Chapter 3
Digitizing Healthcare:
Electronic Medication Administration Record (eMAR) and Bedside Medication Verification (BMV)

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ABSTRACT

Proliferation of the Internet and Information Technology (IT) has led to many innovations in the healthcare industry. Among such innovations are the Electronic Medication Administration Record (eMAR) and the Bedside Medication Verification (BMV), both of which have been widely implemented by hospitals around the world. In this regard, the goal of this chapter is three-fold. It first describes the underlying work-flow utilized in these systems by comparing it with traditional methods of medication administration. Then it investigates the adoption and implementation of eMAR and BMV in hospitals in the United States, the conversion from traditional medication administration to eMAR documentation, and how utilization of eMAR and BMV can promote patient safety. The chapter concludes with the exploration of future trends in medication administration through the utilization of eMAR and BMV, and highlights future research directions in the field.

INTRODUCTION

It is estimated that the United States spends two billion dollars each year as a result of medical errors. Medical errors also attribute to a total of 7,000 deaths in the United States alone annually (Paoletti et al, 2007). The estimated rate of bodily harm or death in 2002 was 3.5 incidents per 1,000 administered medication doses (Goth, 2006).

Hospitals have been utilizing traditional paper-based medication administration records for years. However, the traditional method encompasses multifaceted steps that are time consuming and prone to promote errors. There could be up to 65 steps involved in the complete process of medication administration from prescription to the patient administration (Douglas and Larrabee, 2003). During the process of bedside medication administration, it is important for healthcare providers to administer the correct medication to the proper patient. Along with verifying the correct patient and medication, the medication dose, the route of medication administration and the timing of its administration need to be confirmed. These are referred to as the *Five Rights of Medication Administration* in the healthcare field.

Proliferation of the Internet and the diffusion of Information Technology (IT) have led to many innovations in the area of healthcare, including the Electronic Medication Administration Record (eMAR) and the Bedside Medication Verification (BMV). eMAR incorporates a complex collaboration of medicine, pharmacy, nursing, and other allied health professions to formulate a workable document regarding patient medications, and is essentially a patient medication profile and electronic record that is complete, dynamic, and functions in real-time. Infrastructure for the system usually involves a wireless network installed in a hospital, several bedside computers, bar coding on employee identification badges, on patient identification wristbands, and on medications. Data available through the system consists of patient's medical history, including past operations of the patient and allergies, as well as employee information participating in the implementation of the system. The system also integrates important information on medications, such as appropriate dosage and possible medication interactions. Finally, eMAR's dynamic features allow healthcare professionals to enter medication orders and update patients' condition and needed care in real time.

BMV is a system that is tightly integrated with eMAR by using a bar code mechanism. Bar codes are placed on medications, the patients' hospital identifying wristbands, and employee badges. Utilization of bar code scanning assures validation of accurate medication administration by facilitating data entrance and update by the personnel in the system. Implementing the eMAR system along with the BMV together facilitates correct and efficient medication administration in hospitals, while enhancing patient care, outcome and safety.

This chapter examines the adoption and implementation of eMAR and BMV systems in hospitals around the United States, the conversion from traditional medication administration to eMAR documentation, and how utilization of eMAR and BMV systems can promote safer medication administration in hospitals. The chapter concludes with the exploration of future trends and research in medication administration through the utilization of eMAR and BMV.

BACKGROUND

Being an innovative application of Information Systems to the healthcare field, eMAR and BMV are made up of five interrelated components: hardware, software, data, procedures, and system users. Hardware consists of medication carts and laptop computers with wireless networking capabilities. Software is available through several major vendors, including the IntelliDot Corporation, LifeCare Technology, Inc., Medical Information Technology, Inc., Mediware Information Systems,

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