

Electronic Medication Administration Record

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Abstract

Medical errors are a leading cause of death in the United States. Research has found many factors that increase medical errors. These factors fall into either individual-related factors, like the stress and overwork that nurses experienced, or organizational-related factors, like insufficient space to document and poor medication labeling. The eMAR, which is a medication administration software solution, is one tool that has been developed to help decrease the amount of medical errors. Two different eMAR systems are looked at in this paper: the barcode-assisted medication administration with eMAR and I.V. interoperability, which combines the barcode-assisted medication administration, the eMAR, and intelligent infusion devices. The research has found that medical errors decrease when the eMAR is used. One duty of the nurse is to keep patient safe. With the use of the eMAR, the nurse is not only able to decrease medical errors, but also is able to protect the patient and increase patient safety.

Keywords: emar, medical errors

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Medical errors are the eighth leading cause of death in the (Agency for Healthcare Research and Quality [AHRQ], 2000). This makes medical errors as a cause of death higher than deaths as a result of motor vehicle accidents, breast cancer, and AIDS (AHRQ, 2000). Medical errors cost the United States 37.6 billion dollars a year and about 17 billion of those costs are due to preventable medical errors (AHRQ, 2000). The general public is very concerned about being given the wrong medication, being given two or more medications that interact in a negative way, and experiencing complications from medical procedures (AHRQ, 2000). Implementing an electronic medication administration record (eMAR) is one way of reducing medical errors (AHRQ, 2000). Nurses should support the implementation of the eMAR because evidence based practice shows that the eMAR is effective in decreasing medical errors and helps provide effective and safe patient care. This paper will discuss what the eMAR is, the different causes of medical errors, the effectiveness of the eMAR in reducing medical errors, and why nurses should support the implementation of the eMAR.

eMAR

The eMAR is a medication administration software solution that is used by medical personnel (“eMAR Overview,” n.d.). By implementing the eMAR, hospitals can help improve patient safety and reduce the amount of time spent on documentation (“eMAR Overview,” n.d.). By improving patient safety, implementers of the eMAR help support patient rights, which are the Right Patient, Right Drug, Right Dose, Right Route, and Right Time (“eMAR Overview,” n.d.). Implementing barcode technology with the eMAR to document medication administration not only saves time that medical personnel could use elsewhere, but also helps increase accuracy in the process of medication administration (“eMAR Overview,” n.d.). The eMAR not only

documents medication administration, but it also easily documents vital signs and other observation that medical personnel see when caring for patients (“eMAR Overview,” n.d.). With such benefits, one is hard-pressed to find reasons not to support the implementation of the eMAR.

Causes of Medical Errors

To understand why the eMAR is important, a look at the causes of medical errors must be done first. Kim and Seomun (2014) performed a study on the causes responsible for medical errors by nurses who gave high-risk intravenous injections. They found three main causes associated with medical errors in this area. The first type of cause was human-related factors, which included lack of knowledge and awareness of the medication (Kim & Seomun, 2014). There are an increasing number of medications being used in the high risk setting (Kim & Seomun, 2014). If the nurse lacks knowledge and understanding about the medications that they will be giving, then medical errors can occur (Kim & Seomun, 2014). The second type of cause found was injection procedure-related factors (Kim & Seomun, 2014). Sometimes the nurse would inject the patient with the wrong fluids if a large dose was ordered or if there was a shortage of time (Kim & Seomun, 2014). Also, if physicians gave verbal prescriptions, this could lead the nurse to mistake the name and dosage of the medication ordered, resulting in a medical error (Kim & Seomun, 2014). The third type of cause Kim and Seomun reported in their study was environmental factors. If drugs are stored carelessly on the unit, this could cause different medications to become blended together, which could lead the nurse to take the wrong medication (Kim & Seomun, 2014). If a medication has damaged labels, this could cause the nurse to be unable to precisely say which medication is being given, which could lead to the wrong medication given (Kim & Seomun, 2014).

Karavasiliadou and Athanasakias (2014) conducted a study to find individual and organizational factors that could cause a medication error in the clinical nursing setting. They found that there were many factors within the individual and organization that could lead to a medical error. Stress and overwork of the nurse were found to be causes of medical errors (Karavasiliadou & Athanasakias, 2014). Lack of experience could cause an error where a new nurse could miss the signs and symptoms of an error during a medication procedure that an experienced nurse could detect (Karavasiliadou & Athanasakias, 2014). Karavasiliadou & Athanasakias noted that other individual factors that were found to cause medical errors were miscommunication between healthcare personnel, misreading of the medication package, miscalculation of the medication dose, not adhering to the proper steps of medication administration, problems with physician orders, and difficulties in the usage of an infusion device. If there is an interruption or a distraction in the environment, nurses could lose their train of thought, which in turn could contribute to medical errors (Karavasiliadou & Athanasakias, 2014). Increased workload and nursing staff shortage caused an increase in the occurrence of medication errors (Karavasiliadou & Athanasakias, 2014). Variables in the physical environment, like insufficient space to document, could also cause a medical error (Karavasiliadou & Athanasakias, 2014). Other organizational factors included poor medication labeling and packaging and similar medication names (Karavasiliadou & Athanasakias, 2014). With so many factors helping cause medical errors, attention needs to be given to these risk factors and suitable preventative measure need to be implemented (Karavasiliadou & Athanasakias, 2014).

Medical Error Reduction with the Implementation of the eMAR

Many studies done on the implementation of the eMAR found that it reduced medical

errors. Seibert, Maddox, Flynn, and Williams (2014) conducted a study on the accuracy rate of medication administration with the implementation of barcode-assisted medication administration with eMAR (BCMA-eMAR). The study observed the accuracy rate before and after the implementation of BCMA-eMAR at two community-based hospitals (Seibert et al., 2014). What Seibert et al. found was that the overall accuracy at hospital 1 increased from 89% to 90%, with a $p = 0.00015$. With wrong-time errors excluded, which is where a wrong-time error is an administration of a dose 60 minutes before or after the scheduled administration time, the overall accuracy at hospital 1 increased from 92% to 96% with a $p = 0.000008$ (Seibert et al., 2014). The overall accuracy at hospital 2 did not change significantly, but with wrong-time errors excluded, the overall accuracy at hospital 2 increased from 93% to 96% with a $p = 0.015$ (Seibert et al., 2014). Seibert et al. concluded that the implementation of the BCMA-eMAR helped in significantly increasing medication accuracy rate, while decreasing the frequency of preventable errors.

Poon et al. (2010) also conducted a study about the effects of the BCMA-eMAR on the administration of medication. The study took place at a medical center that was implementing a BCMA-eMAR (Poon et al., 2010). With the implementation of the BCMA-eMAR, error rates of different causes decreased across the board (Poon et al., 2010). Poon et al. found that the nontiming error rate, when not using the BCMA-eMAR, was at 11.6% versus a 6.8% for those that did use the BCMA-eMAR. This is a 41.4% decrease in errors with a $p < 0.001$ (Poon et al., 2010). Potential adverse drug events, when not using the BCMA-eMAR, were at 3.1% versus a 1.6% for those that did use the BCMA-eMAR (Poon et al., 2010). This is a 50.8% decrease in errors with a $p < 0.001$ (Poon et al., 2010). The timing error rate, when using the BCMA-eMAR, decreased by 27.3% with a $p < 0.001$ (Poon et al., 2010). Transcription errors, when not using

the BCMA-eMAR, were at 6.1%, but they were eliminated with the use of the BCMA-eMAR (Poon et al., 2010). Poon et al. concluded that there were significantly reduced error rates in medication administration when a BCMA-eMAR was implemented.

Prusch, Suess, Paoletti, Olin, and Watts (2011) state that medications given intravenously have the highest risk for errors. I.V. interoperability was developed to tackle this problem (Prusch et al., 2011). I.V. interoperability takes BCMA and eMAR technology and combines it with intelligent I.V. infusion devices (Prusch et al., 2011). Prusch et al. found a 24.8% reduction in the nursing time required for the interoperability pump programming process versus the manual process. The time spent at the pump was decreased when the number of programming steps was decreased by 58.8% (Prusch et al., 2011). The mean monthly compliance rate increased from 56.5% to 72.2% on the telemetry floor with the integration of I.V. interoperability (Prusch et al., 2011). The mean monthly compliance rate increased from 34.1% to 58.6% on the medical-surgical floor with the integration of I.V. interoperability (Prusch et al., 2011). The number of pump edits decreased on both floor since the integration of I.V. interoperability (Prusch et al., 2011). The telemetry floor edits decreased from 56.9% to 14.2% with similar results found for the medical-surgical floor (Prusch et al., 2011). Prusch et al. concluded that medical errors were reduced and nursing workflow was simplified with the implementation of the I.V. interoperability.

Why Nurses Should Support the Implementation of the eMAR

One of the nurse's duties is to keep the patient safe (Kim & Seomun, 2014). While taking care of the patient, the nurse must juggle through many individual and organizational factors that can increase medical errors (Karavasiliadou & Athanasakias, 2014; Kim & Seomun, 2014). With the implementation of the eMAR, the nurse can decrease or eliminate some of the

effects of these factors and, overall, improve patient safety. With the use of I.V interoperability, the nurse can decrease the amount of time spent at the pump and will have software to check infusion parameters, which will increase patient safety and time available to be spent with the patient (Prusch et al., 2011). With the implementation of the BCMA-eMAR, the nurse can decrease a wide array of medical errors (Poon et al., 2010; Seibert et al., 2014). With this technology, nurses will have the exact time that medications are due at their fingertips, decreasing timing errors and increasing quality of care and patient safety (Poon et al., 2010; Seibert et al., 2014). Nurses will be notified of any adverse effects from medications by the eMAR, which will also increase patient safety and quality of care (Poon et al., 2010). The nurse will also be more accurate when medicating, which will improve patient safety (Seibert et al., 2014). There are many benefits to implementing the eMAR, but the ones that matter the most to nursing and the reasons that nurses should support the implementation of the eMAR are the improved patient care and increased quality of care.

Conclusion

Medical errors are a serious part of the healthcare setting. They are an everyday occurrence that can be minimized with the right tools and procedures. There are many factors, both individual and organizational, that help cause medical errors. Recent studies show that the eMAR and derivatives of the eMAR are effective tools in decreasing the rates of medical errors. They also help support patient safety, reduce the amount of time spent on documenting, and increases medication administration accuracy. Although the eMAR is a great tool, other ideas need to be formed to help improve patient safety and medication administration accuracy and decrease medical errors. Nurses need to become proactive in demanding the implementation of the eMAR in all clinical settings.

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