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The Relationship Between Nursing Experience and Education and the Occurrence of Reported Pediatric Medication Administration Errors

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Medication errors are one of the most common incidents in the hospitals. They can be harmful, and they are even more detrimental for pediatric patients. This study explored the relationship between nursing experience, education, the frequency and severity of reported pediatric medication administration errors (PMAEs). The data for this study were collected from a larger pan Canadian study. A survey tool was developed to collect self-reported data from nurses. In addition to descriptive statistics, a Poisson regression or a multiple linear regression was completed to address the research questions, and a Boneferrai correction was conducted to adjust for the small sample size. Results demonstrated that on units with more nurses with a higher level of current experience, more PMAEs were reported ($p = .001$), however; the PMAEs reported by these nurses were not as severe ($p = .003$). Implications to advance both safe medication delivery in the pediatric setting and safe culture of reporting for both actual and potential errors are identified.

MEDICATION ERRORS ARE one of the most common types of hospital incidents, and they often have devastating consequences (Wilkins & Shields, 2008). Data from the 2005 National Survey of the Work Health of Nurses were weighted to represent all registered nurses in Canada delivering direct patient care. Nearly one-fifth of all registered nurses reported that their patients had experienced a medication error occasionally or frequently under their care (Wilkins & Shields, 2008). There are many factors that influence this number such as heavy workloads and overtime. It is important to recognize that nurses are the last person in the process of medication administration to resolve and intercept the errors; therefore, they must know the effect, rationale and compatibilities of the drug, and need to calculate the right dose for patients (Ofosu & Jarrett, 2015) along with having a work environment that supports this process. Nurses can administer up to 50 medications per shift (Grigg, Garrett, & Craig, 2011) and they spend up to 40 percent of their time administering medications (Hughes & Blegen, 2008).

Medication errors have the potential to be harmful with pediatric patients over-represented as victims (Honey & Condren, 2010). Medication errors are prevalent in children due to individual calculations of medications developed for

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adult consumption, and the propensity for reactions to small errors (Broussard, 2010; Chen, 2013; Kaufmann, Laschat, & Wappler, 2012). Additionally, medications on pediatric wards are often packaged and prepared for adults, and staff often lack nursing education and clinical experience in this setting (Broussard, 2010). In order to examine these factors, it is essential to first identify them.

Purpose of Study

The data in this study were from the second phase of a larger study (Sears, O'Brien-Pallas, Stevens, & Murphy, 2013). The purpose of this phase of the study was to examine how nursing experience and education related to pediatric medication administration error occurrence. Specifically, the study explored the frequency of reported pediatric medication administration errors (PMAEs), the severity of errors, and the quality of nursing care at the time of a PMAE. A medication error was defined as "any preventable error that has occurred as a result of human mistakes or system flaw that occurred in the process of administering a medication resulting in harm or the potential for harm" (Institute of Medicine, 2000).

Research Questions

The research questions underpinning this phase of the study were as follows: 1) What is the influence of unit nurse characteristics (experience and education) on the frequency of reported PMAEs?; 2) What is the influence of unit nurse characteristics (experience and education) on the severity of error?; and 3) What is the influence of unit nurse characteristics (experience and education) on the quality of nursing care at the time of a PMAE?

Background

Level of Nursing Experience

A descriptive, cross-sectional study conducted by Unver, Tastan, and Akbayrak (2012) revealed that novice nurses' lack of experience negatively affects the frequency of medication errors. Compared to more experienced nurses, novices were less able to recognize the causes of medication errors. Moreover, many nursing students who have had a reduced load in their clinical training often begin their work with heavy workloads (Saintsing, Gibson, & Pennington, 2011). This inexperience is seen to result in a decreased incidence of error reporting (Duffield et al., 2011; Saintsing et al., 2011). Around 75 percent of novice nurses commit medication errors and thus often require additional support in acute care environments (Saintsing et al., 2011). It is recommended that there should always be a consistent scope of expertise in their workplace environment (Saintsing et al., 2011).

In an experimental study conducted by Simonsen, Daehlin, Johansson, and Farup (2014) comparing registered nurses with at least 1-year experience and bachelor students in their last term, registered nurses demonstrated better medication knowledge than the bachelor students. This indicates that increased experience is significantly correlated with decreased risk of medication error.

Level of Nursing Education

Research has shown that with higher proportions of baccalaureate nurses on a unit, comes lower levels of mortality and failure-to-rescue rates (Aiken, Clarke, Sloane, Lake, & Cheney, 2008). A baccalaureate education is associated with better patient and nurse outcomes (Blegen, Goode, Park, Vaughn, & Spetz, 2013). In 2013, Blegen and colleagues conducted a cross-sectional study using data from 21 University Health System Consortium hospitals to analyze the relationship between registered nurse (RN) education and patient outcomes. If nurses had a higher education, such as a baccalaureate degree or higher, the number of adverse events such as the occurrence of deep vein thrombosis or pulmonary embolism, congestive heart failure, decubitus ulcers, failure to rescue and the length of stay decreased significantly (Blegen et al., 2013). The Institute of Medicine (IOM) recommends increasing the number of RNs with baccalaureate degrees to 80 percent by 2020, following IOM's campaign in their report on the Future of Nursing (Institute of Medicine, 2011).

Frequency of Error

Ghaleb, Barber, Franklin, and Wong (2010) conducted a prospective study of 444 pediatric patients, and 2955 medication orders to detect the incidence of medication errors on pediatric units. The researchers identified that 13.2 percent of the medication errors were prescribing errors and 19.1 percent were administration errors. Researchers have determined that medication errors are approximately three times more likely on pediatric units than on adult units (Woo, Kim, Chung, & Park, 2015). In a 5-week retrospective cohort study by Al-Jeraisy, Alanazi, and Abolfotouh (2011), analysis of 2,380 medication errors were conducted and 1,333 errors were identified, which equated to a 56 percent error rate. In another study that evaluated telephone enquiries to the National Poisons Information Service concerning in-hospital pediatric medication errors, medication error rates on pediatric units varied from between one per 5.8 admissions to one in 662 pediatric admissions (Tharian, Thompson, & Tuthill, 2010). Further, as previously reported from the first phase of this study (Sears et al., 2013), 245 (65.9 %) actual errors were reported and 127 (34.1%) potential errors were reported. Of the 372 errors reported, most are committed at the wrong time (45.2%), wrong dose (22%), other factors (18.5%), wrong medication (8.3%), wrong route (2.7%), wrong patient (1.9%), wrong time and dose (0.8%) and wrong patient and medication (0.5%).

Severity of Error

The literature reports that 95 percent of medication errors are not reported. The five percent that is reported is related to life-threatening effects (Institute of Medicine, 2007). It is perceived, therefore, that medication errors, which are considered minor or less severe, would go unreported. Al-Jeraisy et al. (2011) studied 2,380 medication orders, in which 1,333 medication errors were recognized. 44.5 percent of errors were in infants younger than 1 year of age. Children under 5 years of age were at a higher risk of error. Furthermore,