

The Impact of E-Learning on Medication Administration of Nursing Students: What Recent Studies Say?

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Abstract—Nurses are responsible for the care and treatment of individuals, as well as health maintenance and education. Medication administration is an important part of health promotion. The administration of a medicine is a common but important clinical procedure for nurses because of its complex structure. Therefore, medication errors are inevitable for nurses or nursing students. Medication errors can cause ineffective treatment, patient's prolonged hospital stay, disablement or death. Additionally, medication errors affect the global economy adversely by increasing health costs. Hence, preventing or decreasing of medication errors is a critical and essential issue in nursing. Nurse educators are in pursuit of new teaching methods to teach students significance of medication application. In the light of technological developments of this age, e-learning has started to be accepted as an important teaching method. E-learning is the use of electronic media and information and communication technologies in education. It has advantages such as flexibility of time and place, lower costs, faster delivery and lower environmental impact. Students can make their own schedule and decide the learning method. This study is conducted to determine the impact of e-learning on medication administration of nursing students.

Keywords—E-Learning, Medication Administration, Nursing, Nursing Students.

I. INTRODUCTION

THE main professional goal of nurses is improve human health status [1]. Medication administration (MA) is one of the most vital roles and responsibilities of nurses [2]. It is an important part of delivering safe patient care [3]. Roles of clinical nurses in medication management are complex and versatile [4]. MA is probably one of the most critical duties of nurses since the resulting errors may have unintended, serious consequences for the patient [5]. Because of the complexity of MA, medication errors that caused by nurses and nursing students are among the most common health threatening mistakes that affect patient health status. One commonly used definition for a medication error is "Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer" [6]. These errors cause significant risks to patient safety [7]. The effects of medication errors on patient safety vary from little harms to deaths. Beside of the personal effect of the inappropriate use

of drugs, it can affect global economy by increasing hospitalization day and costs. According to several studies, medication errors usually occur during the prescription and administration stages and can account for between 65% and 87% of all medication errors [8]-[12]. However, it is a fact that medication errors rate is not still known clearly because of the inadequate and unreliable notification of errors. There are lots of reasons why we have limited information regarding medication errors of nurses and nursing students. People that the reason of medication errors or organizations that collect information about medication errors in general or student-made errors in particular may not be willing to share such reports publicly for fear of legal responsibilities [13]. It is thought that there are lots of MA errors than reported and lots of patients that affected from medication errors [14]. For that reason, reducing medication errors and increasing patient safety has recently become really critical issue in nursing. Improving MA skills of nursing students takes important place in nursing education systems, too.

It is very important point to maximize the MA ability of nursing students to improve patient safety and student's self-confidence in clinical situations [2]. Therefore, safe medication management is a major competency taught in the nursing curriculum [15]. In professional nursing education programs, nursing students learn about medication administration from nursing courses and textbooks. Then they perform these tasks in clinical areas [13]. However, this is not completely possible because of the some paucity in nursing education system. Nursing students' limited clinical experience, decreased access to patients, restrictions on student interventions, limited time and economic constraints cause poor practice chance for students. The unpredictable, complex and many times limited clinical situations often create stress for novice nurses, which in turn may reduce the ability to critically think and competently function [16]. Therefore, students may be at risk of making medication errors related with medication administration [17]. These indicate the urgent need to enhance the medication administration ability of nursing students and to improve their self-confidence in clinical situations by improving their knowledge of medication administration and drugs [2]. This important need has driven nurse educators to find novel and improved ways to train their students [18]. In this era, nurse educators accept the use of technology based education methods as a solution. As the technology has developed and expanded, current efforts are directed at e-learning [19].

Especially in recent years, e-learning has become more popular for nursing education to eliminate these problems like

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other disciplines. E-learning education has been introduced into the nursing field as an instruction method for creative and critical thinking via the reorganization and restructuring of various new learning activities [20]. E-learning is defined as "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services, as well as remote exchange and collaboration" [21]. It basically based on the web and it makes information available for learners that have time paucity or geographic remoteness [22]. E-learning provides to learners an increased accessibility to information, personalized schooling, availability when learner wants, interactivity and increased convenience [23]. E-learning modules are cost-effective and timesaving methods which are easily available for students and are especially good for repeated topics [2], [24]. With the advantage of flexibility related to time and place, an e-learning system can increase student's opportunities to study and learn from educational materials on their own schedule [16]. Several studies related to effectiveness or advantages of e-learning teaching strategies concluded in nursing literature until now. The topics were various such as pressure ulcer classification, hand washing theory and skills, exposure therapy for phobia/panic, teaching ergonomics, preventing eating disorder, preventing aggression and medication administration [25]-[30]. Lots of studies revealed the effectiveness of e-learning teaching strategies for nurses and nursing students. For instance, the study's results "Effectiveness of an e-learning tool for education on pressure ulcer evaluation" conducted by Morente and colleagues showed the effectiveness of an e-learning approach based on the use of a web-based adaptive tool devised for education on pressure ulcers evaluation, in comparison with a traditional on-campus lecturing strategy [31]. Similarly, a randomized controlled trial's results conducted by Bloomfield and colleagues indicated that the computer-assisted learning module is an effective method for teaching both the theory and practice of hand washing to nursing students. Some of the studies showed the effects of e-learning teaching strategies of nurses and nursing student's medication administration skills [29].

II. AIM

The aim of this review is to determine the impact of e-learning on medication administration of nursing students.

III. METHODS

We conducted a systematic literature review to evaluate the study results within e-learning on medication administration of nursing students. Akdeniz University electronic databases including MEDLINE, CINAHL e.g. were searched studies published in English with "nursing education", "e-learning on medication administration of nursing students", "web based drug administration course" and "web course on drug administration" key words. Also references of the determined studies reviewed. The studies published within 15 years were selected to the review.

IV. RESULTS

In the recent literature review, there are three studies about e-learning on medication administration of nursing students.

A quasi-experimental study was conducted by Mettäläinen and colleagues (2014) to evaluate the efficacy of a medication administration web course in increasing nursing students' self-evaluated competence on medication administration. In this study, Finnish nursing students self-evaluated their medication administration competence before and after the course. 244 students answered the questionnaire before and 192 after the web course. Its results indicated that the web course significantly improved self-evaluated competence of nursing students in four fields that include basic pharmacotherapy, intravenous medication and infusion, blood transfusion and epidural medication. The study revealed that the education strengthened all these competencies of students [32].

Another study was conducted by Sabin and colleagues in 2013 to evaluate the effectiveness of two different medication administration safety assessment methods. Sample was 63 third-year pre-registration nursing students and was paired up from four participating universities in the UK. It inferred that the combination of a web-based assessment tool and further assessment of safe technical measurement interpretation and dexterity in practice simulation setting is an innovative, viable, valid and reliable assessment method for the safe administration of medicines [33].

Another study that "Development of an Online Course on Medication Administration" conducted by Cassiani and colleagues in 2003. In this study, the course material was presented in a series of websites that include eight topics concerning medication administration routes in addition to questions for knowledge assessment. The participant's of the study had evaluated the course positively. It concluded that this online course should be integrated to the undergraduate nursing programs as an additional resource for student learning [34].

V. CONCLUSION

Medication errors are really important and critical issue for patient safety and global health. Because of the complexity of medication administration obviously, it is absolutely impossible to eliminate all medication errors. However, the role of nursing administrators in reducing and preventing these errors is vital. To reduce the medication errors that occurred by nurses preventive strategies should be taken like standardization and the simplification of medication procedures and others [14]. Therefore, nursing faculty started to implement new teaching methods to nursing education such as e-learning.

E-learning is an effective, innovative, viable, valid and reliable teaching strategy for nursing students on medication administration. It strengthens medication administration competencies of nursing students, improves the students' self-confidence and patient safety. On the other hand, it decreases the medication errors. Because of the complexity of medication administration, it is necessary to maximize medication administration skills of students and e-learning can

be used for this purpose [32]. E-learning on medication administration should be implemented to the nursing curriculum to improve nursing students' skills and human health. E-learning programs should also be applied to nursing students in order to evaluate their efficacy in clinical situations. In this way, e-learning may be more effective teaching method as a combination or blending with traditional classroom based learning [35].

On the other hand, there is limited study about e-learning in medication administrations of nursing students. Additional research is needed to identify the most effective teaching strategies that support the development and enhancement of clinical reasoning abilities and skills in nursing students and inexperienced registered nurses, as these abilities apply to medication administration and other nursing responsibilities [13]. Especially in Turkey, we couldn't come across any randomized controlled experimental study about medication administration for nursing students. There is urgent need more experimental studies to show the advantages and disadvantages of e-learning on medication administration of nursing students worldwide.

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