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Strengthening nursing education through mobile technology integration thus promoting technological competency & medication error reduction.

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PURPOSE

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

INTRODUCTION

- **The practice environment for nurses has changed radically due to the advances in information technology and massive expansion of knowledge in health care.**
- **Promoting technological competency is a priority in nursing which can be done by integrating the use of mobile technology in the clinical setting and course work to better prepare graduate nurses for the current and future health care environment.**
- **Nursing students experience high levels of stress and anxiety in their nursing education, Rosenthal (2003) recommends mobile technology to be an effective technological tool to improve nursing education by providing access to nursing and medical data to students, decreasing stress, at the same time improving patient safety and decrease medication errors.**

INTRODUCTION-CONT'D

- **Medication errors are a major cause of harm to patients and reducing medication errors is a major concern in today's technologically sophisticated healthcare environment.**
- **Nurses are the main professionals involved in administering medications and administration is the part of the medication process with the least safeguards in place.**
- **Safe medication administration requires accurate patient assessments, multiple dosage calculations, knowledge of drug actions, their interactions & toxicities.**
- **Mobile technology, especially personal digital assistants (PDAs) used by nursing students can provide access to information at the point of care to safely calculate medication dosages to reduce medication errors thereby promoting technological competency.**

BACKGROUND

- **The American Association of Colleges of Nursing (2005), the National League for Nursing (2008), and the Institute of Medicine (2003), some of the major forces in professional health care and nursing education advocate the incorporation of technology in nursing education (George et al., 2010).**
- **Technological competency is the skilled demonstration of intentional and authentic activities by nurses who practice in environments requiring technological expertise. It supports current high-tech nursing practice by validating the dependency on nursing on technologies in the management of health care (Locsin, 2005).**
- **Nurses are the bridge between the patient and technology.**
- **The nursing curriculum and teaching strategies need to teach with and about technology to better inform health care interventions that improve health care outcomes especially medication error reduction (NLN, 2015).**

BACKGROUND-CONT'D

- **AAN believes that mobile technology can provide nurses & nursing students instant access to healthcare info at the bedside thereby allowing them to work with greater accuracy, yet with greater safety, thus reducing the incidence of med errors.**
- **PDAs- small mobile handheld that can be used at the bedside to access information, can be installed with software-includes a calculator, med ref tools & textbooks.**
- **Healthcare providers need fast & easy access to info at the point of care. Books & ref materials are cumbersome, maybe updated q 4 yrs. PDAs are portable, practical alternatives to traditional ref materials, can be synchronized with the latest data, an important benefit in avoiding med errors.**

SIGNIFICANCE

- **The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) believes there is no acceptable incidence rate for medication errors and the goal of every health care organization should be to continually improve systems to prevent harm to patients due to medication errors (NCCMERP, 2008).**
- **NCCMERP - reported > 106,000 hospitalized pts die and 2.2 million are injured/yr as a result of medication errors.**
- **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).**

SIGNIFICANCE-CONT'D

- **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.**
- **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).**

Statement of the Problem

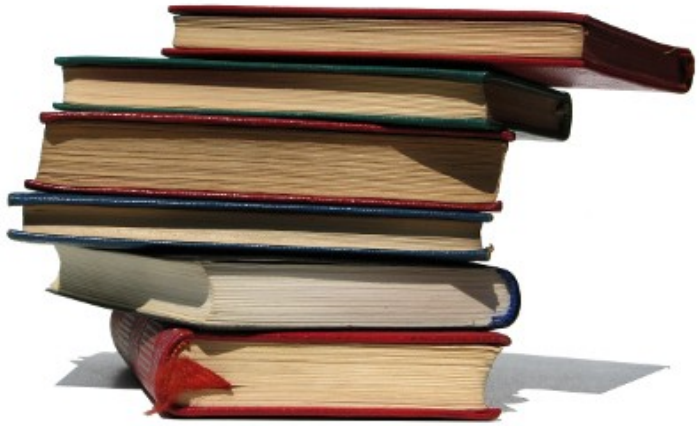
“ In junior undergraduate medical-surgical students , will the use of handheld technology (PDA) in calculating drug dosages for oral medications, intravenous fluid rate & checking indications & side effects of meds increase the accuracy and speed of medication calculations compared to the usual practice of using textbooks and a calculator?”

METHODOLOGY

- **An evidence-based pilot study using Rosswurm and Larrabee's change model was conducted at a private School of Nursing.**
- **A convenience sample of twenty undergraduate junior nursing students enrolled in the medical-surgical nursing course was given a case study with an attached medication administration record.**
- **Students were instructed to use the PDA with nursing software to complete the questions and calculate drug dosages in the case study.**
- **The comparison group was the same twenty students who use the PDAs. They were required to complete the same case study using textbooks and a calculator after 4 months. The two outcomes measured were accuracy and speed.**

Palm E2

Textbooks

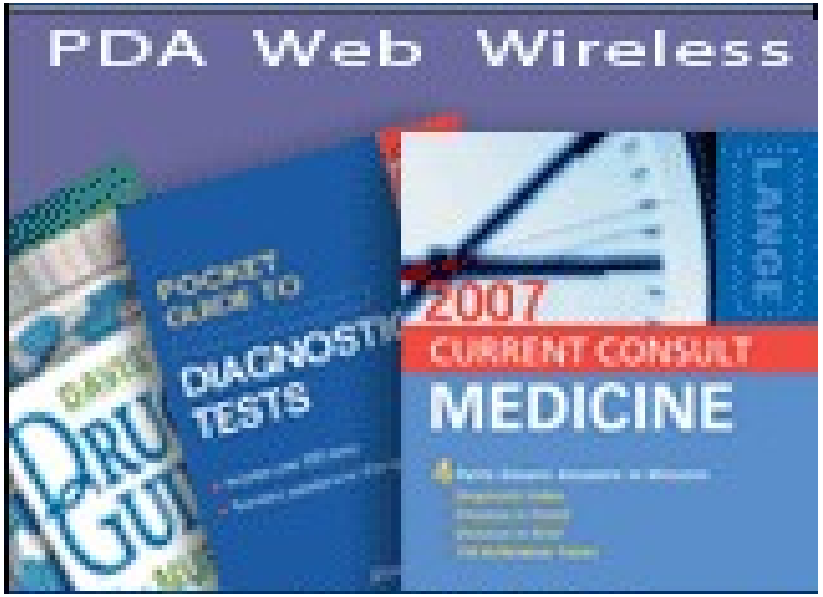


Examples of PDA Software

- **Quick Drug References, ex. Epocrates, Abx guide, Medscape**
- **Calculators, ex. Medcalc**
- **Diagnostic Tests, ex. Unbound Medicine, Nursing Central**
- **Clinical Reference, ex. Current Consult**
- **Dictionary, ex. Taber's Cyclopedic Medical Dictionary.**
- **More Nursing software can be found on the PDA cortex website, www.pdacortex.com.**

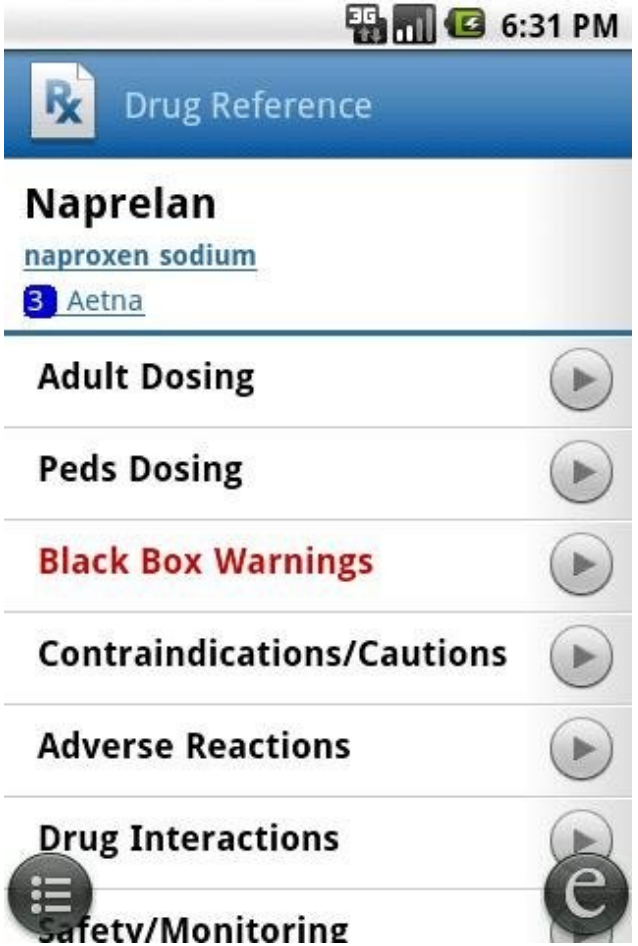
Clinical Reference

- **Look up diseases & diagnoses**
- **Differential diagnosis information**
- **Recommended diagnostic tests**
- **Recommended treatments**
- **Updated frequently with web resources**



Quick Drug References

- Latest drug updates
- Many free programs
- Adult & pediatric dosages
- >3,300 brand and generic drugs, including dosing, interactions, black box warnings, safety & monitoring, adverse reactions, & pricing
- Multi-Check multiple-drug interaction checker
- Replace outdated unit medication manuals



Calculators

- Drug dosages
- IV drip rates
- Pediatric/adult conversions
- BMI
- Glasgow coma scale
- Urine output
- Mean arterial pressure
- Pregnancy calculator
- And more!

Medical calculator

RESULTS

- **The mean accuracy was higher by 0.25 in the PDA group compared to the textbook group.**
- **The mean speed was 7.25 minutes for the PDA group and 12.0 minutes for the text book group, df was 38 and p = 0.0001.**
- **The level of difference between the means for the two groups was statistically significant.**
- **This shows that the group that used the PDA worked at a faster speed and greater accuracy than the group that used the textbooks.**

CONCLUSION

- **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 at the point of care, thereby reducing the incidence of medication errors.**
- **It is an important technologic competency that will improve the quality of nursing practice and therefore should be included in the nursing curricula.**
- **These outcomes are in concert with IOM's goal to provide safe medication administration at the point of care.**

CONCLUSION

- **The use of mobile technology in the nursing curriculum would introduce students to the habit of using technology for safe practice thus promoting technological competency.**
- **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).**

Implications for the future

- **Mobile technology- as a relatively new technological breakthrough-helps to ease the routine & tedious process that accompany the field of nursing.**
- **Allowing students at the university level to grow with this tool as they delve into their nursing careers, will also allow them to carry this useful tool to their future jobs.**
- **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 mobile 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).**

The End

- **“Classroom without boundaries, in which anytime and anywhere learning is a reality. 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).**

Questions?

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Appendix A: Informed Consent

To the Participant:

- **You have volunteered to take part in a study to measure the accuracy and speed of medication administration with the use of a personal digital assistant (PDA).**
- **Your part in the study will involve completing a case study using the personal digital assistant (PDA) during your medical-surgical clinical rotation at post-conference. Your participation in this study is voluntary. If you choose not to participate or withdraw from the study at any time, there will be no penalty nor will it affect your grade. Your instructor will not see your answers. The results of the research study may be published, but your name will not be used. The demographic tool that you will fill will be kept confidential.**
- **All responses will be coded without identifying information about you. There will be no sharing of individual responses and responses will be kept confidential. Results collected by the researcher at completion will be stored in a locked drawer in the researcher's office. Upon completion of the statistical analysis, the data will be stored in a secure room in the researcher's office. The only people who will have access to this information will be the researcher, the researcher's advisor and a statistician.**
- **There will be no risks involved with participation in this study. The results of the study would be beneficial to you and future nursing students in that it will promote an understanding of whether or not it would be efficacious to require nursing students to purchase personal digital assistant (PDA) for use during their clinical experience.**
- **If you have any questions about the study, please contact Laly Joseph at 201-692-2436.**
- **After reading the above, I hereby voluntarily consent to participation in this study. I am aware that I have the right to withdraw from this study at any time without penalty.**

- **Summary of the Study**
- **I would like to get a summary of this study:**
- **Circle One: Yes No**
- **Participant Name (print): _____**
- **Participant Signature: _____**
- **Date: _____**
- **Principal Investigator Name: Laly Joseph**
- **Principal Investigator Signature: _____**
- **Date: _____**

Appendix E: Demographic Tool

Please complete this form.

- **1. Age: _____**
- **2. Gender: _____**
- **3. Computer Skills (Place an X if you have knowledge of the skill or state if any other)**
  - **Word Processor (eg. Microsoft word) _____ Presentation software (eg. Powerpoint) _____**
  - **Web search techniques (eg. Medline) _____ E-learning software (eg. Blackboard) _____**
  - **Spreadsheets (eg. Excel) ____ Databases (eg. Access) ___ Statistical programs (eg. SPSS) ___**
- **4. Do you own a computer?**
  - **a. Yes _____ b. No _____**
  - **If no, what resources do you use to access a computer _____**
- **5. Do you own a Personal Digital Assistant (PDA)?**
  - **a. Yes _____ b. No _____**
  - **If Yes, How often do you access it in day, state number of times _____**
- **6. Would you be interested in using PDA technology in school? A. Yes ____ B. No __**

Appendix C: Case Study

- Mr. James Jones, a 60-year old patient is seen at the dialysis center for weekly dialysis treatment. The patient weighs 140lbs after dialysis. He has no known drug or food allergies. The orders from his physician, Dr. Taylor include:
- Obtain weight three times weekly prior to and after dialysis
- Furosemide (Lasix) 120mg PO twice daily
- Metolazone (Zaroxolyn) 10mg PO daily
- Enalapril maleate (Vasotec) 2.5mg PO twice daily
- Epogen 4000 units IV three times weekly in venous line following dialysis
- Calcium carbonate 3000mg PO with each meal
- 0.9 % Normal saline 500ml IV every 24 hours

- Solve and answer the following problems:
- What is the clinical indication of Furosemide?
- Calculate how many tablets of Furosemide the patient is taking per dose. Supply: Furosemide 60mg /tablet. Mark the medication administration record (MAR).
- List two side effects of Metolazone
- Calculate how many tablets of Metolazone the patient is taking per dose. Supply: Metolazone 5mg/tablet. Mark the MAR.
- Name the class of antihypertensive drug that Vasotec belongs to.
- Calculate how many tablets of Vasotec the patient is taking per dose. Supply: Enalapril maleate 2.5mg/tablet. Mark the MAR.
- What is the clinical indication for Epogen?
- Calculate how many ml of Epogen the patient should receive per dose. Supply: Epogen 4000 units/ml. Mark the MAR.
- Calculate how many tablets of Calcium Carbonate the patient will receive with each meal. Supply: Calcium carbonate 1500mg/tablet. Mark the MAR.
- Calculate ml/hr of 0.9% Normal Saline the patient will be receiving

Appendix E: Post-Evaluation Survey

In your opinion does…

- **Using PDA technology in the clinical setting would save you time.**

- **YES NO**

- **Using PDA technology in the clinical setting would help you accurately retrieve information about medications.**

- **YES NO**

- **Using PDA technology in the clinical setting would help you accurately calculate dosages of medications.**

- **YES NO**

- **Would you recommend the use of PDA technology in the nursing curriculum.**

- **YES NO**