

# Development of Online Continuing Education Courses on National Health Examination for Community Health Nurses: Using the Rapid Prototyping Method

Eun-Ha Kim<sup>1</sup>, Kye-Ha Kim<sup>2</sup>, Kyung-Eui Bae<sup>3\*</sup>

<sup>1</sup>Department of Nursing, Catholic University of Pusan

<sup>2</sup>Department of Nursing, Chosen University

<sup>3</sup>Department of Nursing, Dongseo University

## 지역사회 간호사를 위한 건강검진 온라인 교육안 개발: Rapid prototyping method를 활용

김은하<sup>1</sup>, 김계하<sup>2</sup>, 배경의<sup>3\*</sup>

<sup>1</sup>부산가톨릭대학교 간호학과

<sup>2</sup>조선대학교 간호학과

<sup>3</sup>동서대학교 간호학과

**Abstract** This study was conducted to develop an online education program for visiting health nurses on National Health Examination. The study period was from November 2016 to December 2017. The program was developed in stages using rapid prototyping methodology. 1) Learners' needs were identified through literature review and focus group interviews (FGIs) with visiting health nurses and stake-holders in the field. 2) The contents of the education program including counseling strategies regarding the health of visiting health nurses were developed. 3) Online education materials were developed and piloted amongst learners. 4) The contents of educational programs were classified into eight learning modules, and online education drafts were pilot tested. 5) Based on feedback from learners, this program was revised and a web-based continuing education program for community nurses was developed. These education programs effectively assisted nurses with counseling regarding health examinations during visiting health nursing care. Therefore, the online continuing education program may be a very effective educational approach to improving nurses competency.

**요약** 본 연구의 목적은 방문간호사를 위한 국가 건강검진에 관한 온라인 보수교육 프로그램을 개발하기 위함이다. 연구 기간은 2016년 11월부터 2017년 12월까지 시행되었다. 교육 프로그램은 래피드프로토타입 방법을 활용하여 단계적으로 개발하였다. : 1) 관련 문헌 검토와 이해관계자 및 전문가의 포커스그룹 면담(FGI)을 통해 학습자의 요구도를 확인하였다. 2) 방문 간호사의 건강 검진에 관한 상담 전략을 포함하는 교육내용의 개요를 작성하였다. 3) 온라인 교육자료 개발자와 연구자가 회의를 거쳐 온라인 교육 프로그램을 개발하여 학습자에게 모의 조사를 실시하였다. 4) 확정된 교육내용을 8개의 모듈로 구분하여 온라인 교육 자료 초안을 개발하여 파일럿 과정을 실행하였다. 5) 학습자의 피드백을 반영하여 교육 프로그램을 확정하여 지역사회 간호사를 위한 건강검진 온라인 보수교육 프로그램을 최종적으로 개발 및 운영하였다. 개발 된 온라인 보수교육 프로그램은 방문 간호사가 건강검진에 관한 상담을 수행하도록 돕는 데 효과적이었다. 따라서 온라인 보수교육 프로그램은 간호사의 실무역량을 향상하는데 효과적인 교육적 접근이라 할 수 있겠다.

**Keyword** : Community Health Nurses, Online-Education, Health Examination, Rapid Prototyping Method, Continuing Education

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\*Corresponding Author: Kyung-Eui Bae(Dongseo University)

email: womenhealth@gdsu.dongseo.ac.kr

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## 1. Introduction

The National Health Examination (NHE) is significant as the government provides health examinations to everyone over the course of their entire life cycle, which is unprecedented in the world. The NHE has gradually improved the awareness rate of hypertension and diabetes; the awareness rate of hypertension among those aged 30 or older increased from 66.3% in 2007-2009 to 69.3% in 2016, and the awareness rate of diabetes improved from 42.1% to 48.4% during the same period[1]. The NHE in Korea aims to prevent chronic diseases and is divided into general health examination, life transition health examination, and cancer screening. Even though the NHE has an effect on the prevention of chronic diseases, the percentage of those who manage their diseases post-examination is only around 20%, which is quite low[2]. As part of the Integrated Health Promotion Program to enhance the NHE's preventative function, services from the Visiting Healthcare Project and the Healthy Lifestyle Practice Project are provided in connection with NHE outcomes[3]. The National Health Insurance Service gives visiting nurses the NHE outcomes of residents in the local community for which they have charge. The nurses visit the residents' homes, provide health counselling about the NHE outcomes, and check the level of health awareness and healthy lifestyle practice after six months.

Visiting nurses in Korea have played a leading role in establishing the Visiting Healthcare Project, which is designed to ensure health equity by providing healthcare services that are tailored to various needs, including attending to health problems in vulnerable groups. Integrating or connecting health and welfare is a global trend, and the UK and Japan have highlighted the connection between health, social workers, and implemented integration programs[4]. In 2013, the Community-Based Integrated Health

Promotion Program was introduced in Korea, and it reorganized the Community Health Center Program, which was previously listed by unit project, health area, and life cycle, and provided integrated services. As of 2018, the number of people assigned to the Visiting Healthcare Project under the Integrated Health Promotion Program is 2,368, and visiting nurses account for 87.3%, which is most of them[5]. In this regard, the *Visiting Nursing Manual* is distributed by the Korea Health Promotion Foundation to provide standardized visiting nursing services. The Ministry of Health and Welfare collaborated with the Korea Health Promotion Institute and developed a manual for visiting nurses to use in counselling about NHE outcomes and risk factors[6]. As for the educational content, the manual gives the NHE classification and period by age, explains how to manage health risk factors through examples of NHE outcomes, and briefly introduces the definitions, causes, symptoms, and treatment and care methods of major chronic diseases including high blood pressure. However, there was a limitation of meeting only the actual needs of local residents with this manual, reporting inquiries from the National Health Information Portal in the question-and-answer format. When surveyed, 52.7% of the visiting nurses wanted to see detailed explanations about diagnostic tests' purposes, methods, and outcomes, but the manual focused only on interpreting the outcomes; as a result, few visiting nurses used the manual[7]. In addition, since it was inconvenient to carry the manual's printed copies and there was not enough time to familiarize themselves with the manual, visiting nurses did not use the manual during their actual health counselling or education in many cases.

Having identified gaps in knowledge, skills, and practice[8], the educational team proposed to develop an online continuing education course on National Health Examination for

visiting health nurse. Online continuing education accessible to the nurses at any time, could be a solution to the problem of motivating busy nurses to attend course. Because Korean is one of the world's most internet-accessible nations, the educational team constructed on online on national health examination course for the visiting health nurse that followed the commonly used rapid prototyping method[9]. This research describes the development of this educational materials during a 1-years period from May 2016 to May 2017. The needs of visiting nurses for the NHE were identified by focus group interviews with visiting nurses in Community Health Centers, health teachers, and those eligible for the NHE. The researchers set three learning goals: (1) understand the purposes of the general health examination, life transition health examination, and cancer screening; (2) explain the NHE's specific items and methods; and (3) solve questions about NHE outcomes. The authors drew on this information to make online multimedia instructional video. Educational outcomes were evaluated using reflection quizzes, structured self-evaluation for nurse.

The purpose of this study was to identify visiting nurses' professional education needs with respect to implementing nursing care for health checkup patients and develop education materials to reinforce their professional competency.

## 2. Methods

### 2.1 Theoretical framework

This study applied the method from Jones and Ricky[9] which is "rapid prototyping development methodology" to the process of developing education material by using developmental research method. Rapid prototyping methodology follows the system development processes of analysis, design, development, implementation, and assessment in order to supplement the

limitations of the traditional Instructional System Design (ISD) model, but emphasizes simultaneous and circular characteristics[10]. Moreover, it has a repetitive feature wherein the user and instructional designer cooperate and participate to develop and revise a prototype.

In Korea, various studies[11,12] which applied rapid prototyping development methodology have been conducted in the fields of business, industry, and computer engineering since the late 1990s, and they were applied for web-based instructional development, web-based problem-oriented learning, and the development of contents for e-learning method[13]. It is a characteristic of the rapid prototyping development methodology that the user plays the same role as the developer (instructional designers, and content experts), and through equal sharing of authority, both the developer and the user can engage in interactive learning, and the completeness of the development output is enhanced(Fig. 1).

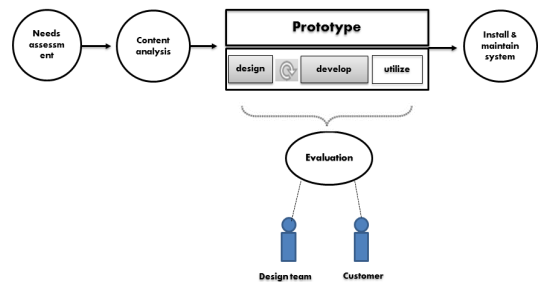


Fig. 1. Rapid prototyping development methodology.

The development of a teaching plan by applying rapid prototyping development methodology is done in the following stages. (1) Analysis phase: To analyze the demands of the learner and the instructional designer, methods such as literature review, interview and survey. Observation are used to understand the purpose of teaching, the current status of the online education of learners, and learners' motivation and existing knowledge regarding the relevant educational course. The instructional designer

analyzes the lecture plan and teaching materials and establishes the goal of the entire module and the learning objective of each module. (2) Design phase: The entire structure of the educational course (size and structure of the classes) is designed simultaneously with the analysis, and by dividing the stage into the “teaching strategy confirmation and design” and the “interactive action strategy design,” the instructional designer proceeds with the confirmation and designing of teaching strategy while the developer designs the interactive action strategy. (3) Prototype phase: After the completion of the general design, the horizontal and vertical development scope of rapid prototyping is determined (Fig. 2).

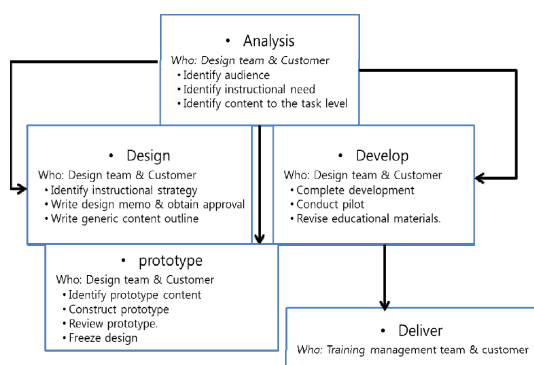


Fig. 2. Stage of development applying rapid prototyping development methodology

At first screen, the user can experience the overall structure, operation method, and navigation of the website, while the screen for one session of lecture. The validity of the instructional design, interaction strategy design, and content details design can be evaluated. (4) Development phase: After confirming the prototype, images were not previously secured. After the development is completed, a pilot test is conducted for a small group of learners, and a final revision is made based on the advice of expert reviewers. (5) Deliver phase: The lecture is implemented in practice and is assessed according to learners' satisfaction level.

## 2.2 Gathering relevant Data

An education material for nurse intervention according to existing health examination results was developed based on the findings of the literature review[5,6,14,15] and an integrative needs assessment. To determine the scope of the material contents, we reviewed and analyzed the extant literature on health examinations in terms of definitions, implementation of principles, recommendations, related laws, and the contents of existing education programs, as described below. (1) We reviewed education content through recommendations of the UK National Screening Committee, the World Health Organization (WHO), the USPSTF, and the adult health examination recommendations of South Korea[14]. (2) We analyzed the Framework Act on Health Examination, and reviewed the literature on the screening programs currently conducted at health examination centers[15]. We also analyzed the websites of the National Health Insurance Service and the health examination centers of private general hospitals. (3) Based on the existing literature, we classified health examinations according to life-cycle periods and diseases. Life-cycle periods were classified as infant, adolescent, adult, and elderly. (4) We divided the examination methods into diagnostic medical examinations and radiological examinations. The latter included general radiological examinations and radiological examinations using special imaging equipment. Diseases were classified into chronic, degenerative, and (the five major) cancers.

And then we also investigated the educational demands of learners, which comprised visiting nurses at community health centers who deal with health checkup, nurses working at the health checkup centers, and school nurses. Focus group interviews (FGIs) were conducted to investigate learners' needs in an attempt to improve the content of the intervention

education program.

Participants comprised 24 full-time female nurses. Following recommendations that focus groups should comprise 6 to 10 participants, we divided the participants into four groups of six participants each. The focus group interviews were conducted after obtaining approval (No.1041493-201705-002- 01) from the institutional review board of the investigator's affiliated institution, in accordance with the FGI guidelines of Krueger and Casey[16]. Prior to conducting the FGIs, we first explained the purpose of the study and data collection procedure to the directors of two health examination centers and four community health centers in S and B cities and obtained agreements from them. We obtained the informed consent to the participants. The researchers set out the investigation progress and each role for the proficiency of the survey. And The researchers proceeded according to the question items and discussed the additional questions about the main questions so that the contents could be composed naturally in the discussion and discussion process. Within the scope of the research topic, we prepared to lead the question naturally. FGIs were then conducted by two experienced researchers from May 6 to May 27, 2017; the interview took approximately 1-1.5 hours each. In order to develop the FGI question, the researchers should be able to clarify the research problem in the first research meeting and then draft the question after reviewing the research question and finally review the contents of the question. The question was structured. The main questions asked were as follows. (1) What recent information should nurses have about health examinations? (2) What knowledge and skills do nurses need to provide health screening counseling? (3) What knowledge have you considered necessary when counseling health examination patients? We analyzed the data collected from the FGIs using the content

analysis method, based on the audio recordings and transcripts. The transcripts were read repeatedly to find meaningful words, sentences, and paragraphs and to classify and categorize data according to the aspects of health examinations (periods, methods, and diseases). To increase the validity and reliability of data analysis, we held regular meetings to discuss the data analysis results. The validity and reliability of the educational need assessment tool based on FGI data were evaluated by a panel of experts. They formulated 10 questions to assess the appropriateness of the educational goal, educational construct, evaluation, effectiveness of the process, and suitability of the learning materials. The main questions were as follows: Is there an educational goal that includes educational topics and contents? Is the curriculum effective for nursing practice? Is the amount of educational content appropriate to achieve the educational goals? Is there a plan for various forms of evaluation tools (such as true-false type, multiple choice type, and essay type) in consideration of the educational goals and contents? Is the source of the learning materials clearly presented? The panel members were then asked to rate the course description draft based on these questions on a self-report three-point Likert-type scale, where 1 = disagree, 2 = partially agree, and 3 = completely agree.

### 2.2.1 Pilot testing

The revised educational materials were then pilot-tested using a sample of Korean public health centers. It was conducted at the education bureau of the Korean Nurses Association with around 4,000 nurses for a period of 10 months. The material was presented across eight modules (for a total of eight contact hours) with the aim of assessing the program delivery procedures, estimating the time required to administer the program, and obtaining participants' feedback and suggestions. We also considered the

facilitator's own observations during the delivery. The mean score of evaluation on educational materials was 4.01 points out of 5.0. A questionnaire with 13 items was used for the pre-assessment in this study, and the highest score was obtained on the item "The contents were helpful for nursing practice (4.0)", followed by "The contents reflect the latest trend (3.98)" and "The teaching method is appropriate (3.99)." Further, there are other answers provided by the respondents such as, "The lecture given by the lecturer was satisfactory (4.10)" and "The educational contents were satisfactory overall (4.20)." Meanwhile, the scores on the other items were as follows: "Is the administrative work easy to perform? (3.87)" and "Are the announcements on the website being managed? (3.80)". During the pilot test, some concerns were identified that required revision, and nurses' comments helped us refine the course delivery methods and readjust the timeframe.

### 3. Results

#### 3.1 Nurses' Educational Needs

Participants nurse's age was 35-55 years. Over 80% of the study participants held a nursing diploma (n = 20), with experience in public health nursing ranging from 1 to 15 years.

Nurses reported having insufficient pathophysiological knowledge to explain the physical symptoms related to the results of health examinations while providing counseling to health examination patients. They also had difficulties answering common questions from patients regarding health examination items that were beyond the 'good (normal range)' and how those items were related to patients' physical symptoms. In particular, some participants felt perplexed while providing counseling due to their lack of familiarity with the names and

procedures related to imaging examinations and their lack of information regarding how patients could prepare for such examinations in advance. Thus, they expressed a high degree of interest in the latest imaging equipment.

They also reported that patients were ambivalent about health examinations, given that while it may be easy to diagnose a disease, a diagnosis may result in financial problems and harmful bodily effects such as radiation exposure. Accordingly, the demand for education on imaging technology, preparations in advance, and safety precautions was high. They also deemed it necessary to clarify the purpose of the health examination as a screening test, rather than relating it to commercial or welfare systems, by explaining the difference between national and private hospital health examinations. All participants in the FGIs agreed that the educational material should comprise key information appropriate for nurses in charge of health examination counseling and that this information should be useful to the health examination patients. The necessity of delivering information that could be substantially useful by reviewing previous studies related to health examinations, laws and ordinances, existing publications, and domestic and overseas online nursing education programs was raised. Other suggestions included the use of pictures and illustrations related to cases to make the information easier to understand and to keep the material simple and concise. It was determined that an online course was an appropriate educational method, with explanations given in a question-and-answer format, thus, allowing learners to focus on the material at their own pace without losing interest.

#### 3.2 Expert Panel Review

The mean scores ranged from 2.3 to 2.9, meaning that the content of the health

examination counseling course conformed to public health nurses' needs, with several experts praising its innovation and diversity. The results provided preliminary evidence that the material was appropriate for addressing the health examination counseling education gap for public health nurses. Three main changes emerged following the panel review. First, it was determined that an overview of the health examinations (purpose, type, and process) should be added, rather than limiting the scope of the National Health Screening Program. Second, specific terms used in the draft (the web-based educational materials) were refined based on the experts' suggestions. Finally, strategies to explore public health nurses' current understanding of health examinations were included at the beginning of the material delivery via pre-test and inductive activities in each module. Based on the educational demand survey (FGIs), the training materials on understanding the purpose of health examinations and health management according to patients' life cycles were developed. To ensure that the educational material could be used effectively by nurses in charge of the early detection of health issues, material related to basic understanding of health examinations, counseling, and follow-up management based on real cases was presented, which coincided with patients' life cycles and health management.

### 3.3 Program Content

A basic understanding of health screening comprises mastery of the area of health examinations and the ability to ask questions about the actual cases of counseling. Two educational areas were identified, each consisting of three to five topics (Table 1).

Considering the online format, explanations were provided in a question-and-answer format between learners and experts, in addition to an active writing style from patients' perspectives. This way, the material motivated learners to

Table 1. Learning plan for online educational material over two sessions

Session	Module	Content	TRT*
Session one: Understanding health screening	Module 1: Role of health screening	Definition of health screening 1. Goal and Basic rules 2. Subjects and target disease 3. Health examination program in private hospitals	51:33
	Module 2: Diagnosis of lifestyle disease	Health problems of adult period 1. Level of diagnostic medical test (adult period) 2. Level of diagnostic medical test (lifestyle disease) 3. Level change of medical test and lifestyle disease	48:43
	Module 3: Diagnosis of cancer	Cancer and symptoms 1. Pathological physiology of cancer 2. Physical symptoms of cancer 3. Diagnostic medical tests for cancer 4. Tracking tests on metastasis	60:53
	Module 4: Medical tests and pathological physiology	Monitoring for disease course 1. Liver function test and physical symptoms 2. Kidney function test and physical symptoms 3. Hematology and chemistry	40:50
	Module 5: Radioactive imaging test and safety	Radiographic test with radiation matter & Endoscopic test 1. X-ray test (chest, neck etc.) and nursing 2. Nursing and the ultrasonography test method 3. Nursing and the mammography test method 4. Safety of gastrointestinal series and colon studies 5. MDCT, PET-CT and radiation exposure 6. Radiation exposure on MRI & MRA 7. Understanding gastrointestinal endoscopy 8. Understanding colonoscopy	48:28
Session two: Nursing intervention by life cycle	Module 6: Health problems by life cycle	Assessment of lifestyle diseases 1. Detection of risk factors 2. Counseling on healthy life practices 3. Health problems in the pediatric phase 4. Health problems in adolescence	60:47
	Module 7: Screening tests by life cycle	Monitoring for health problems by life cycle 1. Physical function tests for the elderly 2. Aging hormone tests for the elderly 3. Medical tests for pediatric health problems 4. Medical test for adolescence health problems	58:38
	Module 8: Nursing care of diseases by life cycle	Management of lifestyle diseases 1. Diseases in pediatrics and nursing 2. Disease in students and nursing 3. Disease of the elderly and nursing	62:05

\*Total running time

overcome difficulties related to the patients' environmental factors and actual behavioral changes, with reference to the results of the previous studies and educational demand survey. Finally, the overall validity of the content was verified by three stakeholders. Each module was divided into four sections--preparation, learning, evaluation, and recapitulation--to optimize learners' understanding.



Fig. 3. Course contents and main page

The first area, mastery of health examinations, consisted of five topic modules on the purpose of health examinations, the nature of examinations according to patient type (general, infants and students, and cancer examinations), and an overview of imaging examinations. Module 1 comprised the definition, composition, purpose, and course of change in health examinations. Module 2 comprised information related to specific items in general health examinations and diagnoses. Module 3 comprised information on the purpose, composition, method, and diagnosis of cancer examinations. Module 4 comprised the types, purpose, methods, precautions, and preparations for the main imaging examinations conducted in the Korea National Health Screening Program and for photographs for diagnosis. Module 5 presented the goals, methods, procedures, preparations, and diagnoses of infants' and students' examinations and interpretation of the examination results.



Fig. 4. Sample screen -introduction page.

The second area, "ask any questions," comprised three topics, which were presented in Modules 6-8, during which questions were answered based on real-life cases, in relation to the diagnostic tests conducted in health examinations, various imaging examinations, and diagnostics in life transition periods. Based on the questions asked by actual patients, Module 6 answered questions in relation to liver function tests, tests for lipid metabolism, and renal function tests, while Module 7 comprised the purpose, methods, preparations, precautions, and photographs related to the interpretation of ultrasonography, computed tomography (CT), magnetic resonance imaging, and positron emission tomography-computed tomography (PET-CT) results.



Fig. 5. Sample screen 2-lecture page.

Lastly, Module 8 provided definitions, diagnostic methods, prevention and treatments, and management methods for the diagnosis of major diseases of the various life transition periods, including adolescence (tuberculosis and scoliosis), adulthood (hypertension and diabetes), and old age (dementia) and included diagnostic checklists and interpretation of results.





Fig. 6. Sample screen 3-answer & expansion page.

#### 4. Discussion

This study attempted to comprehensively examine educational demand on medical checkups and develop education materials that could enhance nurses' capabilities to encourage the examinees in a nursing service field of the local community. Through analysis of demand for the development of educational material, contents provided key standards for competency, and enhanced learners' satisfaction[7]. This study utilized interviews with stakeholders and expert reviews as well as focus group interviews in order to reflect how medical checkup agencies, experts on healthcare policy and nurses think about medical inspection. The focus group interview results suggested that the opinions of the examinees could be taken into account prior to intervention, and be a potential data in addition to extensive practical information from the health examination[17]. With the existing limited data on the status and demand of education on medical examination, it's essential to comprehend health issues in which the examinees have interest and difficulties in acting on healthy life habits and form an educational program to address such issues for the development of educational material tailored to learners. Also, this study adopted a methodology that could embrace requests from users in the field of education, and clients (organizations). By doing so, it measured nurses' educational demand on medical checkup both qualitatively and quantitatively, specified contents formation,

and reflected it on learning strategies. In addition, it also enhanced the program composition by asking nursing experts to design detailed content arrangement, receive web expert reviews on the web-based delivery system, and conduct content verification again to find an efficient delivery method.

An education program is composed in a way it could improve outcomes of learning[18]. Online education, especially, allows for flexibility in promoting learner-focused self-directed learning away from instructor-centered standardized education[18]. Educational materials developed in this study were made up of pre-test, content learning and post-test to engineer interactions between learners and content. Also, conversational explanation between learners and instructor and questions and answers were utilized in order to boost efficiency of the learning methods in line with the previous study[19] and expert review was performed after the program was developed to improve content validity and overall compositional quality.

The content of the education program was made up of nursing services that could deepen general understanding of medical inspection, address questions about the content and encourage healthy life habits, by reviewing literature and reflecting educational demand and expert opinions. It included items of general medical checkup, health examination at each life turning point, medical checkup by lifecycle and nursing services before and after imaging diagnosis, which were most requested among recommendations, principle rules and regulations, implementation standards and guidelines from domestic and overseas authorities for medical checkup. It was in line with one research [20] that found, in order to guarantee the maximum effects of education, what nurses need to learn and what kind of nursing service they are engaged in should be understood first before developing a desirable

education program.

First, during the focus group interview of nurses, or learners, a sub-category of understanding of general health examination results was added by reflecting the finding that “While consulting with subjects, explaining liver or kidney dysfunction with physical symptoms caused by changes in examination results was more persuasive than comparing their results with normal measures.” It is similar to the report that, if subjects with little medical knowledge are given digitized examination results on paper, they could feel both unstable and dissatisfied with the examination[7], also similar to the suggestion that education on the significance of medical checkup be provided enough to meet subjects’ demand to protect their health[21]. In addition, this finding is similar to the theme of ‘MRI & MRA examinations and Radiation exposure’, where participants showed distrust in the examinations due to false information they had about radioactivity, and it’s because they had few opportunities of getting to know about the recent imaging technology and consequently they were very concerned and suspicious about CT scans or other examinations with potentially higher radiation exposure[22]. Meanwhile, the Ministry of Health and Welfare, and the Ministry of Food and Drug Safety[23] drew up ‘recommendations on patient exposure dose for children,’ and suggested the radiation exposure reduction method, and are providing information on how to minimize radiation exposure during a medical checkup. Therefore, nurses are required to alleviate examinees’ fear and help them get a safe checkup by informing them of how to prepare prior to the examination, how to use protective gear, how to avoid other chances of radiation exposure and almost others. Also, there should be a pathophysiology-based professional training for visiting nurses so that they could give detailed information that the examinees want.

For expert interviews, Modules 6, 7 and 8

introduced cases of health examination patients and appropriate nursing interventions based on the finding that “subjects in the community were willing to keep healthy life habits after being examined medical, but didn’t know about an intervention measure.” Among the subjects of visiting care, 96.2% were vulnerable families with 52.3% of the elderly, and since they were less capable of taking care of themselves, the percentage of those who kept healthy life habits were low compared to those who were willing[24]. The Ministry of Health and Welfare and Korea Health Promotion Institute have distributed nursing intervention educational materials for healthy life practice and provided relevant training[6]. As these materials are focused on health promotion activities, they haven’t been used to make medical judgment and establish nursing goals based on professional knowledge on diseases, as an attempt to identify patients’ nursing demand for a certain disorder and prevent progression or complications of the disease. Therefore, health inspection education materials for nurses should contain a diagnostic test to detect shifting symptoms of a worsening disease based on a professional understanding of the disease, and practical content about a nursing intervention measure to stave off any complication.

Given that the use of pictographs and visual materials has been suggested as an effective strategy for an educational material friendly to the subjects’ culture[25], this study presented cases from the TV show ‘Medical checkup, ask whatever you want’ in the form of animated illustration, provided constant images of nurse and checkup subject’s personal information, and offered health information in figures and tables. In addition, it added experts’ explanation with a focus on diagnostic imaging from ‘Medical checkup, complete mastery’ and on video clips of cancer inspection, thereby enhanced visual efficiency. When it comes to online learning,

quality of contents make a significant impact on learners' satisfaction, according to some research[13], and in terms of improved quality, a web-based flash program is a good option since it can deliver the content better, not just simply presenting a recorded course. A web-based education program is better for nurses who work in various fields as a small unit as they can access it selectively without time or space restrictions[25]. As this study developed educational materials for the online platform for greater and more efficient access, it is expected to make considerable contributions to improving quality of nursing.

This study was used rapid prototyping method to develop the online education program. Rapid prototyping method is an instructional design approach that combines the design, developmental and evaluation phases. It is a non-linear approach that produces a sample working model that is scaled down representative version of the whole course[9]. Rapid Prototyping overcomes the challenges of the conventional ADDIE practices by enabling stakeholder to peek into the course and provide feedback that the designers can implement without needing to worry about redoing the course[9]. The prototypes have shorten the development timeframe and thus saved significantly in the cost for online education courses. Today many online education applications achieve high standards in providing instructors to manage online courses via web technologies and database system. In Korea, the previous study[11] conducted using the rapid prototyping method for web-based instruction. And then Kang and Jang[12] was used to develop teaching model. Recently, the study[26] about curriculum development for Korea armed forces nursing academy military nursing board nursing based on rapid prototyping instructional systems development was conducted using same methodology like the present study. Most advanced online learning

systems are considered "one-size-fits-all", meaning the same system with same functions used for different classes, subjects and institutions[27]. However, different institutions, each subject and even every individual class should have their own specific requirements for their distinct online education web system. A primary goal of the prototype is to provide a general understanding of how the course will look and work like. It is built to test the instructional efficacy and/or usability of concepts or processes like interactive activities and the navigational framework[9]. Developers can create functional online education course through rapid prototyping development with minimum amount of efforts.

To sum up, this study confirmed that nurses' demand to be educated on medical checkups reflects the demand from checkup subjects, and comprehensive information on the purpose of inspection items, judgment of results, risk regarding examination tools as well as follow-up checkup should be available for the subjects. The significance of this study lies in the fact that it investigated such demand of visiting nurses by focusing on education materials necessary for medical checkup counseling at the actual local community settings from the perspective of beneficiaries of such education. Meanwhile, this study failed to separate visiting nurses' experience of providing visiting care from their entire professional life, thereby being unable to check different educational needs depending on their past experience, something future research should look into. Furthermore, as this study examined visiting nurses of local public health it centers in one region, the results should be generalized with caution.

## 5. Conclusion

In this study, an educational material was

developed to enable nurses to provide nursing intervention efficiently to those undergoing health checkups. Educational contents were developed based on the results of the investigation and analysis of the educational needs of nurses in the community nursing field. By developing online-based contents, whereby the learners could self-evaluate their learning stage to convey the contents more effectively and easier community nurses scattered in the community. Providing such online educational contents for continuing nursing education should be considered an advanced educational material, and it reflect the latest trends. As for the detailed topics constituting the educational course, demands of the community nurses attending to the recipients of health checkup were reflected. This education material was provided online so that self-learning could be possible through contents anytime anywhere.

Feedback regarding the satisfaction level of the students and the educational contents will be provided in a prompt manner, and it will become easier to develop and apply the student-oriented educational contents based on such feedback. Moreover, it is proposed that the rapid prototype protocol, which was applied to construct the educational material in this study, should be applied to the development of the contents of continuing education for nurses. It is expected that such a methodological approach can be repeatedly applied for the development of contents of the continuing nursing education in various fields as it provides an efficient approach to the integration of the demands of students in the education for adults who want to obtain the new professional field knowledge.

These are the limitation of this study. First, the nurses' experience of visiting nursing care part was not separated in the case therefore, it was difficult to check the difference between nurses who have more or less knowledge of visiting nursing care. In addition, since this study was

conducted for nurses in particular area, it should be cautious to generalize the results of this study.

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Eun-Ha Kim

[Regular member]



- Feb. 1992 : Ewha womans Univ. Nursing Science, BSN
- Aug. 1995 : Ewha womans Univ. Nursing Science, MSN
- Aug.. 2006 : Ewha womans Univ. Adult Nursing, PhD

•Feb. 2007 ~ current : Catholic University of Pusan., College. of Nursing, Professor

<Research Interests>

Community health Nursing, Geriatric Nursing , Health Education

Kye-Ha Kim

[Regular member]



- Feb. 2001 : Ewha womans Univ., Nursing Science, MS
- Aug. 2005 : Ewha womans Univ., Women health Nursing, PhD
- April. 2007 ~ current : Chosun Univ., Dept. of Nursing, Professor

〈Research Interests〉

Geriatric nursing

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Kyung-Eui Bae

[Regular member]



- Aug. 2000 : Ewha womans Univ., Nursing Science, MS
- Aug. 2006 : Ewha womans Univ., Women health Nursing, PhD.
- Mar. 2008 ~ Feb. 2014 : Kaya Univ., Dept. of Nursing, Professor

•Mar. 2014 ~ current : Dongseo Univ., Dept. of Nursing, Professor

〈Research Interests〉

Women health Nursing, Education, Enneagram