**VIRTUAL ALGORITHM SIMULATION (VAS) BASED ON PROBLEM: LEARNING MEDIA IN MEDICAL SURGICAL NURSING**

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***Abstract***

***Introduction:*** *Innovative learning media for online simulation-based nursing students is still not optimal. The study aimed to develop online simulation video-based learning media, namely virtual algorithm simulation (VAS) based on problems in medical-surgical nursing (MSN).* ***Methods:*** *A research development or Research and Development (R&D) which consists of two stages. The first phase of the study was conducted focus group discussion (FGD) with eight medical surgical nursing lecturers and expert discussion with 50 students, three of IT experts, and two MSN experts. The second phase of the research was conducted FGD with five participants, and socialization of instructional media to six lecturers and 54 students. The feasibility test instrument uses learning media assessment instruments consisting of subcategories of learning media rules, Computer Assisted Interaction (CAI), management, and the relevance of the material and syllabus. Data were analyzed using descriptive analysis.* ***Results:*** *The assessment of media experts showed the highest mean in the VAS management subcategory of 3.53. Evaluation of nursing experts and students with the highest mean in the subcategory of material relevance and syllabus, namely 3.9 and 3.57. The results of discussions with experts stated that 100% of the learning media Virtual Algorithm Simulation (VAS) is suitable for use as a medium for learning medical surgical nursing.* ***Conclusions:*** *VAS can be used as a learning media for medical surgical nursing. Online simulation-based learning media can facilitate the accessibility of learning material, increase knowledge and skills of nursing students.*

***Keywords:*** *e-simulations; learning media; videos*

**INTRODUCTION**

Nursing is a discipline that still requires face-to-face activities in its learning. However, nursing agencies must move towards online learning strategies (Huun, 2018). The Ministry of Research, Technology (2018) explains that educational institutions must develop the application of a blended/hybrid learning system in the era of the industrial revolution 4.0. Technological developments in the form of telephone, e-mail, and video conferencing can be used as a medium to portray the world of clinical practice more clearly (Shrader et al., 2016). Simulation-based education is a critical component of nursing education (La Cerra et al., 2019). Simulations have become commonplace but must be developed to be based online (Huun, 2018). In the United States, leaders of nursing agencies are faced with an increasing need to integrate high-quality simulations into the curriculum of undergraduate nursing education (Gore and Singh, 2018). The use of innovative learning media on online simulation video-based nursing students is still not maximized.

Professional education learning system has been changed from a traditional passive to a dynamic and diverse methodology. It required students to be active, critically and creatively (Presti, 2016). The basis of this educational transformation is through the application of innovative learning (Sowan and Idhail, 2014). Creative learning has been proven effective in increasing critical thinking, creativity, problem-solving abilities and student activity (Chan, 2016). Educators and academic developers can use blended learning methods to improve cognitive skills and clinical skills in health disciplines (Forbes et al., 2016). Blended learning is a learning method that combines face-to-face meetings with online material. The use of multimedia in an interactive online learning environment is a strategy to produce high levels of student satisfaction, self-efficacy, and student achievement (Sowan and Idhail, 2014).

In health education and professional education, the nature of learning is based on experience (Koivisto et al., 2015). Efforts to improve student experience can be made through simulation methods. Simulating patient conditions in the real world and allowing students to emulate professional roles in a safe and attractive learning environment will make the experience for students (Koivisto et al., 2015). Learning through simulation can broaden their understanding of patient care as a whole, namely physically, emotionally, relational, and spiritual (Stewart, Stringer, Van Regenmorter, Miller, Alexander and Phillippi, 2019), stimulating students to conceptualize knowledge and internalize procedures in real life (Koivisto et al., 2015). The application of evidence-based learning is needed to prepare new graduates for better and safer patient care (Yeh et al., 2019). Significant increase in self-efficacy and self-confidence can be done by providing simulations that can be done repeatedly (La Cerra et al., 2019).

Based on some of the explanations above, we took the initiative to make all learning media based on online simulations, namely Virtual Algorithm Simulation (VAS) Based on Problems in Medical-Surgical Nursing in the Nursing Science S1 Study Program. Through this media, students are expected to know the real case description in hospitals and nursing actions that must be taken. The purpose of this study is to develop learning media Virtual Algorithm Simulation (VAS) Based on Problems in medical-surgical nursing in the Nursing Study Program. The expected outcome of a VAS based on the problem is the achievement of learning outcomes in which students are able to arrange nursing care correctly.

**METHODS**

This research uses research and development design to produce a case-based learning media. This research was conducted in two stages. The first phase, the study included evaluating the learning model, the first FGD, designing the development of VAS learning media, and conducting feasibility tests and expert discussions with IT experts and Medical-surgical Nursing experts.

Evaluation of the learning model was conducted on ten nursing students who had already passed the medical surgical nursing course. The learning process of case-based medical surgical nursing has been carried out several times. However, discussion of cases is still rare, and students do not understand the resolution of the case.

The first FGD aims to explore the problems that occur at the research site. The researcher invited the lecturers of medical surgical nursing and discussed five items of statements related to the implementation of case-based on learning in the study area, constraints, and solutions. Focus Group Discussion 1 shows that learning constraints based on cases are not optimal, namely limited time, the unequal ratio of lecturers and students, lack of student motivation, and inadequate facilities. This causes the learning outcome in the form of the ability to arrange nursing care in part. The solution provided is to create a real case-based learning media using online media

Designing the development of learning media Virtual Algorithm Simulation (VAS) Based on Problem by compiling two videos of nursing care. The cases used are cases of erosive + melena gastritis and dengue fever cases. Nursing care is prepared based on the Indonesian nursing diagnosis standards (IDHS), Indonesian nursing outcomes standards (SLKI), and Indonesian nursing intervention standards (SIKI). Students can access videos through google class.

The feasibility test was conducted on 50 students with inclusion criteria students had received medical surgical nursing courses, students actively lectured, and students were willing to become respondents. Students who are on college leave and are not present during the activity are exclusion criteria. The media feasibility test was assessed using a learning media assessment instrument (Yuntoto, 2015) consisting of subcategories of learning media, CAI, management, and the relevance of the material and syllabus. Scores used in the instrument are four strongly agree, three agree, two disagree, and one disagrees. This data used an ordinal scale (good (code 1), sufficient (code 2), and (lacking code 3)) and analyzed using descriptive analysis of mean and standard deviation.

Expert test with 3 IT experts was carried out with a graduate in computer science, an expert in online learning media, a lecturer in computer education. Expert tests with 2 medical surgical nursing experts were conducted with lecturers specializing in medical surgical nursing who were actively teaching. Expert test activities carried out by exposure to learning media and how to use Virtual Algorithm Simulation (VAS) Based on Problem continued with discussion.

Phase 2 research consisted of socialization and testing of the use of VAS learning media, FGD 2, and providing recommendations. The socialization and trial were conducted on 54 students and six nursing lecturers. Students and lecturers are given explanations related to how to use VAS and facilitated modules to facilitate the use of learning media.

Students acces googleclass

Students get a code to login

Students access the video assessment

Students get the assignment to arrange nursing care based on the assessment video by downloading the askep form on Googleclass

Students collect assignments by uploading on Googleclass

Students get the code and login

Students can access diagnosis –evaluation videos

The tutor has a discussion related to the case

**Figure 1 The flow of using Virtual Algorithm Simulation (VAS) Based on Problem**

Students and lecturers are then allowed to try learning media, either through computers, or Android mobile phones. After the socialization, students can access the learning media well. Focus group discussion two and the provision of recommendations were attended by five people consisting of the Nursing Study Program and the Deans of the Faculty of Health Sciences.

Researchers took research data in the nursing study program in June-September 2019. Researchers had conducted an ethical test and were declared to be ethical with No. 049 / EC / KEPK-S2 / 09/2019 by the Ethics Committee of Muhammadyah Lamongan University.

**RESULTS**

Phase 1 research produced learning media for Virtual Algorithm Simulation (VAS). The results of the feasibility test of learning media based on the assessment of media experts showed the highest mean in the VAS management subcategory of 3.53. Evaluation of nursing experts and students with the highest mean in the subcategory of material relevance and syllabus, namely 3.9 and 3.57. Most experts give good rating assessments on Virtual Algorithm Simulation (VAS) on all assessment categories. The results of discussions with experts stated that 100% of the learning media Virtual Algorithm Simulation (VAS) is suitable for use as a medium for learning medical surgical nursing.

 Some suggestions from the results of expert discussions are improvements in video and sound quality, assignment of time for assignments, modules added to the android version of the tutorial, and better platform usage. As for expert advice that cannot be fixed, that is related to the use of platforms other than GoogleGlass accessing instructional media. Researchers still use GoogleGlass as an e-learning media is reacting simulated videos because agencies do not yet have adequate servers, and other platforms have smaller video upload capacities compared to Google Glass.

Table 1. Results of the evaluation of the Virtual Algorithm Simulation (VAS) Based on Problem

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Experts | Subcategories | Mean | SD | Assessment | Total |
| Good  | Enough  | Less  |
| 1 | Media Experts | Learning media rules | 3.18 | 0.65 |  2 (67%) | 1 (33%) | - | 3 (100%) |
| Management | 3.53 | 0.52 | 3 (100%) | - | - | 3 (100%) |
| CAI media | 3.21 | 0.54 | 2(67%) | 1 (33%) | - | 3 (100%) |
| 2 | Medical-surgical nursing experts | Learning media rules | 3.69 | 0.48 | 2 (100%) | - | - | 2 (100%) |
| Management | 3.5 | 0.53 | 2 (100%) | - | - | 2 (100%) |
| The relevance of the material and syllabus | 3.9 | 0.32 | 2 (100%) | - | - | 2 (100%) |
| 3 | Users (Students) | Learning media rules | 3.48 | 0.64 | 36 (72%) | 13 (26%) | 1 (2%) | 50 (100%) |
| CAI media | 3.49 | 0.58 | 34 (68%) | 16 (32%) | - | 50 (100%) |
| The relevance of the material and syllabus | 3.57 | 0.57 | 35 (70%) | 14 (28%) | 1 (2%) | 50(100%) |

Phase 2 research produced several recommendations for research sites. The recommendations include; conducting VAS socialization to students as a whole; VAS can be a learning medium for nursing care; the VAS module can be a guide in compiling Indonesian Nursing Diagnosis Standards / Standar Diagnosis Keperawatan Indonesia (SDKI), Indonesian Nursing Output Standards / Standar Luaran Keperawan Indoensia (SLKI) and Indonesian Nursing Intervention Standards / Standar Intervensi Keperawatan Indonesia (SIKI) -based nursing care, and the VAS can be developed with other cases in preparation for hospital learning.

**DISCUSSIONS**

The results of focus group discussion 1 explain that students have not been able to arrange nursing care correctly. It has happened because of the lack of a maximum discussion on the preparation of nursing care during the learning process and the limited time of each facilitator. The solution provided is to create a real case-based learning media using online media. The online simulation method approach in the preparation of nursing care is the solution to these problems. Online simulations provide flexible and safe learning opportunities for students in learning real cases (Yeh et al., 2019). Creativity, collaboration skills, cost-effectiveness and time, are positive values ​​from the simulation. The use of the evidence-based practice in case simulations can increase nurse competence in improving disease diagnosis and management (Raney et al., 2019) and the preparation of nursing care. Simulation methods are usually used to teach clinical skills through manikin before performing in patients through simulations (Jarvill, Kelly and Krebs, 2018). In addition to focusing on student skills, Simulation can broaden their understanding of patient care as a whole, namely physically, emotionally, relational, and spiritual (Stewart, Stringer, Van Regenmorter, Miller, Alexander and Phillippi, 2019). Therefore, the online simulation method can be extended to achieve the competence of nurses in the preparation of nursing care.

The results of the assessment of learning media, it is known that media experts give a functional evaluation of VAS management. Yunoto (2015) mentions the category of management consisting of the accuracy of the formulation of objectives, the control of the delivery of material, the competencies that must be achieved, the accuracy of the VAS being targeted by learning media, the ease of application is understood.

The material presented in the Virtual Algorithm Simulation (VAS) is Based on Problem in the form of a video of nursing care for patients with gastritis and dengue fever. This video is played by students who have done clinical practice at a hospital. Bayramzadeh et al. (2018) explain that in implementing simulations, actors must have an understanding of the roles of team members, the tasks they perform, and how to operate the medical devices used and the technology used in the simulation. The use of students who are experienced in clinical practice in hospitals as actors is sufficient to describe the role of nurses well.

The content of the Virtual Algorithm Simulation (VAS) Based on Problem is in the form of nursing care videos compiled from assessment, diagnosis, intervention, implementation, and evaluation. This is following the opinion of Huun (2018) that the video content that is simulated must be arranged based on the perceived needs of students. Giving clinical assignments, assessments, and discussions (Huun, 2018) and giving feedback on patient care can be done at the end of simulated learning (Neander et al., 2018). The flow of use of the Virtual Algorithm Simulation (VAS) Based on Problem has been designed from the provision of material, assignments, task collection, and discussions with the facilitator. Students can easily evaluate their ability to arrange nursing care.

The platform used in the Virtual Algorithm Simulation (VAS) Based on Problem is the googles class. Virtual simulation allows broad achievements inaccessibility, time flexibility, can be used by many users, ease of use, secure access (Huun, 2018). Cost-effectiveness, e-simulation standards, including simulation tools, usage instructions, and supporting facilities, also need to be considered from virtual simulations (Huun, 2018). Agencies must provide appropriate facilities so that the desired learning objectives are met (Gore and Singh, 2018). Institutional limitations in the fulfilment of e-learning facilities stimulate researchers in the use of google class. Google class is familiar and easy to use platform.

Medical-surgical nurses and students provide a good assessment of the relevance of the material to the medical surgical nursing syllabus. Nursing courses are core subjects in nursing education with student learning outcomes able to compile and demonstrate nursing care which includes assessment, nursing diagnoses, planning, implementation, and evaluation. The application of e-simulation facilitates the success of students (Huun, 2018) in achieving learning outcomes. Nursing students can observe e-simulations before they do it independently (Oermann, Muckler and Morgan, 2016). The use of these simulations is expected to improve clinical reasoning, clinical judgment, critical thinking, problem-solving, and the development of psychomotor skills in nursing students (Meakim et al., 2013). Virtual Algorithm Simulation (VAS) Based on Problem has been designed.

**CONCLUSIONS**

Virtual Algorithm Simulation (VAS) Based on Problem is appropriate to be used as a medium for learning medical surgical nursing. Media experts give good judgment in the management sub-category as teaching media. Medical-surgical nurses and students stated that the contents of the Virtual Algorithm Simulation (VAS) are compatible with the syllabus of medical surgical nursing, which consists of assessment, diagnosis, intervention, implementation, and evaluation. Virtual Algorithm Simulation (VAS) can be applied to all courses in nursing education to familiarize virtual-based learning for students. The effectiveness of the Virtual Algorithm Simulation (VAS) also needs to be done to determine the impact of using e-simulation in learning outcomes.

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