AN ANIMATED MODELS DEVELOPMENT OF CARDIOVASCULAR SYSTEM IN PHARMACOLOGY LEARNING MODULE FOR MEDICAL STUDENTS

by Bernadette Dian Novita Dewi

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ABSTRACT

Hypertension is the most known common cardiovascular disease. Based on the Indonesian Competency Standard of Medical Doctors (StandarKompetensiDokter Indonesia or SKDI), the management of essential hypertension is at 4A or the highest level. Therefore, doctors should be able to establish a complete and independent diagnosis and management. The student passing rate in the cardiovascular system at the undergraduate level of medical education of Faculty of Medicine Widya Mandala Catholic University (FK UKWMS) was around 60-70%. This study is an evaluation to develop learning methods that would improve student learning outcomes. The development of this animation model is aimed to increase the engagement process in Pharmacology learning, especially in the cardiovascular system. 98 active students participated in this study, divided into 74 undergraduate students and 24 clinical internship students. The evaluation was carried out using a pre-test and a post-test related to pharmacological animation video exposure. Using the Wilcoxon different test, there was a significant difference between the pre-test and post-test results, especially in the clinical internship program's students. This animated model was expected to help students to determine the rational determination of hypertension therapy.

Keywords: *Animation, Learning Module Of Pharmacology In The Cardiovascular System, Medical Students.*

ABSTRAK

Hipertensi merupakan penyakit kardiovaskular yang paling sering terjadi. Berdasarkan Standar Kompetensi Dokter Indonesia (SKDI) penatalaksanaan hipertensi esensial berada pada level tertinggi 4A, yang dokter harus mampu menegakkan diagnosis dan penatalaksanaan secara tuntas dan mandiri. Angka kelulusan mahasiswa Fakultas Kedokteran Universitas KatolikWidya Mandala Surabaya (FK UKWMS) di Blok Kardiovaskular 2 pada jenjang Sarjana pendidikan dokter berada padak isaran 60-70%. Hal ini menjadi evaluasi untuk mengembangka nmetode pembelajaran yang dapat meningkatkan hasilbelajar mahasiswa. Pengembangan model animasi ini diharapkan meningkatkan Hasrat untuk membaca buku teks Farmakologi, proses *engagement* pada pembelajaran Farmakologi terutama pada sistem

kardiovaskular. Kegiatan pengabdian kepada masyarakat ini diikuti oleh 98 mahasiswa FK UKWMS, yang terdiridari 74 mahasiswa Program Sarjana Studi Pendidikan Dokter (S1) dan 24 mahasiswa Program Studi Profesi Dokter. Evaluasi dilakukan dengan menggunakan *pre-test* dan *post-tes* dilakukan sebelum dan setelah mahasiswa dipaparkan video animasi farmakologi. Menggunakan uji beda Wilcoxon, terdapat perbedaan yang signifikan pada hasil *pre-test* dan *post-test*. Perubahan signifikan terutama terdapat pada mahasiswa Program Studi Profesi Dokter. Model animasi Farmakologi Sistem Kardiovaskular diharapkan dapat membantu mahasiswa kelak setelah menjadi dokter untuk menentukan penentuan terapi hipertensi secara rasional.

Kata Kunci: *Animasi, Modul Pembelajaran Farmakologi Sistem Kardiovaskular, Mahasiswa Kedokteran*

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INTRODUCTION

Hypertension is the most common cardiovascular disease. Individuals who have normal blood pressure at 55 years old have a 90% chance of suffering from hypertension. The prevalence of hypertension increases with the aging process; for example, 50% of people aged 60-69 years old suffer from hypertension, and this prevalence increases at the age of 70 years old(1,2). The prevalence of national hypertension based on Riskesdas 2013 is 25.8%, with the highest prevalence in Java (3–5). Hypertension needs to be adequately treated to prevent target organ damage complications, including heart, brain, and kidney. Controlling hypertension and complications is a goal of health development in the millennium era.

Pharmacological management is one of the real efforts to alleviate this problem.

The competency standard of the Indonesian Competency Standard of Medical Doctors (Standar Kompetensi Dokter Indonesia or SKDI) is the minimum standard for medical education set by the Indonesian Medical Council (KKI) to produce professional doctors according to the needs of public health services, developments in medical science and technology (6). Based on the SKDI, the management of essential hypertension is at the highest level of 4A, which means that students could make a complete and independent diagnosis and management (6). Strategies and concrete steps for Medical Education at the Faculty of Medicine, Widya Mandala Catholic

University Surabaya (FK UKWMS) at the undergraduate and clinical internship level have prepared educational designs, especially for cardiovascular systems and health problems by making cardiovascular block 2 in year 2; involve the pharmacology department and the internal department in the emergency block at year 4; heart rotation for professional education.

The blended e-learning cardiovascular system is a combination of face-to-face learning, giving space to the student with questions (in compliance with didactic learning), and aims to improve the quality and quantity of educational activities vertically (student-teachers) and horizontally (between students) (7,8), and certainly in pursuit of using technology accessible by students (9,10).

METHOD

In building this blended e-learning cardiovascular system model, we designed it in three stages during one year. In the first stage, the activity is directed at identifying the level of knowledge, attitudes, and behavior of students: 1) diagnosis for cases of the cardiovascular system; 2) determining rational therapy after diagnosis 3) providing information and education counseling (IEC) related to diagnosis and therapy; 4) determination of rational evaluation and treatment monitoring (11). The expected results in this stage are a map

of the characteristics of knowledge, attitudes, and behavior. An initial draft of the blended e-learning cardiovascular system can be developed for undergraduate students of medical education and medical profession students of FK UKWMS.

In the second stage, the activity is directed to try out the blended e-learning cardiovascular system obtained from the first stage. This second stage's expected result is a map of student characteristics after being exposed to the blended e-learning cardiovascular system.

In the final stage, the activity is directed at the final evaluation of the blended e-learning cardiovascular system, which has been tested in the second stage. The evaluation was carried out in the pre-test and post-test. The expected outcome is a digital-based health literacy model with intellectual property rights(IPR)recognition.

RESULT

1. Result Description of the Activity

This activity was attended by 98 active students of the Faculty of Medicine, Widya Mandala Catholic University Surabaya (FK UKWMS), consisting of 74 students of the Medical Education Study Program and 24 students of the Medical Profession Study Program. Recruitment of respondents was carried out voluntarily. The purpose of involving students from the

two study programs is so that this learning video can be useful for them based on the learning period stages at FK UKWMS.

2. **Development Desing of the e-Learning Animated Video**

In the development of the Cardiovascular System Pharmacology learning animation video, we divided it into several stages, namely:

2.1 **Compiling a competency map,** which is a chart or flow of competencies from the subject matter of knowing the cardiovascular system's pharmacology, especially for strengthening pharmacology materials and guidelines in deciding the selection of anti-hypertensive drugs in daily practice. The making of a material map is done by describing the subject matter, which is divided into 1) physiology of blood pressure regulation and 2) the mechanism of anti-hypertensive drugs.

2.2 **Manuscript preparation** is an early stage before entering the production stage. The script in the development of instructional animation video media is similar to the video media script in general, which consists a description of the scene, a description of the scene's visual appearance, and narrative and audio information.

2.3 **The production of instructional animation videos** involves team members and animators. This animated video of cardiovascular system pharmacology learning is divided into two videos, namely: 1) physiology of blood pressure regulation with the video link: https://drive.google.com/open?id=1z UwXhRsiUbcK60jkBuusexmKMlw xLYYg, with registration certificate of Intellectual Property Rights (IPR) Copyright 000176991, and 2) video of the mechanism of action of anti-hypertensive drugs with the link https://drive.google.com/open?id=1 Vz63iWEqYSX4IzBvO1q-BXvQXqo6nztm with registration certificate of Intellectual Property Rights (IPR) Copyright 000203618. The duration of all videos were around 5-10 minutes. In phase 2.1 to 2.3, the participants were not involved.

2.4 **Implementation of the cardiovascular system pharmacology learning animation video.** At this stage, this video is implemented for 98 medical UKWMS students. To determine the effect of this animated video, pre-test and post-test were carried out, and feedback on the animated video's content and visualization. All the participants were involved by attending the course, fulfilling pre-

test and post-test, and also giving valuable feedback.

2.5 Evaluation. This stage is to determine the role of implementing the cardiovascular systems'spharmacology animation video on students' understanding of knowledge. This animated video is also expected to increase the engagement process on Pharmacology learning, especially in the cardiovascular system.

3. Activity Evaluation Result

The evaluation was carried out using pre-test and post-test, which werethen carried out by statistical tests to determine the significance of changes in their knowledge after exposure to this instructional animation video. The evaluation results are as follows:

Table 1. Test Result of Before and After Seing Pharmacology Cardiovascular System's Animated Video

Test	$\dot{x} \pm SD$
Pre-test	4.9 ± 2.08
Post-test	9.29 ± 2.019

Notes : $\dot{x}$ = average ; SD = standard deviation

After conducting a normality test, and obtained $p < 0.05$,the data's distribution was abnormal. Thus the statical analysis was continued using the Wilcoxon test for analyzing pre and postcondition. The Wilcoxon's significance result was $p < 0.05$,and it was a significant change in knowledge after exposure to the pharmacology cardiovascular systems's animated video.

This learning video makes it easier for medical profession students to better understand and apply pharmacology lessons than undergraduate students (semester four and above), as shown in Figures 1 and 2.
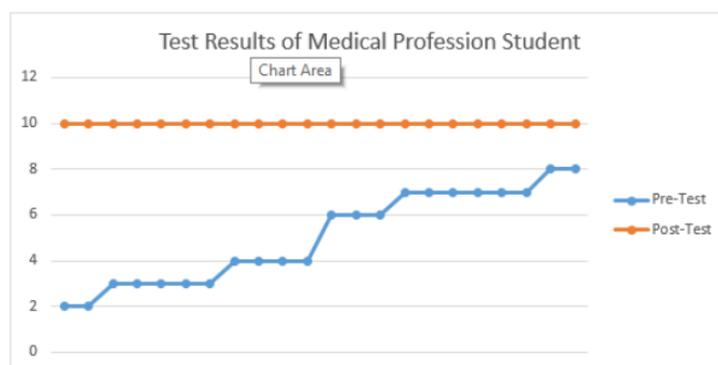

Figure 1. Chart of Medical Profession Student Pre-Test and Post-Test Results
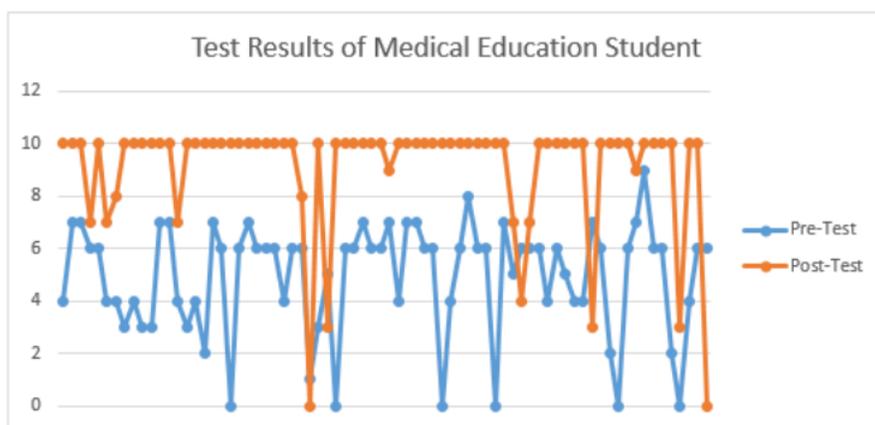
Figure 2. Chart of Medical Education Student (Bachelor's Degree) Pre-Test and Post-Test Results

DISCUSSION

Figure 1 and 2 show that there was a significant change in knowledge after exposure to the pharmacology cardiovascular systems's animated video. The results were obtained because the FK UKWMS medical profession students had: 1) received a lesson in the pharmacology of the cardiovascular system in the fourth semester; and 2) have met with patients so that they have learned about rational drug selection(9).

This learning video makes it easier for medical profession students to better understand and apply pharmacology lessons than undergraduate students (semester four and above), as shown in Figures 1 and 2.

The effective utilization of film can foster learning and teaching about pharmacology aspect in an innovatively creative way(12). However, facilitating all pharmacology aspect in the range of cognitive skills among students were a bit imposible. Animation will only be a trigger to the metacognitive abilities of the students for self-regulated learning. Based on this result, future animation films in pharmacology will be produced continually.

CONCLUSION

Animated video is an effort to increase the engagement process on Pharmacology learning, especially in the cardiovascular system. This effort turned out to increase the knowledge of FK UKWMS students, especially UKWMS FK medical profession students who had: 1) received a lesson in the pharmacology of

the cardiovascular system in the fourth semester; and 2) have met the patients.

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