"Try It" Mini Grant May, 2015 Report

Title of Project:
Using QR Codes and Handheld Scanners to Simulate Medication Administration Scanning Systems for Pre-licensure Nursing Students

Grant Recipient:
Cynthia Rubbelke, MEd, MSN(R), RN, Instructor, School of Nursing

Grant Goals
To decrease the number of medication errors, various coding and scanning systems have been developed and are currently in use in the majority of hospitals where SLU nursing students have their clinical experiences. The School of Nursing Clarke Learning Laboratory (CLL) has been designed to create an authentic learning environment, mimicking a hospital setting. However, the School of Nursing does not have a commercial coding and scanning system. During simulation experiences in the CLL students administer simulated medications to the simulated patients. Students have often commented that a coding and scanning system would "catch" their errors in medication administration and would make the simulation seem more real. Commercial simulated medication scanning systems have been developed but cost as much as $20,000 or more. The goal of this project was to create a medication scanning system that mimics the hospital setting allowing students a real experience at a greatly reduced cost.

Grant-related Preparation and Process

During summer 2014 patient armbands, medications and the simulated electronic health record were prepared for the scanning process. Using a QR code generator obtained online (https://www.the-qrcode-generator.com/) QR codes were created for more than 60 different medications. Labels were printed with the specific QR codes and applied to each medication container. This included more than 1500 simulation medications in the dispensing carts because there are multiple pills/tablets/vials for each medication. Using the same QR code generator QR codes were created for the simulated patient armbands that are worn by the mannequins. The patient armband QR codes were generated to open the simulated medication administration record (MAR) in the patient's electronic health record. Once the QR codes were created the barcode scanner was configured on an HP laptop computer. Cells were created in each of the patient MAR spreadsheets in order to scan the medications into the MAR. A cell was created below each medication that stated, "Click Here to Scan Med". Using conditional formatting, the cell background was yellow when those words were in the cell. The font was also increased compared to the rest of the spreadsheet. The reason for the enlarged font and cell color were to draw attention to the cell so that the student would know where to place the cursor when scanning the medication. Additional conditional formatting and spreadsheet formulas were created to change the cell color to green, red, pink or purple depending on whether or not the student scanned the correct medication. The scanners were used during both the fall and spring semesters for nearly 700 simulations. During the spring, students attended simulation from the following courses: Nurs252, Nurs446, Nurs447, Nurs448, Nurs449, Nurs452 and Nurs510. All of the students except those in Nurs252 had been to simulation in the fall semester and had already been exposed to the scanning system. During the spring semester a checklist was created

for the lab faculty members to document medication errors as well as any other technical issues that occurred with the scanning system or process. If a medication error was committed the student was expected to complete a simulated Occurrence Report similar to what they would be required to complete in the hospital. In order to determine if an error was committed the faculty members assessed whether or not the student had completed the first 5 of the 10 medication rights. These rights included:

1. Right patient (The nurse must ask the two identifiers and scan the patient armband.)
2. Right medication (This includes the right medication given, as well as missed medications.)
3. Right dose
4. Right route
5. Right time

Other issues that were assessed included:

1. Scanned armband QR code into incorrect document
2. Scanned medication in incorrect location on MAR
3. Did not understand color coding
4. Correct medication was scanned but MAR was coded incorrectly

Overall there were nine instances of medication errors during the spring semester.

- Two of the instances the student did not scan the medication at all
- Four were because the QR code would not scan either the armband or medication, yet the student administered the medication without this verification
- The other three instances were unrelated to the scanning system

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Other frequent issues that occurred which were not medication errors included the following:

- The patient armband was scanned into the top line of the MAR or another document
- The medication was scanned in the wrong area on the MAR
- The student had the correct medication but the MAR read incorrect medication because the coding was not accurate.

What Worked as Expected

Setting up the simulated medications and armbands went well but was extremely time consuming. Fortunately I had the assistance of a work study student to help with the process. Once the QR codes were created the work study student was able to label all of the medications and armbands. Some of the URLs were lengthy and created a detailed QR code, however the QR code shortener provided an abbreviated version that still scanned properly. The greatest challenge was being able to get a QR code that was small enough to fit on tiny medication labels and armbands. Ultimately all QR codes were successfully prepared.

Orienting the faculty on how to use the scanner system went well. Everyone was supportive of using the new system. The faculty member or graduate student working with the students each day was the individual responsible for orienting the students to the new system. It was originally planned to create a video or PowerPoint presentation orienting the students to the system prior to their simulation experience. This was not done because there are already several videos and

presentations that they are required to view prior to simulation. Instead, the scanner system was explained and demonstrated before the start of each simulation session.

What Did Not Work as Anticipated

The biggest issues not anticipated were technical problems. I did not anticipate that there would be quite so many instances of students scanning the QR codes into the incorrect document or into the wrong cell of the MAR. The program was clearly labeled "Click Here to Scan Med". Unfortunately students often become anxious in simulation so that may have contributed to the incorrect steps. In a real MAR and scanning system the medication can be scanned regardless of cursor location on the page. With a spreadsheet the scanner acts the same as a keyboard and scans into the location of the cursor. Another issue noted was that students sometimes scanned a correct medication but it would read "Incorrect Medication." This was because the formula had been altered. Because we use a Google spreadsheet and use the file revision feature to revert the MAR after each simulation it was sometimes getting reverted to an incorrect previous version. Sometimes the students inadvertently scanned into the formula cell which erased the formula and then it was reverted incorrectly. The other faculty members in the simulation lab were unfamiliar with how to write the formulas to correct the situation resulting in the error and student confusion.

Future Directions

For the most part the experience was well received by the students. Many students verbalized that it was similar to the hospital experience. Even though it was not identical to what they experience in the hospital they felt that a missing piece had been added. Because debriefing is a vital part of simulation it allowed an opportunity to discuss the pitfalls and errors with the system. When a student created a medication error they did not just complete the Occurrence Report but also had the opportunity to discuss what may have contributed to that error and how they felt about the situation. Debriefing also allowed discussions about technology in patient care. Discussion focused on how to deal with increasing technology and what the nurse should do when technology fails. In some instances the student had the correct medication but it scanned it as incorrect. This provided an opportunity to talk about how they would handle that situation in a true hospital setting.

In regards to resolution for scanning into the incorrect cell, specific cells were locked so students could not scan over what is already there. It is anticipated this will dramatically decrease the number of times that the formula is deleted or altered. Summer plans include revising all of the MARs with the new locked cell feature. In addition, other methods to scanning the armband are being investigated. With the current method the student was required to open a new tab in Chrome. Often the student missed this step and opened the MAR directly. This is one reason for scanning the armband into the MAR instead of opening the MAR. The goal is to create a method that will only unlock the MAR if they scan the armband first.

We will continue to use the scanning system and look for ways to improve the process. We purchased four additional scanners for the other CLL simulation rooms and medication labs. We are also introducing the students to the system during the medication skills lab that is prior to their simulation experience.

There is a definite need for such a system in the simulation community. Several of the simulation list serves repeatedly have queries about what schools are using for medication scanning systems. Many of the nursing schools do not have an adequate budget to purchase the commercial products. As a result of this project I will be presenting a hands-on workshop in June at the International Nursing Association for Clinical Simulation and Learning (INACSL) on how to create a medication scanning system on a limited budget. Margie Hassler, Clarke Learning Laboratory Coordinator and I plan to submit a course proposal to the International Meeting for Simulation in Healthcare (IMSH) scheduled for January 2016. Our plan is to submit for a preconference workshop that would include "how to" for the scanning system as well as our simulated electronic health record that was created in Google Drive.