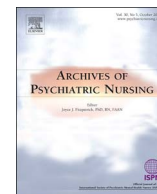




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Application of the SEIPS Model to Analyze Medication Safety in a Crisis Residential Center[☆]

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ABSTRACT

Purpose: Medication safety and error reduction has been studied in acute and long-term care settings, but little research is found in the literature regarding mental health settings. Because mental health settings are complex, medication administration is vulnerable to a variety of errors from transcription to administration. The purpose of this study was to analyze critical factors related to a mental health work system structure and processes that threaten safe medication administration practices.

Background: The Systems Engineering Initiative for Patient Safety (SEIPS) model provides a framework to analyze factors affecting medication safety. The model approach analyzes the work system concepts of *technology, tasks, persons, environment, and organization* to guide the collection of data.

Methods: In the study, the *Lean* methodology tools were used to identify vulnerabilities in the system that could be targeted later for improvement activities. The project director completed face-to-face interviews, asked nurses to record disruptions in a log, and administered a questionnaire to nursing staff. The project director also conducted medication chart reviews and recorded medication errors using a standardized taxonomy for errors that allowed categorization of the prevalent types of medication errors.

Results: Results of the study revealed disruptions during the medication process, pharmacology training needs, and documentation processes as the primary opportunities for improvement. The project engaged nurses to identify sustainable quality improvement strategies to improve patient safety.

Conclusion: The mental health setting carries challenges for safe medication administration practices. Through analysis of the structure, process, and outcomes of medication administration, opportunities for quality improvement and sustainable interventions were identified, including minimizing the number of distractions during medication administration, training nurses on psychotropic medications, and improving the documentation system. A task force was created to analyze the descriptive data and to establish objectives aimed at improving efficiency of the work system and care process involved in medication administration at the end of the project.

Introduction

According to the Institute of Medicine's (IOM), *To Err is Human* report, an estimated 1 of 854 inpatients and 1 of 131 outpatient deaths are caused by medication errors (MEs) (Institute of Medicine, 1999). A ME is defined as any error occurring in the medication process (Wittich, Burkle, & Lanier, 2014). Problems with the medication process, prescribing and dispensing, and medication administration errors are avoidable, and some can lead to serious adverse drug events, including death (Agyemang & While, 2010). According to Critchley (2015), medication related errors are the second most common patient safety event in acute care settings. Other causes of MEs are a result of faulty

systems, processes, culture, and environmental conditions that create an unsafe atmosphere vulnerable to mistakes (Frith, 2013).

Medication Safety in Mental Health Settings

Although problems in the medication process undoubtedly contribute to medication errors in acute care settings, it is less clear how problems in the work system and process threaten safe medication administration practices in mental health settings. Medication is a critical therapeutic intervention and may be the most important task of a nurse in the mental health setting. However, recent research found nurses in psychiatric settings lack experience and knowledge base,

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suffer from stress, and receive inadequate support and supervision related to medication administration (Duxbury, Wright, Bradley, & Barnes, 2010).

In a study, Agyemang and While (2010) reported 39% of MEs occur during the physician prescribing phase, and 38% occur during the nurses' medication administration process. All other errors were shown to occur between the transcribing and dispensing stage. Frequent causes of MEs include: (a) administering a medication to the wrong patient, (b) administering a wrong dose, and (c) failing to give a prescribed medication (Wittich et al., 2014). MEs frequently involve errors in the six rights of medication: right medication, right dose, right time, right route, right patient, and right documentation. Omission errors occur when medications are not administered. Studies have shown common medication errors occurring in mental health settings include differing medication processes, such as identifying patients using photographs which can lead to misidentification (Cottney & Innes, 2015). Complex medication regimens can increase the risk of serious medication errors and potential for harm. Other contributing factors include noisy environments, frequent disruptions, pro re nata (prn) doses, and number of doses due (Cottney & Innes, 2015). Medication compliance is problematic in this population (Ito & Yamazumi, 2003). In patients with bipolar disorder, unpredictability of mood episodes creates problems with medication adherence (Darling, Olmstead, Lund, & Fairclogh, 2008). Furthermore, impairment of cognitive functioning and decision-making ability in those with severe mental illness (SMI) may prevent patients from intercepting or questioning a potential ME (Maidment & Parmentier, 2009).

An increased number of patients with SMI are receiving treatment in local, community crisis residential centers. While receiving treatment, opportunities exist to improve medication adherence through patient education and to improve the quality and safety of care that is needed in this vulnerable population. Improvements in safe administration of medicine in the mental health setting is needed to increase quality care.

Purpose

This article analyzes critical factors related to work system structure and process that pose threats to safe medication practices in a residential mental health facility. Lean methodology tools were used to identify safety vulnerabilities in the medication administration process that were later used to develop a quality improvement plan.

Conceptual Framework

A critical analysis of factors related to human errors are helpful in identifying MEs in the mental health setting. The Systems Engineering Initiative for Patient Safety (SEIPS) Model is the conceptual model used for this project to identify problems in the work systems in a residential mental health setting. The SEIPS Model is a patient safety approach based on an industrial engineering subspecialty of human factors, although emphasis is placed on the interactions within the work system to include the *person, organization, tools and technology, tasks, and environment* (Carayon, et al., 2006). According to Carayon et al., (2006), the emphasis on the interaction between the person performing a variety of tasks within the workplace environment aids in identifying areas for interventions or improvement. The SEIPS Model analytical approach combines human factors and work system processes to evaluate system failures and outcomes for patients, staff, and organizations (Frith, 2013). The model borrows from a familiar healthcare quality model known as the structure-process-outcome model of Donabedian (Carayon, 2012), and further delineates the system into persons, task, technology, environment, and organization.

A common quality improvement approach is Lean methodology. This project implemented a Lean methodology, process management approach to examine organizational processes with the goal of improving quality, increasing productivity and teamwork, and reducing

costs (Kimsey, 2010). A key approach of lean methodology is to have a problem-solving mindset. Quality improvement tools such as process flowcharts, workflow diagrams, and surveys are examples of tools used. By combining the SEIPS Model with Lean methodology tools, inefficiencies in work system and processes were identified and solutions provided to improve medication safety. Additionally, MEs were categorized using the National Coordinating Council for Medication Reporting and Prevention (NCC MERP) taxonomy to identify ME types, to examine causes of MEs, and to develop QI processes aimed at reducing MEs.

Methods

A nonexperimental, descriptive design was used to analyze critical factors related to medication administration practices in the mental health setting. The project was completed in a 16-bed, non-hospital crisis residential center located in the southeast United States. Four full-time RNs, one full-time licensed practice nurse (LPN), and four part-time RNs participated in the study. A lean methodology approach was used to “plan” the improvement cycle using PDCA (plan, do, check and act) and to identify problems in the system (Kimsey, 2010). Lean methodology tools and results are described in subsequent paragraphs. Patient charts were also sampled for analysis using lean methodology; chart reviews focused on identifying the type of medication errors occurring in the organization and highlighted where errors were really occurring, thereby avoiding assumptions about how medication errors were occurring. Chart reviews were conducted among patients discharged from the facility with a diagnosis of one or more SMIs, including schizophrenia, bipolar disorder, depression, schizoaffective disorders, and anxiety disorders. Chart reviews were completed and data were recorded and analyzed to gather the frequency and type of medication errors recorded on clients discharged from the facility over a 10-month period. The study was approved by the executive director and clinical director of the center and the Institutional Review Board of the project director's university. Informed consent was received from nurse participants in the facility.

Instruments and Data Sources

Quantitative and qualitative data were gathered through floor plan observations, a questionnaire, retrospective chart reviews, activity tracking logs, and interviews. After carefully defining the purpose, the project director developed a quantitative and qualitative questionnaire consisting of a mixture of one open-ended question and 21 statements with numerical rankings that sought staff opinions about perceptions, knowledge, and barriers of medication administration. The questionnaire constructs included questions to identify opinions describing the system categories of the SEIPS model: person, tasks, technology, environment, process, and organizational patient safety outcomes. The questionnaire was evaluated by two pre-test volunteer nurses to identify and correct any problem questions. The reliability of the questionnaire was evaluated using IBM SPSS Statistics for Windows, Version 24.0 (Armonk, NY). The Cronbach alpha was found to be 0.932, which reflects a highly reliable instrument.

Data Analysis

The data analysis plan included summarizing data with descriptive statistics including frequencies and percentages for quantitative data and themes for qualitative data. Descriptive statistics were run using Qualtrics Software and Microsoft Excel.

Results

Several factors in the work system process and structure showed to contribute to medication errors. Results of the critical factor analysis

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