Title:
Medication Error Reduction Using PDA Technology By Nursing Students at the Point of Care

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Session Title:
Using Technology to Reduce Sentinel Events
Slot:
H 03: Monday, 19 September 2016: 8:00 AM-8:45 AM
Scheduled Time:
8:00 AM

Purpose:
"The purpose of this presentation is to educate nursing faculty to effectively integrate technology into their teaching through the use of PDA, to provide students with classroom and clinical experiences, to increase evidence-based practice and decrease medication errors by making relevant information available right at the point-of-care".

Keywords:
Medication errors, evidence-based care, Nursing students & nurses, point of care and PDA technology, nursing education

References:

Abstract Summary:
This evidence-based study was done to determine if nursing students could calculate medications in a case study with greater speed and accuracy using PDA technology with a nursing software compared to students using textbooks and a calculator by having access to the latest health care information thereby reducing medication errors.

Learning Activity:

<table>
<thead>
<tr>
<th>LEARNING OBJECTIVES</th>
<th>EXPANDED CONTENT OUTLINE</th>
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<tbody>
<tr>
<td>&quot;The learner will be able to explain the critical steps of medication administration and how to perform this procedure safely&quot;.</td>
<td>This content will be provided during the presentation on the safe administration of medication which includes the rights of medication administration, accurate patient assessments, multiple dosage calculations, knowledge of drug actions, their interactions, and toxicities.</td>
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<td>&quot;The learner will be able to identify how PDAs have been shown to increase evidence-based practice and decrease medication errors&quot;.</td>
<td>This content will be provided during the presentation on how PDAs have the ability to make evidence-based information available to</td>
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by making relevant information available right at the point-of-care". nurses when and where they need it and also have the potential to reduce medication errors by providing a portable and convenient reference source for healthcare providers. The rate at which new medication information is being produced, the IOM acknowledges that it is almost impossible for healthcare providers to have current knowledge of every medication they encounter and therefore recommends a point-of-care reference source such as a PDA for all healthcare providers.

Abstract Text:

**Purpose:** The purpose of this evidence-based pilot study was to determine if nursing students could calculate medications in a case study with greater speed and accuracy using a personal digital assistant (PDA) compared to students using textbooks and a calculator thereby reducing medication errors. Medication errors are a major cause of harm to patients in health care settings and reducing medication errors is a main concern in today's healthcare setting. Nurses are the main professionals involved in administering medications and administration is the part of the medication process with the least safeguards in place. Information technology, especially handheld technology (PDAs) used by nursing students can provide access to information to safely calculate medications.

**Background/Significance:** The Institute of Medicine's report on the safety of health care systems estimated that somewhere between 44,000 and 98,000 Americans die each year as a result of medication errors. This exceeds the number of people that die from motor vehicle accidents, breast cancer and AIDS. IOM estimates that medication errors result in at least one death every day in the United States and have stressed patient safety as a priority. They also conclude that it is not acceptable for patients to be harmed by the health care system that is supposed to offer healing and comfort—a system that promises, "First, do no harm." (IOM, 1999). The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) reported that more than 106,000 hospitalized patients die and 2.2 million are injured every year by medication errors (NCCMERP, 1999).

The IOM drew attention to the need for technology solutions that can make a difference in the ability of nurses to ensure safe, high-quality patient care emphasizing the area of medication administration (McKesson, 2004). The American Association of College of Nursing (AACN) recognized that technological advances are increasing opportunities to improve the quality of, and access to, nursing education (AACN, 2002). Additionally, the Board of Governors of the National League for Nursing (NLN) in their position statement "Transforming Nursing Education" recommended nurse educators to effectively integrate technology into their teaching through the use of sustained, evidence-based practices, distance learning, simulation and Personal Digital Assistants (PDAs) to provide students with clinical experiences in diverse settings and to improve care provided to patients (NLN, 2005). Technology solutions, especially PDA technology, can make a difference in the ability of nurses to provide safe patient care in the area of medication administration, especially medication calculations by having access to the latest healthcare information. Health care professionals require access to ever-expanding knowledge, and PDAs or other handheld computer devices can serve as valuable tools for education, information storage and retrieval, and clinical practice (George et al., 2010). Using PDA technology at the point of care; by a bedside, in the community, in the office, or in a patients home can reduce errors and promote patient safety. It provides a mobile platform whereby the nursing student or nurse can download various types of software and access information quickly that supports evidence-based nursing practice (Beard et al., 2011).
Methodology / Data Analysis: Rosswurm and Larrabee's change model guided the study. The stages are similar to the nursing process and can be used in clinical settings by nurses and nursing students. The six steps of this model are as follows: assess, link, synthesize, design, implement and evaluate, and integrate and maintain (Rosswurm and Larrabee, 1999).

Twenty undergraduate junior nursing students enrolled in the medical-surgical nursing course of a private School of Nursing in Northern N J served as the convenience sample. The participants were then given a case study with an attached medication administration record. Participants were instructed to reread the case study, complete the ten questions and sign off on the MAR just as they would in the clinical setting. The maximum allotted time was fifteen minutes. Students were encouraged to search any necessary information in the PDA to complete the questions in the case study. The participants were also allowed to use the calculator section of the PDA to calculate drug dosages. The investigator recorded each participant's completion time (from beginning to completion) on their case study. After completion of the case study, the students were asked to fill out a post evaluation form regarding their use of PDA technology. The comparison group was the same twenty students who use the PDAs to complete the case study. They were required to complete the same case study using textbooks and a calculator within the maximum allotted time of fifteen minutes after 4 months.

The two outcomes measured were accuracy and speed. Accuracy was determined from the 10 questions asked in the case study. Each correct answer received a score of 1, and each incorrect score was scored as 0, with a maximum score of 10. The speed was the time each student took to complete the case study, the maximum time allotted was 15 minutes. The groups are similar, since it was the same group used for the PDA exercise and textbook exercise to complete the case study. The t-test, a non-parametric test was used. The mean accuracy, mean speed, the standard deviation (SD), the t value, the degrees of freedom (df) and the level of significance (p value) were calculated.

The mean accuracy for the PDA group was 9.90 and 9.65 for the textbook group, df was 38 and p = 0.06. The level of difference between the means for the two groups was not statistically significant. However, the mean speed was 7.25 minutes for the PDA group and 12.0 minutes for the textbook group, df was 38 and p = 0.0001. The level of difference between the means for the two groups was statistically significant. This may show that the group that used the PDA worked at a faster speed than the group that used the textbooks. The standard deviation for the two groups revealed that the participants' responses were similar to the mean.

Findings / Implications: Medication administration is a critical step, and the nursing student or nurse administering that medication must be able to perform this procedure safely. Medication administration is also performed frequently, which increases the chances for error, since it involves calculations. When medication information is available in a PDA, it can be retrieved easily, thereby reducing the incidence of medication errors. The results revealed that medication calculations may be done with greater speed using PDA technology compared to the traditional use of textbooks and a calculator. These outcomes are in concert with IOM's goal to provide safe medication administration.

Discussion: The use of handheld technology in the nursing curriculum would introduce students to the habit of using technology for safe practice. The rapid influx of mobile technology into nursing practice also dictates that nurse educators train current and future nursing students to deliver new strategies of care. This also provides an opportunity for nurse researchers to indulge in evidence-based research to confirm the effectiveness of these strategies in providing optimum health care (Melynk, 2012). This technology will eventually help the practicing nurse to spend more time on patient care and have access to the most current information. Health care employers are also expecting graduate nurses to have the latest information technology skills. Mobile devices like the PDA can open a door of lifetime learning, as students are capable of moving from one learning environment to another (Franklin, et al, 2007).