Systematic review of barcode medication administration nursing essay

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One of the most important and potentially life altering tasks that a nurse must perform is that of medication administration. While the entire process may involve many disciplines, the bedside nurse remains the final stop in a line of checks that occur prior to any medication reaching a patient. The goal of medication administration is to deliver prescribed medications in an effective and safe manner. Often times, barriers are present that prevent the safe administration of medication which include, but are not limited to, errors in the translation of physician orders, inappropriate judgment and lack of attentiveness (Ulanimo, O'Leary-Kelley, & Connolly, 2007). The incorrect administration of medications may be devastating to the patient as well as the healthcare provider. The adverse effects from inappropriate administration could ultimately include death. Research has shown that many adverse outcomes in the hospital and in patient care are due to medication errors (Poon, Keohane, Bane, Featherstone, & Hays, 2008). It is estimated by the Institute of Medicine that, " on average, a hospitalized patient is subject to one medication administration error per day" (Koppel, Wetterneck, Telles, & Karsh, 2008, p. 408). Medication errors are costly to an organization as well. It is estimated by the Institute of Medicine as well, that a single adverse event could cost a hospital upwards of near 4, 600 dollars

for each occurrence (Ross, 2008). Adverse events alone have the potential to cost an organization up to 1. 22 million dollars annually (Ross, 2008).

Healthcare organizations and officials have initiated standards to help with safe patient care, one of which pertains directly to medication administration. The Five Rights of Medication Administration is the initiative that has been guiding the way that nurses and bedside providers administer medications to patients. These rights ensure that the right patient receives the right medication, to include dose and route, and that it is given at the right time (Fowler, Sohler, & Zarillo, 2009). No matter what measures are used to focus on this issue, there will always be human error. Leaders in technology have implemented a system that helps to reduce errors, therefore increasing patient safety, when it comes to medication administration. They have done so by using a barcode medication administration system. This system helps by putting hard stops on different aspects of medication administration in hopes to decrease the amount of errors that occur, with patient safety being the ultimate focus.

Barcode medication administration embodies the values of the five rights of medication administration by using a systematic and consistent process for each and every patient. It does so by prompting the nurse to scan the patient's armband to ensure patient identification. It then pulls that patient up and allows the nurse to access the medication profile (Ross, 2008). The nurse then scans the barcode that is on the medication package verifying they have the right medication, right dose and right route. If the medication matches the ordered dose and route, no further documentation is needed in most cases. However, it is when there is a discrepancy between these that

nurses are made aware of the situation by an alert message that they must act upon in order to continue (Dasgupta, Jacob, & Dwibedi, 2011). They must also scan their own name badge in order to confirm or document the provider that is administering the medication (Koppel et al., 2008). As with any change, some barriers exist in the initiation of the system. These may include implementation issues that include staff acceptance as well as potential for continued error due to staff finding workarounds to different aspects of the administration. There are also proven benefits with the system such as a decrease in errors and improved efficiency by staff. The alert messages and required action makes it harder for the nurse or provider to overlook warnings that may prevent possible adverse events.

Literature Review

An initial computerized literature search of " barcode medication administration" using CINAHL and ProQuest resulted in numerous articles. To broaden the research also used were the terms " informatics" and " medication errors". The information obtained from these searches included qualitative and quantitative research studies, literature reviews, and descriptive analysis of the medication administration system. The research resulted in numerous viewpoints of barcode medication administration to include the perspectives of multidisciplinary teams, administration as well as barriers and issues with initial implementation and nursing satisfaction. In all of the different articles that were discovered, there were some key points that repeated throughout. Those key points discovered were tactics used to make the systems successful as well as barriers that were encountered, as outlined below.

Implementation. The implementation of a new system or process always has its challenges. A significant amount of the research founded dealt with the initial implementation barriers and how they were worked through. In an article by Ross, the entire implementation process was defined and reviewed retrospectively. The nursing administrators and bedside nurses as well as Information Technology (IT) and Pharmacy all worked together to build a common vision and work in collaboration to make the transition accepted and enable it to succeed, this group was called the collaborative design team (Ross, 2008). The article outlined the process of the vendor selection in which conscious decisions were made based upon the different needs of the hospital. Staff participation was encouraged in order to make the implementation a success. Staff insight was taken into consideration and weighted heavily when it came to choosing the right system. The decision was made and the design was completed over the course of six months. The viewpoint of the nursing staff was taken in the highest consideration and they were involved in the implementation process. Policies were changed and re-written and introduced to staff prior to training so that they were aware of the change. " The biggest concerns among the staff were that the system slowed them down, took them away from patient care, and that the standard hospital dosing times and ' real time' administration would cause conflict" (Ross, 2008, p 4). The hospital administrators took this into consideration making process maps and rewriting policies again to make the transition as smooth as possible.

Wireless technology had to be upgraded so that the systems that were in patient rooms were able to operate and function well. IT left logs for staff to

report errors. Prior to the roll out, each staff member was required to take a four hour course for education on the new system. To also make the transition smoother, super users were placed on the unit for two weeks to help with staff issues and questions. Weekly meetings were held after implementation as well to continually work on issues that were occurring with the system. Staff was kept up to date on these by a ' Barcode Bulletin Board' that was present in each unit (Ross, 2008). The implementation of the new system was a success due to the collaboration that occurred between all of the disciplines. " We found that collaboration was critical to our success. Our barcode implementation has improved not only patient safety but also how our outsourced IT utilizes its resources and time" (Ross, 2008, p. 7).

In another article by Wakefield, Ward, Loes and O'Brien, discussed was the implementation of the barcode medication administration in critical access hospitals. The barcode medication administration system that was implemented here helped to maintain accuracy in all of the associated critical access hospitals while reshuffling the medication inventory process (Wakefield, Ward, Loes, & O'Brien, 2010). The barcode system also helped maintain accuracy in billing. Often times, prior to the implementation, medications were dispensed and not charted, therefore creating it impossible to bill the patient or insurance for services rendered. All of the critical access hospitals that were discussed in this article have been able to maintain their target of a 90 percent scanning rate (Wakefield et al., 2010). Nursing staff also remains happy with the change. " All interviewees indicated that the use of the BCMA devices and change in workflow have

been generally well-received by the nurses, and have prevented medication administration errors" (Wakefield et al., 2010, p. 585).

Acceptance. It is well known that in order to make a system function to its full capacity and potential, buy in from staff must be obtained. Several articles were found in research speaking to nursing and staff satisfaction when it came to barcode medication administration. In a time motion study completed by Poon, et. al, nursing satisfaction and workflow was observed within the system. Concern was discussed that with the nursing shortage, the barcode system would slow nursing staff down, which would hinder them from fully caring for their patients in the capacity that they deserved (Poon et al., 2008). The study was set in a 735 bed hospital over a nine month period to explore nursing workflow within the barcode administration system. Baseline observations were taken before the roll-out as well as after. In these situations, an observer, after allowed consent by the patient, followed the nurse into the room and observed her action when administering medication. It was found after the completion of the study that time spent on medication administration did not change significantly among the nursing units from before to after (Poon et al., 2008). The amount of time spent with management of physician order decreased by 11 minutes over an eight hour shift, actually saving the staff more time than before. This study completely helped to alleviate nursing staffs' fears about increasing their workflow and helped to create acceptance surrounding the implementation.

Fowler, Sohler and Zarillo also outline several aspects that deal with nursing satisfaction when it comes to barcode medication administration. This study used a comparative, descriptive design to answer several questions about

nursing satisfaction and the system. Staff was surveyed prior to implementation as well as three and six months after. The research completed showed mixed feelings. The staff was dissatisfied prior to implementation and continued to be after the study. They did however rate that they were highly satisfied with the safety that the barcode system brought into medication administration and they expressed that it made it easier for them to practice the five rights of medication administration (Fowler et al., 2009). The authors recommend continued surveys be completed to see if time helped to increase satisfaction or new employees helped to increase the overall satisfaction.

Reduction in Error. Errors in medication administration can be devastating to a patient as well as to the nurse. It has been investigated as to why medication errors occur. These discoveries are discussed in the article by Ulanimo, O'Leary-Kelley and Connolly. It has been found that most medication errors are due to, " lack of attentiveness, inappropriate judgment and missed or mistaken physicians orders" (Ulanimo et al., 2007, p. 29). The authors used a descriptive style study to answer the research questions that they had posed. The sample consisted of 61 registered nurses at a Veterans Affairs hospital in California. The nurses were asked to return a survey as to what they thought were the largest cause for medication errors. The number one and number two reasons were failure to check patient identity and they occurred when nurses were tired and exhausted (Ulanimo et al., 2007). All of the nurses surveyed agreed that the number of administration errors has decreased since the hospital implemented the barcode administration system. This study shows that while errors still occur, the nursing staff

believes that their current practice of barcode administration truly does prevent or decrease errors.

In a short article written by AHRQ, pharmacy workload is examined after implementation of barcode medication administration. Often times, pharmacists are interrupted by emergent phone calls, patients or by physicians. It is easy to see with this that the potential errors from pharmacy distribution can be real and extremely costly. One hospital mentioned in the article decreases their dispensing errors by 63 percent after the implementation of a barcode system. This is so because by the nurse verifying the route and dose at the bedside, medications are not mistakenly given to patients if they are the wrong item (" Studies Examine," 2008). In the same study, the largest benefit was a decrease in the adverse drug events that saved the hospital 2. 2 million dollars annually (" Studies Examine," 2008).

In the research completed by Wild, Szczepura and Nelson a study was completed over several years' time in the United Kingdom regarding the implementation of barcode medication administration in a long term care facility and the reduction in adverse drug events that were seen. The staff was given a questionnaire and asked to assess their knowledge of medication errors. This was completed prior to, as well as after implementation (Wild, Szczepura, & Nelson, 2011). It was found through the surveys that nursing staff felt less stress and pressure with the system. This was so because barcode medication administration was helping to prevent medication errors that may have been previously overlooked due to the system alerting when one of the rights was violated or incorrect.

Potential for Continued Error. At times, users deviate from the written standards when it comes to new or unfamiliar systems. This may be called a " work around" and is often seen when a staff member is not able to navigate through the system efficiently. This may be due to lack of knowledge or due to build flaws in the system. In the study completed by Koppel, et. al, several methods were used to evaluate work around in the healthcare setting; observation, interviews and participation in staff meetings and education (Koppel et al., 2008). Fifteen different workarounds were noted in the study that were placed into three different categories. These categories were, omitted steps in the process, those that performed steps out of sequence and those that were unauthorized steps completed in the process (Koppel et al., 2008). At times, the reasoning was due to missing medication, medications that were not bar-coded or possibly home medications that were brought in to take. Other times, however, staff was lazy and did not go into the room to scan wristbands and instead scanned a sticker they kept on their person for convenience. It is suggested in the article to continue with observations and monitor compliance to ensure that standards are being met.

Discussion

The review of literature shows much promise for the reduction of medication errors as evidence by multiple studies. There are areas in which the system would work extremely well such as inpatient medical/surgical floors and in long term care facilities. Nursing homes often have hand written Medication Administration Records (MAR) and the transcription of handwritten instructions leaves much room for error. Often times, in the way of the old

systems, nursing staff did not even know that errors had been made due to lack of awareness. Now with the barcode medication administration, it leaves smaller room for error. With some systems in the long term care facilities, pictures of the resident come on the screen to give another assurance of accuracy since, at times, residents may suffer from memory problems and may be unable to identify themselves.

An area where the system may not work as efficiently and could potentially cause delays in care would be in an emergency department or in an intensive care unit. In these areas, lifesaving medications may need to be given quickly and on the premise of verbal orders when time does not allow for the entry of the order or verification by the pharmacy. In these situations, there is often times a pharmacist in the department that is able to be a resource for medication administration. " In the emergency department, the timing of actions is extremely important and circumstances are occasionally such that there is no time to register prescriptions before the medications are administered" (Lenderink & Egberts, 2004, p. 186). In these situations, staff should still verify the order and that the five rights are being met by a conversation with the physician to ensure safety is being met.

An initial computerized literature search of " family witnessed resuscitation" using CINAHL and PubMed resulted in numerous articles. Using this search we were able to obtain numerous studies regarding outcomes of family witnessed resuscitation. To broaden our research we also used the terms " cardiopulmonary resuscitation" and " family presence". The information we obtained from these searches included qualitative and quantitative research studies, literature reviews, and a concept analysis review. The research

resulted in numerous viewpoints of family witnessed resuscitation to include the perspectives of both family members as well as healthcare professionals.

Barcode medication administration, as proven by the research, shows great promise in the world of medication administration. It is a new and exciting advancement in technology that hospitals should implement in order to decrease adverse drug events and poor outcomes associated with medication administration and the error that is associated with this. As technology advances, it is expected that more research will be completed in order to fully see the impact of the system.

Conclusion

It is likely that by adopting barcoded medication administration into our practice, it will decrease the number of adverse drug events that are seen in the hospital setting. It is evident by the research that has been completed that barcode medication administration has true benefit in the safe administration of medications and helps to decrease the errors that could potentially be made along with this. Many systems are new still and it would hold benefit to continue to survey areas months and years after implementation. As with any system change, there will always be resistance but what it comes down to is what is best for the patient and what increases the overall good. In this situation, barcoded medication administration is most certainly in the best interest of the patient and this will be proven as research continues.