcare settings [2]. Kaplan and Porter [2] reported that a remedy to the Unites States cost crisis did not require breakthroughs in medical science or new government regulations, but simply, an accurate way to measure costs and compare them with outcomes. The authors highlighted that the ability of hospital staff to perform cost calculations is crucial to reducing cost problems in hospitals.

Developing managerial cost accounting education programs is crucial for nurses and nurse managers to improve cost calculation and enhance management competencies. To achieve competency in cost analysis, nursing schools in the United States have developed joint MBA/MSN programs based on financial management, such as accounting and financial reporting. However, cost analysis and management education programs are unusual in Korea. According to a review of cost analysis and management education programs in Korea, no refresher education program was listed among the 1,833 continuing education programs for nurses, including online and offline education programs supplied by the Korean Nurses Association from January 2014 to August 2015 [3]. Moreover, the graduate nursing curricula does not adequately address cost analysis and management issues. For example, currently, Korea has 174 nursing schools, but only two colleges include cost accounting courses as part of their graduate program. The lack of adequate cost management programs may be because the nursing unit is considered a cost center rather than a revenue center, and nurse managers' cost management mainly focuses on reducing costs through supply control. Therefore, there is a need for development of adequate cost analysis and management education programs for Korean nurses.

주요어 : 간호사, 간호교육, 원가분석, 교육요구도

* 본 연구는 정부의 재원으로 한국연구재단 중견연구비 지원(NRF-2014R1A2A2A01003682)에 의해 연구되었음. 본 연구는 다년도 연구과제 "디지털리터러시를 활용한 시뮬레이션 기반 간호원가분석 교육 프로그램의 개발 및 효과"의 일부로, 본 과제는 교육요구도 개발, 교육 콘텐츠 개발 및 웹기반 교육프로그램의 효과 평가로 구성되었음. 본 연구는 1, 2단계인 "웹기반 교육프로그램의 교육요구도 및 교육 콘텐츠 개발"의 결과임.

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투고일: 2019년 3월 15일 수정일: 2019년 3월 25일 게재확정일: 2019년 4월 9일

In Korea, with increasing competition among hospitals due to changes in the business environment [4], financial management competency has become necessary for nurse managers. Financial management competencies include accounting, cost management, and budgeting [5], which are crucial for running nursing units. Although budgeting is one of the most important capabilities for nursing managers, it is a lesser requirement for nursing managers in Korea than it is in the United States. Owing to healthcare system differences, unlike the United States, nurse managers in Korea have few opportunities to manage budgets, such as labor costs. Thus, the cost management competencies of nurses in Korea must fit the Korean medical environment. Within the nursing field, managerial cost accounting competencies include the ability to calculate consumption costs, analyze, and apply managerial cost accounting data in the workplace [6].

To develop an efficient cost analysis and management education program for nurses, it is essential to identify the components of managerial cost accounting knowledge, which will address the education needs and priorities of nurses [7]. Brennan [8] showed that identifying educational needs should be part of the initial stages of continuing education programs. As the environment of the healthcare industry becomes more complex and expensive than ever before [4], understanding the cost of patient care and comparing these costs to outcomes becomes more important. This is vital because this knowledge aids cost-effective management in current hospital systems. Therefore, enhancing the cost accounting competencies and analytical skills of nurses is essential to prepare them for future healthcare changes.

Aim

The purpose of this study was to develop the educational components of managerial cost accounting for nurses using comprehensive literature review, nominal group technique, experts' audit and priority analysis by experts.

Method

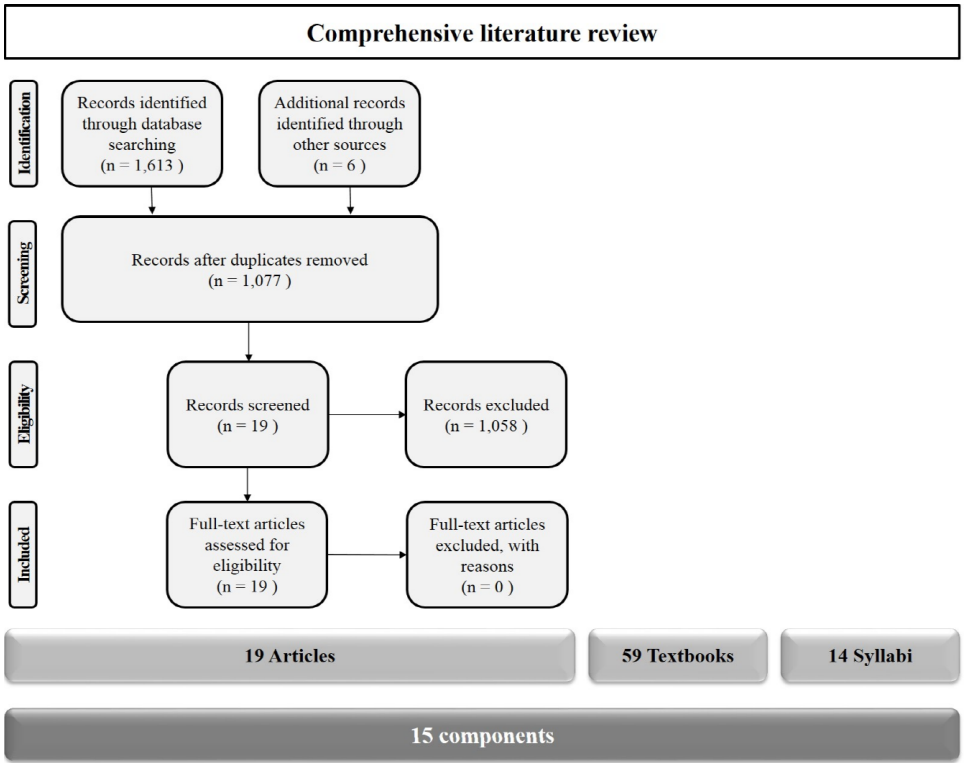
Study Design

The study design was as follows; 1) a comprehensive literature review to identify components for managerial cost accounting; 2) the nominal group technique (NGT) with focus group interview (FGI) to identify the managerial cost accounting educational components required for nurses; 3) experts' audit using a content validity index (CVI) survey; and 4) priority analysis using an analytic hierarchical process (AHP) by experts to determine the relative importance of the defined components.

Comprehensive literature review

To identify the components of managerial cost accounting education for nurses, two researchers conducted a comprehensive literature review and searched relevant websites from March to September 2014. A wide variety of references were included in web databases, textbooks on accounting and cost management, and managerial accounting course syllabi retrieved from the official websites of nursing, healthcare, and business administration departments. The web databases searched included Medline, EMBASE, Cochrane Library, Cumulative Index to Nursing and Allied Healthcare Literature (CINAHL), KoreaMed, Research Information Sharing Service (RISS), Korean Studies Information Service System (KISS), and Korea Institute of Science and Technology Information (KISTI). The keywords used for these searches were "cost," "accounting," "cost management," "cost accounting," "cost analysis," and "managerial accounting." Database searches and the extraction of articles were performed from July to September 2014. Finally, we extracted and reviewed 19 studies among 1,619 studies (6 Korean studies and 13 international studies). Furthermore, 59 textbooks on nursing, business, accounting, and health management were reviewed to select the appropriate managerial cost accounting components for nurses. In addition, 14 syllabi related to undergraduate and graduate courses were collected from the websites of 22 universities (4 Korean, 18 international).

The researchers then classified and extracted preliminary managerial cost accounting educational components from each source. Finally, the 15 most common educational components of managerial cost accounting were identified. Next, researchers made cards for each of the 15 components, which were used to encourage active discussions of focus group. Each card included the name of the component and a brief definition and explanation. Figure 1 shows the comprehensive literature review process.



<Figure 1> The process of comprehensive literature review

The nominal group technique (NGT) with focus group interview (FGI)

This study used the NGT with FGI to identify the managerial cost accounting educational components for nurses. The NGT was used to reach participant consensus based on information gathering. According to the Centers for Disease Control and Prevention's guidelines [9], the process of NGT is composed of card sorting, result recording, discussion, and voting.

Participants: The participants of this step were 15 nurses with more than three years of hospital experience and studying for graduate courses. The participants were divided into three groups for the FGI according to their major, and the number of participants. Two groups (groups A and B) consisted of five nurses each who were interested in hospital managerial cost accounting but were not majoring in nursing management in their graduate courses. These 10 nurses were randomly assigned to the two groups by picking even and odd numbered cards. The other group (group C) consisted of five nurses that were majoring in nursing management. None of the 15 participants had received formal managerial cost accounting training in the past. Group A' participants (aged 28 to 42 years) had an average of 11.2 years of nursing experience and consisted of 4 staff nurses and 1 head nurses. Group B' participants (aged 29 to 42 years) had an average of 10.8 years. They were all staff nurses. The last, group C' participants (aged 31 to 45 years) had an average of 15.0 years and consisted of 4 staff nurses and 1 head nurse.

Process: The NGT with FGI were performed on October 22 and 31, 2014. During the first step, card sorting, the 15 nurses sorted the 15 educational component cards according to the perceived degree of necessity for inclusion in a managerial cost accounting education program for nurses. Next, they scored each component card on a scale from 1 "completely unnecessary" to 5 "completely necessary." During the second step, results recording, the nurses recorded their educational component card rankings and the reasons for their ranking. The perceived degree of necessity was scored based on the clinical experience of participants. No discussion or interaction was permitted among the nurses during the card sorting and result recording steps. In the third step, discussion, the nurses discussed their card sorting results focused on the reasons for their decisions. In the last

step, voting, all nurses voted several times on component priorities until unanimous agreement was reached. After the NGT with FGI, components ranked "moderately unnecessary" and "completely necessary" by all groups were selected as the desirable managerial cost accounting educational components for nurses.

Experts' audit using the content validity index (CVI)

Participants: Twelve experts were involved in the CVI: six nursing management professors, one business administration professor, and five nurse executives. All experts, except the business administration professor, were females. The average age of the expert panel was 49.08 (SD=5.63), and the experts had an average of 21.5 years of professional career experience (SD=5.64).

Process: Based on prior findings, a CVI survey was performed to determine the validity of agreed eight components as managerial cost accounting educational components for nurses. Experts assigned a validity index to each of these components using a four-point Likert scale from "not very valid" to "very valid" by agreement, which was used to avoid ambivalent middle scoring [10]. Components with a CVI score over 0.80 were selected as valid. Data were collected from December 12 to 23, 2014.

Priority analysis using analytic hierarchical process (AHP)

Participants: The participants in the AHP were the same 12 experts who participated in the CVI survey. After the CVI survey, we asked the expert group to prioritize the relative importance of the eight components.

Process: To prioritize the relative importance of the agreed eight components, we used an AHP program developed by MakeIt for Excel software. The AHP is a useful method of identifying the priority presented weight by comparison between components [11]. The expert group evaluated the relative importance using pairwise comparisons between the two components. The scale of relative importance ranged from one (equal importance) to nine (absolutely more important) [12]. Of the 12 experts, the results of seven experts showed a proper consistency ratio (CR). The CR is a measurement of the uniformity of experts' response to AHP questions; a prior study reported that the appropriate CR value was lower than 0.1 [11].

Ethical considerations

After obtaining the approval of the institutional review board, the researchers recruited 15 nurses for the NGT with FGI process and 12 experts for audit and AHP through purposive sampling. The researchers explained the purpose and procedure of the study, and the participants who had voluntarily applied to join the study were asked to provide written informed consent. The consent form stated that participants could withdraw their agreement whenever they want and that their information would be only used for the purpose of this study.

Results

Comprehensive literature review

Through literature review, 15 educational components were extracted. These results were shown in Table 1' components. The educational components varied. They included from basic concepts such as an introduction to managerial accounting, cost measurement process, and cost information use, to advanced concepts such as an analysis of break-even point and activity-based costing.

NGT with FGI

Card sorting results by 15 participants were shown in Table 1. During sorting cards, participants in Group A considered 10 educational component cards to be "completely necessary" for inclusion in a managerial cost accounting education for nurses. During the discussion, the group unanimously agreed on the inclusion of nine of these components. Participants in Group B initially selected 11 educational component cards, and after discussion, unanimously identified 11 components as "completely necessary." Participants in Group C primarily selected eight educational component cards, and after discussion, agreed on the inclusion of eight components unanimously. Group A and B emphasized that the "structure of hospital costing" was most important, while Group C assigned the highest importance to the "process of calculating manufacturing costs," "methods of calculating costs," "activity-based costing," and "use of cost information for hospital performance evaluation."

<Table 1> Fifteen Educational Components and Card Sorting Results by Participant Group

Components	Mean Scores of Group A (n=5)	Mean Scores of Group B (n=5)	Mean Scores of Group C (n=5)	Combined Mean Scores (N=15)	Percentage "Necessary"[a] (%)
Basic concepts of managerial accounting	4.40	4.00	4.40	4.27	93.33
Concepts of hospital costing	4.60	4.40	4.80	4.60	100.00
Special decision making using cost information	3.80	2.60	2.00	2.80	26.67
Structure of hospital costing	4.80	4.80	4.80	4.80	100.00
Process of calculating manufacturing costs	3.60	3.40	1.60	2.87	40.00
Process of calculating hospital costs	4.40	4.60	5.00	4.67	93.33
Calculation of joint costs	2.20	1.60	1.20	1.67	0.00
Decision to transfer costs	2.40	2.00	1.60	2.00	0.00
Methods of calculating costs	4.20	4.00	5.00	4.40	93.34
Activity-based costing	3.20	4.60	5.00	4.27	80.00
Cost of quality and Just-in-time	2.60	3.40	2.00	2.67	26.67
Accounting information systems	4.00	3.80	1.80	3.20	46.67
Use of cost information for hospital performance evaluation	4.40	4.60	5.00	4.67	100.00
Break-even point analysis	4.20	4.40	3.60	4.07	73.33
Understanding the accounting cycle	3.80	3.20	2.40	3.13	33.34

a. Response rate of "moderately necessary" or "completely necessary."

To combine the results of the three groups, the researchers gathered educational component cards selected as "necessary" from three groups. Eight educational components were finally found to be "necessary" by all three groups. Thus, these components represented the desirable managerial cost accounting educational components for nurses. Finally selected educational components were as follows: "basic concepts of managerial accounting," "concepts of hospital costing," "structure of hospital costing," "process of calculating hospital costs," "methods of calculating costs," "activity-based costing," "use of cost information for hospital performance evaluation," and "break-even point analysis."

Table 2 summarized the combined ranking results for finally selected educational components and their definitions. Among these components, "activity-based costing" was chosen as the highest priority educational component. "concepts of hospital costing" and "structure of hospital costing" ranked second and third, respectively. "break-even point analysis" ranked the lowest.

Experts' audit using CVI

The CVI survey determined the validities of the selected eight managerial cost accounting educational components for nurses. Table 3 summarized these results. All eight educational components had a CVI score of over 0.80, and the average total CVI score was 0.99. Seven components, except "break-even point analysis," had a CVI score of 1.

Priority analysis using AHP

Table 4 shows the relative priorities of the eight components for seven experts, with CR values measured below 0.1. The CR value of the seven experts averaged 0.0113. The most important component was "activity-based costing" (importance weight 15.7%). However, the least important component was "basic concepts of managerial accounting" (importance weight 9.2%).

Discussion

We conducted this study to develop the educational components of managerial cost accounting of nurses. For identifying nurses' managerial cost accounting educational needs, the 15 nurses chose eight educational components from a total of 15 educational component cards using NGT with FGI. The NGT is one of the useful methods to reach consensus among participants [9,13]. For this reason, NGT was used in many prior studies that measure educational needs for nurses [7,13]. However, the limitations of NGT found in previous studies were that there were fewer participants and that it was difficult to reflect the opinions of nurses in practice with only a group of experts participating [13]. In a previous study on financial accounting education requirements, these methods were used to

<Table 2> Comparison of Ranking Results by Participant Group

Components	Brief Definition	Group A Ranking (n=5)	Group B Ranking (n=5)	Group C Ranking (n=5)	Combined Mean Ranking (n=15)
Basic concepts of managerial accounting	• Introduction to managerial accounting • Objectives and structures of managerial accounting • Comparison with financial accounting	8	2	7	5.67
Concepts of hospital costing	• Definition of cost • Concept of cost object • Classification of cost	2	3	1	2.00
Structure of hospital costing	• Definition of the three elements of cost • Labor cost of hospital costing • Material cost of hospital costing • Administrative cost of hospital costing	3	4	2	3.00
Process of calculating hospital costs	• Process of cost calculation • Order-based hospital cost calculation • Performance-based hospital cost calculation • Definition of cost allocation • Methods of cost allocation	4	5	5	4.67
Methods of calculating costs	• Introduction to various cost calculation methods • Comparing job order costing and process costing methods • Comparing full costing and variable costing methods • Comparing normal costing and standard costing methods	5	6	3	4.67
Activity-based costing	• Concept of activity-based costing • Five elements of activity-based costing • Calculation process of activity-based costing	1	1	4	1.67
Usage of cost information for hospital performance evaluation	• Concept of responsibility accounting • Classification of responsibility centers • Performance evaluation based on responsibility accounting	6	7	6	6.33
Break-even point analysis	• Concept of cost-volume-profit analysis • Concept of break-even point • Calculation exercise of break-even point using cost-volume-profit formula	7	8	8	7.67

<Table 3> Summary of the Content Validity Index Results of the Eight Educational Components

Components	CVI Scores
Basic concepts of managerial accounting	1.00
Concepts of hospital costing	1.00
Structure of hospital costing	1.00
Process of calculating hospital costs	1.00
Methods of calculating costs	1.00
Activity-based costing	1.00
Use of cost information for hospital performance evaluation	1.00
Break-even point analysis	0.92
Average of CVI scores	0.99

assess educational needs for clinical nurses, but the number of participating nurses was only two groups of 11 people [7]. To make up this weakness of NGT, we recruited three groups of 15 nurses and combined FGI to encourage 15 participated nurses' understanding and selecting managerial cost accounting educational components for nurses.

The eight educational components were crucial because they provide a wide range of education possibilities, ranging from basic cost analysis to advanced managerial cost accounting techniques. They were to meet the needs of nurses who will become chief nursing managers or nurse leaders in hospital management. Dunham-Taylor and Pinczuk argued that materials

<Table 4> Summary of the Analytic Hierarchical Process Results for the Eight Educational Components

Components	Importance Weight (%)	Order
Basic concepts of managerial accounting	9.2	8
Concepts of hospital costing	13.9	2
Structure of hospital costing	12.0	6
Process of calculating hospital costs	13.2	5
Methods of calculating costs	13.3	3
Activity-based costing	15.7	1
Use of cost information for hospital performance evaluation	13.3	4
Break-even point analysis	9.4	7

and supply costs in hospitals are huge [14]. Therefore, one way to reduce these costs is to persuade nursing staff to reduce the use of supplies. To accomplish this goal, nurses and nursing managers should improve their cost accounting knowledge and skills. Consequently, these prior results and our results highlight the need for managerial cost accounting education for nurses.

The components chosen in this study differ from the content of existing textbooks related to cost analysis for nurses [5,15]. These existing texts mostly adhere to the basic concepts of cost, such as fixed cost, variable cost, marginal cost, and relevant cost. However, our results cover a much wider range of managerial cost accounting educational components, as they range from basic components, such as an understanding of cost concepts, to advanced practical skills, such as the use of cost information for performance evaluation. Textbooks on business administration feature more advanced concepts of managerial cost accounting, such as cost object, cost centers, sunk costs, and cost allocation [16,17]. Therefore, we suggest that a more systematic managerial cost accounting education with a broader scope should be developed to improve the cost analysis and management competency of nurses.

After the NGT with FGI, we also found a difference in educational needs depending on the major subject that a nurse chooses. Groups A and B (who majored in non-nursing management) gave “structure of hospital costing” the highest score, which represents a basic level introduction to cost accounting. In contrast, Group C (who majored in nursing management) chose four components unanimously and gave each a five-point score. The components were “process of calculating hospital costs,” “methods of calculating,” “activity-based costing,” and “use of cost information for hospital performance evaluation.” Of these, “use of cost information for hospital performance evaluation” was the highest-level component of cost accounting education and “process of calculating hospital costs” and other components were mid-level. The results showed that the educational needs of nurses who were majoring in nursing management were more extensive than the needs of others. Moreover, their educational needs focused on advanced managerial cost accounting knowledge and skills. We suggest developing a managerial cost accounting education program for nurses in two tracks. The basic track would be for novice nurses who require an understanding of the basic concepts of cost accounting management. The advanced track would be for senior nurses who have a competent understanding of the basic concepts of cost accounting management and who need to apply more advanced cost information to their daily nursing activities.

For developing valid educational components of managerial cost accounting, we performed components validation using both experts’ audit and priority analysis. In a previous study that developed financial accounting educational components, only the CVI of expert groups was used to prove the validation of selected components [18]. However, just CVI of the educational components makes it difficult to know clearly where to focus when developing the education program. To complement this limitation, our study included a priority analysis using AHP with CVI to get concrete validation of educational components. The AHP is used to determine the ranking of criteria and priorities in areas such as economics and government decision-making. In recent years, this method has also been used in the field of nursing to prioritize nursing organization performance indicators or nursing course outcomes [19-21].

In this study, the importance of the eight educational components, which were validated through CVI, was measured using the AHP. According to the CVI results, all components, except “break-even point analysis” scored 1.00. However, for example, “basic concepts of managerial accounting” was the eighth priority in the AHP analysis. Likewise, the importance of components and their validity may show differences. Therefore,

it is necessary to use both AHP and CVI for an accurate analysis by the expert audit to confirm validation based on priority. The results of the AHP did not show a large gap in importance among the eight educational components. The highest-rated component was “activity-based costing” with 15.7%, and the lowest-rated component was “basic concepts of managerial accounting” with 9.2%. These results can be interpreted as the experts’ recognition that all eight educational components are necessary and important. Therefore, these components were considered suitable as managerial cost accounting educational components for nurses.

Additionally, we analyzed the results of the seven experts and excluded the data of five experts for whom the CR was much higher than 0.1. The ranking order of the components did not change based on the results of the seven experts and twelve experts. According to previous research, sample size can influence the study results, and proper sample sizes are required to identify the study objectives [11]. In this study, the order of the importance of components did not change even though the number of experts decreased. However, the results may vary depending on the number of experts; therefore, further research on the appropriate number of experts is necessary. Despite this limitation, we found that “activity-based costing” is the most important component of an effective managerial cost accounting education program, according to the experts’ responses. Recently, the healthcare industry has been rapidly adopting activity-based costing to manage costs. As it has become a popular healthcare system in Korea, experts group in this study may have considered its necessity and importance.

The identified managerial cost accounting educational components are important for both staff nurses and nursing managers. To achieve better performance, staff nurses should determine how cost analyses techniques could be applied to their nursing activities on a daily basis. Therefore, staff nurses should understand that cost accounting leads to better outcomes based on cost efficacy. This is important, because staff nurses are the core facilitators of patient care. Thus, their better understanding of managerial cost accounting would improve overall hospital outcomes. Therefore, our results could be applied to the development of various education programs for staff nurses, nursing managers, and graduate nursing students.

This study has some limitations. First, the lack of published articles makes it difficult to perform a satisfactory analysis in the comprehensive review. Second, this study developed the components of managerial cost accounting education for nurses reflecting the healthcare environment in Korea. However, its range and theme may be different in other countries. Therefore, it is necessary to consider the healthcare environment of the country when applying the results of this study. The results of this study will help nurses understand hospital cost management process and increase competencies of nursing unit management based on cost analysis.

Conclusion

The cost managing competency of nursing managers is essential in fulfilling their organizational role and improving the financial status of a hospital. In this study, eight managerial cost accounting educational components were developed, with “activity-based costing” having the highest relative importance. We found that nurses have a wide range of educational needs for managerial cost accounting from a basic understanding of cost concepts to advanced use of cost information for performance evaluation. As the eight educational components cover the full spectrum of managerial cost accounting and focus on the needs of nurses who will become chief nursing managers and leaders in the hospital, it would be useful to enhance the cost analysis and management competencies of all nurses.

Cost accounting is a very complicated concept, which requires time to learn. Therefore, we suggest that future studies include theoretical concepts and simulation exercises for practical cost calculations. We also recommend that orientation programs for new nurses include contents on cost management, so that nurses develop a cost management mindset in novice.

Conflict of Interest

The authors declared no conflict of interest.

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Development of Educational Components of Managerial Cost Accounting for Nurses*

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Purpose: In accordance with changes in the healthcare environment, it is necessary to understand managerial cost accounting for nurses. This study aimed to develop educational components of managerial cost accounting for nurses. **Methods:** This study is comprised of a comprehensive literature review, nominal group technique using focus group interview, audit by an expert group, and priority analysis. **Results:** The comprehensive literature review identified 15 educational components of managerial cost accounting. In the nominal group technique, the participants finally agreed on eight educational components of managerial cost accounting for nurses. The average content validity index of these components was 0.99. "Activity-based costing" scored the highest for relative importance (15.7%). **Conclusions:** These results can be used to develop an education program to strengthen nurses' managerial cost accounting competencies. Furthermore, it will be helpful to use a basis for the development of cost management curricula for nursing students and on-the-job training courses of nurse managers and executives.

Key words : Nurses, Nursing education, Cost analysis, Needs assessment

** This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIP) (NRF-2014R1A2A2A01003682). This work was part of a multi-year project: "Development and effects of an education program of nursing costs analysis based on simulation using digital literacy" including educational needs assessment, development of educational components, and the evaluation of the web-based education program. This work shows the results of the first and second step, "educational needs assessment and development of educational components."*

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