Case Study

Design, development, and implementation of e-learning content on real patient care for Korean Medicine Rehabilitation clerkship

Eunbyul Cho[1], JongYeon Jeon[2], Hyeonjun Woo[3]

[1] Korean Medicine Science Research Division, Korea Institute of Oriental Medicine, [2] College of Korean Medicine, Wonkwang University, [3] Department of Korean Medicine Rehabilitation, College of Korean Medicine, Semyung University

Corresponding Author:
Hyeonjun Woo
Department of Korean Medicine Rehabilitation, College of Korean Medicine, Semyung University.
65, Semyeong-ro, Jecheon-si, Chungcheongbuk-do, 27136, Korea
E-mail:
woohyeonjun@gmail.com

Background: The clinical clerkship is essential for ensuring that newly licensed doctors of Korean Medicine (KM) have the necessary skills and knowledge to provide optimal patient care. Pre-clerkship training is gaining significance as it equips trainees with the necessary skills to effectively interact with patients in medical settings and deal with unexpected events. The present study aims to report the design, development, and implementation of online course content for pre-clerkship training, and to explore its potential in fostering the development of competent future doctors of KM.

Methods: This study is a qualitative case study on e-learning content design and development. This study referred to the rapid prototyping instructional systems design model to develop a series of e-learning content from January to February 2024. Project initiation, analysis, design, development, and implementation were conducted in parallel, rather than sequentially. Usability testing and evaluation of the program were not involved in this study.

Results: An instructional designer, client, and developer formed a project team. Analysis results were derived from literature review and discussion with the subject matter expert. Storyboards for the lecture type and demonstration type were designed. The ⟨KM Rehabilitation clerkship: real patient care and charting⟩ series were developed into seven video classes based on paper-based storyboards. The online lecture videos were uploaded on YouTube, and students were provided access to the video.

Discussion and conclusion: This study presents detailed steps for designing, developing, and implementing online lecture videos to supplement the clinical clerkship in KM education. Further investigations on the design of curriculum for pre-clerkship training and effective teaching strategies are needed.

Keywords: E-learning, Korean Medicine, Clinical education, Medical records, Rehabilitation medicine

Introduction

A doctor of Korean Medicine (KM) is licensed after completing a KM curriculum and passing the national licensing examination. Obtaining a medical license grants individuals the authority and responsibility to diagnose and treat patients. Providing optimal care while ensuring patient safety requires various competencies, including reasonable diagnosis and treatment, clinical skills, effective communication, and management[1]. To develop a wide

range of competencies, students require hands-on experience with real patients before they graduate. Interaction with real patients in KM clinical clerkship enables students to observe pathological signs that they cannot see through standardized or simulated patients. This experience could be helpful in their clinical practice after graduation[2].

In recent years, there has been an increasing emphasis on active student participation during clinical clerkships to enhance the clinical competency of future KM doctors. However, students' active participation in university KM hospitals remains limited due to the possibility of breaking legal restrictions on student practice and the intensive supervision required from instructors[3]. As most KM clinical clerkships are implemented as short rotations of multiple departments, the opportunity to encounter essential patients of each specialty is not guaranteed[2]. In order to offer students the opportunity to experience essential patients in each department, it is necessary to develop e-learning content that is not influenced by clinical settings.

Furthermore, it is crucial for instructors to demonstrate role modeling through their interactions with patients during clinical education[4]. However, there is always a possibility that learning opportunities cannot be sufficiently provided depending on the clinical situation[5]. If students can observe clinical scenarios, patient interactions, and debriefing of essential patient cases in each department through e-learning, they can better understand what they need to learn from their clinical clerkship in advance.

A crucial yet underemphasized competency in KM education is the ability to create and manage medical records[1]. The medical record serves as the foundation for patient care and should provide a comprehensive description of the diagnosis and treatment. As electronic medical records (EMRs) have been utilized in most hospitals, EMR training for healthcare professionals and students is implemented to improve clinical outcomes[6]. Still, studies are yet to be reported on systematic training in writing medical records in KM education.

In KM education, the curriculum preceding clinical clerkship has gained increasing attention, as the new accreditation standards for Colleges of KM emphasize the importance of preparing students before their clinical practice through training in patient interviewing and safety

protocols[7]. Previous studies have reported e-learning applications in KM clinical clerkship, such as providing standardized clinical skills training before Objective Structured Clinical Examination during clinical rotation[8,9], and online courses for pharmacovigilance practice training[10]. However, there have been no development of online educational content that demonstrates patient care scenarios, medical record documentation, and detailed explanations on the patient care in individual departments.

A recent study investigating unmet needs in KM clinical clerkship revealed several challenges, including limitations in observation-based learning and insufficient experience with essential patient groups[2]. Additionally, the study highlighted the need for establishing learning objectives and systematic design and enhanced preparation in medical record documentation[2]. To address these unmet needs, we aimed to develop a pre-learning lecture series focused on musculoskeletal pain, a core disease in KM Rehabilitation Medicine, with particular emphasis on medical record documentation. Here we present the development process and expected effects in detail. This study can serve as a practical guide for other clinical teachers who wish to develop e-learning contents for their departments. Further, this study provides foundational data for evaluating the educational effectiveness of the contents developed in this study and addressing unmet needs in KM clinical clerkship, such as practice preparation of medical records, experience with essential patient groups, and systematic design of learning objectives.

Design, development, and implementation of e-learning content

1. Study design and setting

The present study is a design and development research for e-learning content for final-year students in a college of KM. This qualitative case study presents the specific methods and results of designing and developing online learning content. This study referred to the rapid prototyping instructional systems design (RPISD) model. Compared to the conventional sequential approach to instructional design, the RPISD model acknowledges that

Table 1. Procedure and timeline of this study

Key stages	Detailed steps	Timeline			
		Jan Week4	Feb Week1	Feb Week2	Feb Week3
Project initiation	• Project team formation	●			
Analysis	• Review of literature	●	●		
	• Review of previous interviews conducted by the author				
Design	• Program design	●	●	●	●
	• Storyboard design				
Development	• Prototype development		●	●	●
	• Storyboard creation				
	• Filming and editing				
Implementation	• Providing the online content				●

the instructional design process occurs simultaneously and in parallel. The RPISD model has the advantage of allowing for continuous interaction between the client and the instructional designer and ensuring that the client's needs are fully addressed[11]. Analysis, design, development, and implementation were conducted simultaneously rather than sequentially.

The RPISD model has a limitation in that it emphasizes Performance Needs Analysis in the analysis phase, which may lead to insufficient attention to other types of analysis. To overcome this limitation, our study incorporated competency modeling for doctors of KM and identified unmet needs for KM clinical clerkship derived from previous studies[1,2]. Additionally, as both the instructional designer and developer majored KM, potential misunderstandings during prototype implementation could be minimized[12].

The specific procedure and timeline of this study are presented in Table 1. The process was conducted from January to February 2024 (Table 1).

2. Initiation of the project

An instructional designer (a specialist in Acupuncture and Moxibustion Medicine with instructional design experience), subject matter expert (client, a specialist in KM rehabilitation), and developer (a student majoring in KM) formed a project team and held a kickoff meeting in January 2024 to develop the online course. The scope of this online course was set as an essential pre-learning class to prepare for a clinical clerkship. Considering the subject

'KM rehabilitation', which mainly covers musculoskeletal and neurological disorders, the contents focused on practicing patients with musculoskeletal disorders.

3. Needs analysis

Since the clinical clerkship in 2024 was the first class of the client, detailed needs analysis, such as evaluations of previous classes, was not possible. Instead, we relied on the findings of interviews with doctors of KM who had interacted with real patients during clinical clerkship[2]. The previous study identified the need to incorporate the process of diagnosis, details of treatment modalities, and writing of medical records were included in the course contents. The results of the needs analysis were: 1) all students should be trained on the tasks required for patient care regardless of the clinical environment; 2) show both the doctor's practice and charting simultaneously; 3) add captions to videos to help students understand terminology.

4. Task analysis

Key tasks that students need to perform during their clerkship were identified and analyzed through systematic meetings and discussions with the subject matter expert. These tasks were categorized according to core competencies required for clinical practice (Table 2).

5. Design

Based on the needs and task analyses, specific learning objectives were established, and course content was

Table 2. Results of task analysis

Related competency	Specific task
History taking & Physical examination	• Observe and document the history taking and physical examination performed by the Korean Medicine doctor and use them to make a final diagnosis
Integrative care	• Develop treatment plans based on observed clinical practices
Standardized communication between doctors of Korean Medicine	• Explain the observed and documented patient conditions
Patient-care management	• Create initial medical records, progress notes, and medical certificates based on observed clinical practices

designed (Table 3). For effective content delivery, the course was structured as a combination of traditional lecture-style presentations and practical demonstrations with a real patient. The designer of this program, who had post-neck pain, participated in the demonstration as a real patient. Storyboards for the lecture type and demonstration type were designed (Figure 1, 2, 3). The storyboards were organized in the order of introduction, motivation, main lecture, and wrap-up.

6. Development

The instructor wrote the manuscript according to the above procedures. The designer analyzed the instructor's overall lecture arrangements and provided feedback on the course structure. Based on the storyboards, prototypes of the online lecture were developed (Figure 4). The 〈KM Rehabilitation clerkship: real patient care and charting〉 series was developed into seven video classes based on paper-based storyboards. Following prototype development, the final video lectures were completed through several revisions and supplements based on feedback from subject matter experts, the instructional designer, and the developer.

7. Implementation

The online lecture videos were uploaded on YouTube (Table 3). Access to the video was restricted to only those individuals who had the link, and the link was shared with the students. The lecture will be provided until the end of the clinical clerkship. The videos were utilized as mandatory pre-learning videos before the clinical clerkship. During the clerkship, quizzes will be taken to
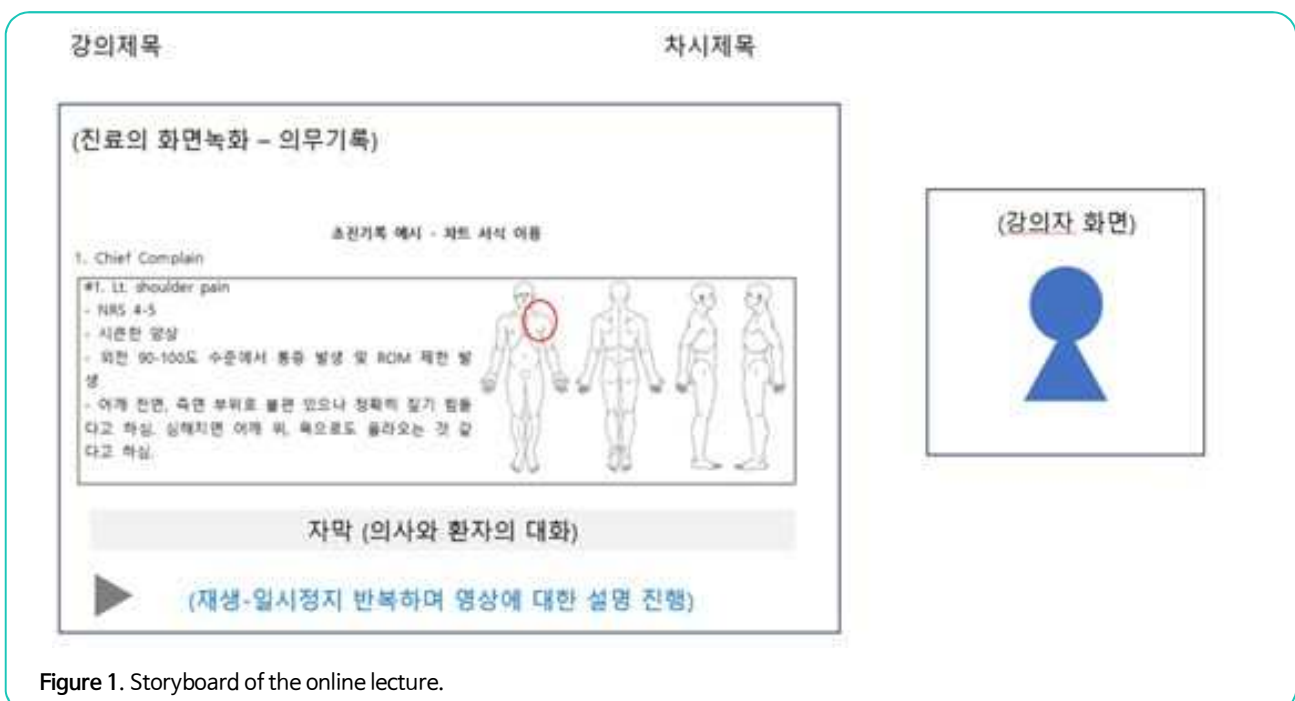

Figure 1. Storyboard of the online lecture.

Figure 2. Storyboard for doctor's practice with real patient.

check for students' learning. The usability testing has not been conducted yet.

Discussion

Students' learning from patients during clinical clerkship cannot be consistent and standardized due to the unpredictable patient visits and hospital setting. Nevertheless, there are core competencies that students must acquire by engaging in clinical clerkship. Referring to the RPISD model of the educational technology field, we designed and developed e-learning content to cover the necessary outcomes that students need to achieve during the clerkship. A total of seven modules were developed for the final product.
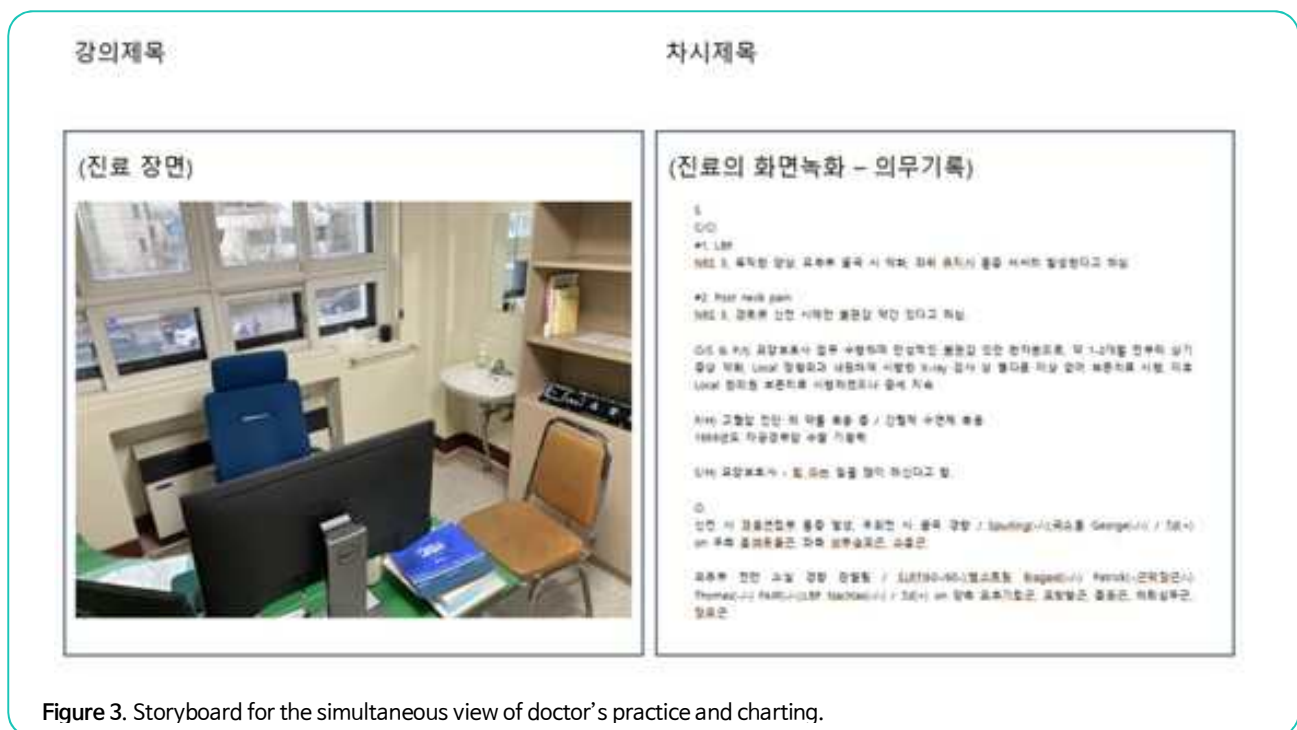

Figure 3. Storyboard for the simultaneous view of doctor's practice and charting.

Table 3. Title and link to the developed online course

No.	Lecture title	Youtube link
1	Introduction to medical record documentation	https://youtu.be/sAmVFL2OSUU
2	Musculoskeletal examination and documentation	https://youtu.be/t1BGrjPenZ4
3	Examples of medical record documentation	https://youtu.be/EY6aiwvTx3Q
4	Preparation of medical certificates	https://youtu.be/wJsqjBA9W0U
5	Using DICOM viewer	https://youtu.be/2UR_AcY3WHo
6	Real patient care: A case of neck pain	https://youtu.be/hsaRU4gqPfE
7	Debriefing of neck pain patient care: Diagnosis and treatment*	https://youtu.be/RzZ96AODL9s https://youtu.be/JcWj_x-Lkis

DICOM, Digital Imaging and Communications in Medicine.
* Splitted into two sections due to the length of the course.

The developed e-learning content emphasized medical record documentation since the analysis indicated that the practice of charting was inadequately addressed in existing clinical clerkships. Although there are some formations and routine comments that physicians use in the medical record, sufficient guides and explanations are lacking in KM education. Insufficient instruction in charting techniques can impede effective communication among healthcare professionals. Furthermore, the curriculum was delivered via pre-learning, as the clerkship necessitates charting medical records to enable students to be active in their observations. The experience of charting medical records during clerkship is expected to enhance students' proficiency in their clinical practice after graduation[2].

This study shares methodological similarities with a study conducted by Hong[13] through the application of the RPISD model. Though the study methods have similarities, Hong developed online lectures for the public, while we provided online lectures for final-year students majoring in KM. Since our e-learning contents are parts of the regular curriculum in a college of KM, we considered the competency of doctors of KM [1], previous interviews on clinical clerkship by the author[2], and meridian & acupoint class developed by the RPISD model[14]. However, there is still a lack of research on the development of online courses in KM clinical clerkship.

Figure 4. Prototype of the online lecture presenting the contents of this e-learning curriculum.

Some limitations of this study should be acknowledged. As the clinical clerkship is still implemented in the regular curriculum, usability testing and evaluation of the project have not been conducted yet. The evaluation of this e-learning content will provide constructive feedback to improve education. In addition, since this clerkship was the first year of the client, materials for the needs and task analysis were limited. Nevertheless, the online course developed in this study have some unique strengths. First, participation of a real patient with neck pain can provide students with authentic learning experiences. A critical limitation of real patient learning is that students can only learn from the patients they encounter[15]. However, reduced learning opportunities and lack of co-operation by patients are difficulties of learning in hospitals[5]. Although recruiting patients can be challenging, creating online contents while obtaining informed consent and ensuring the exclusion of sensitive and personally identifiable information can enhance authentic clinical training[3]. Second, our approach to present scenes of the doctor's charting medical record alongside those from the doctor-patient encounter is expected to enhance students' understanding of charting.

This study will serve as a basis for developing pre-clerkship education or orientation for individual departments. Further studies are needed to determine the specific effectiveness of this online course using learner surveys or interviews. Not necessarily a real patient, pre-recorded videos of patient care can be a good learning resource to showcase examples of clinical processes[16]. More efficient approaches that allow a number of students to learn from a patient need to be continuously implemented and evaluated for their effectiveness in clinical education.

Conclusion

Systematically designed online pre-clerkship lectures for KM Rehabilitation are expected to enhance students' understanding by providing role models for clinical practice. This study provides a systematic approach to developing online pre-clerkship content that incorporates patient interactions and medical record documentation to address key unmet needs in KM clinical clerkship. This e-learning model can serve as a practical reference for other departments developing pre-clerkship training.

ORCID iD

Eunbyul Cho https://orcid.org/0000-0003-3431-1109
JongYeon Jeon https://orcid.org/0009-0007-0913-7053
Hyeonjun Woo https://orcid.org/0000-0003-1614-2145

CRediT Statement

Conceptualization: EC; Methodology: EC; Investigation: EC, JYJ, HW; Resources: HW; Data curation: HW; Project administration: EC; Writing-original draft: EC; Writing-review & editing: HW, JYJ; Visualization: EC, JYJ, HW.

Data Availability

The data presented in this study are available from the corresponding author on reasonable request.

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