Implementing Barcode Medication Administration Systems in Public Sector Medical Units

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ABSTRACT

Medication errors in healthcare have a high cost since it is one of the main causes of harming a patient; it leads to inefficient utilization of healthcare organization resources. The barcode medication administration system helps in improving the patients’ safety. The purpose of this article is to determine preparatory needs for introducing a Barcoding Medication Administration System (BCMA) in the medical units in one of the largest tertiary hospital in Abu Dhabi City, United Arab Emirates. Analytical Hierarchical Process (AHP) has been employed to describe systematic decision-making by prioritizing different factors that affect the implementation of BCMA and how technology plays a role in helping to reduce or prevent human errors by promoting safety in the health care sectors. Five major domains are identified: leadership, technology, process, education, quality and safety. Leadership was found to be the most important factor oppositely of technology was the least important.

KEYWORDS

1. INTRODUCTION

Medication errors in healthcare are one of the main causes of patient harm (Radley et al., 2013). The Institute of Medicine (IOM) estimates that medication errors happen at least daily in hospitals (Aspden et al., 2007). The cost of medication errors is high and leads to inefficient utilization of healthcare organization resources (Chan et al., 2008). Typical medication administration process involves physicians to write medication orders and nurses to carry out these orders by administering medications (Leape et al., 1991). This process carries the risk of many errors (Elixhauser and Owens, 2007). Medication administration has moved gradually to be electronic in line with the movement to digitalize healthcare processes. Digitizing medication administration involves introducing the Barcode Medication Administration (BCMA) System, which is considered to be a powerful tool to prevent errors and ensure more manageable support of patient safety (Radley et al., 2013). BCMA systems

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bring many technologies into the workflow of the medication administration process (Hook et al., 2008). However, this system may be difficult to implement due to various reasons (Klingner and Prasad, 2013). This difficulty comes from its direct effect on the patient safety (Poon et al., 2010).

A wide range of studies address the concept of patient safety in literature and there are factors that found to contribute to patient safety mentioned in literature reviewed in this study. Schein (2010) identified leadership as the first factor that affects patient safety in healthcare organizations directly. This finding was supported by another study done by Squires and his colleagues in 2010 that identified those leaders acknowledgement is essential to deal with high-risk healthcare environments, and seeks to align vision/mission, staff competency, and fiscal and human resources from the boardroom to the frontline (Squires et al., 2010).

Alahmadi (2010) identified teamwork, a spirit of collegiality, collaboration, and cooperation among healthcare professionals as key to patient safety and Greenfield et al (2011) added evidence base practice to this finding. Communication was identified as a key patient safety factor by large number of studies (Cima et al., 2011; Groves et al., 2011 & Russ et al., 2013). Joint Commission International accreditation (JCIA) has identified six main approaches to patient safety and structured them to be the international patient safety goals (Almidani et al., 2014). Medication safety is one of these safety goals (JCI, 2013). Research on medication errors, effects, and solutions, has been ongoing for three decades, and one of these solutions is using the BCMA system (Leape et al., 1991). BCMA is typically utilized in conjunction with an electronic medication administration record (eMAR) system (AHA, 2002). This system offers several levels of functionality by helping to enforce the rights of patient medication administration rights (i.e. right patient, right drug, etc.) that are likely to be more accurate than a manual medication administration (Hook et al., 2008).

This system has helped greatly to reduce medical errors (Kimmel and Sensmeier, 2002). Furthermore, competition among the wide range of available eMAR software and systems (Henneman et al., 2010) can help drive positive improvement effects in hospital performance through low implementation costs. The administrative efficiencies realized through the use of BCMA can result in improved inventory control, billing accuracy, and reduction of rework (Chan et al., 2008). This system can also support nurses by providing drug reference information and various alerts (e.g. look-alike/sound-alike) and reminders (e.g., important clinical actions that need to be taken when administering certain medications) (Hook et al., 2008). BCMA implementation can be complex and multiple factors may affect its successful implementation (Boonstra et al., 2014). To control these factors to support implementation, they must be prioritized. There are several prioritization techniques and methods found in literature.

The purpose of this study is to prioritize factors affecting implementation of BCMA in medical units in a tertiary hospital of Abu Dhabi city in United Arab Emirates. BCMA implementation involves multiple factors and sub factors and indeed is a multi-criteria decision making complex issue. Five important factors (leadership, technology, process, education and quality and safety) affecting BCMA implementation in health sector of UAE has been identified and these factors have been further broken down in many sub factors. To deal with this complexity, issue has been arranged in hierarchical form and AHP has been chosen as the best possible option. The study will use Analytical Hierarchical Process (AHP) model to examine set of factors mentioned in literature to affect the BCMA implementation. The medical city where the BCMA is implemented is the largest healthcare provider in the UAE with more than 625 beds and multi-speciality services. Results of this study will be presented to the facility and system’s leadership to be used as a new strategy to improve safe implementation of this technology. The structure of this study involves a literature review to explore factors that might affect the implementation BCMA. These factors will be tested using the analytical hierarchical process (AHP) model. Discussion of all factors and their subcategories will follow, and conclusions and recommendations from this study will be described accordingly.
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