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NICU Medication Errors: Describing the Cause and Nature of Medication Errors in a NICU in Qatar

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Introduction

A medication error can be defined as “any error occurring in the medication use process” and focuses on problems with the delivery of medication to a patient [1]. Medication errors are a complex and ongoing issue that are of concern in all health care institutions [1]. Such errors range in severity but have been associated with an increased mortality and morbidity rate, as well as resulting in significant health care cost for both adult and pediatric populations [2,3]. Evidence from the literature indicates that more complex medical problems in patients who require multiple medications are more likely to experience medication errors during their hospitalization [3,4]. Since the release of the report “To err is human” by the Institute of Medicine (IOM) in 1999, the importance of good patient safety management has become a major focus of many health care professionals throughout the world [2]. Neonates, as a population, do not appear at a particularly high risk of experiencing medication errors as the vast majorities are not born preterm and often do not require a significant number of medications within the first month of life. Premature newborns in the neonatal intensive care unit (NICU) however are much more vulnerable to medication errors as they often require many different medications, are of small size, are physiologically immature, and may be lacking in the abilities to compensate for the effects of such errors [5].

Methods

A cross-sectional retrospective study investigating medication error reports submitted by healthcare professionals in an online database was completed. Medication error reports developed from January 1st of 2014 until April 14th of

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2015 at a large, tertiary care NICU were reviewed. Medication error reporting within the hospital is policy driven and has migrated from a paper-based to a computer-based system that is accessible to all healthcare professionals. A data collection tool was developed based on three sources: literature review, National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP) classifications and a medication error sample report from the tertiary care hospital. This tool included demographics, personnel and practice event details including date and time, contributing factors, error category, and medications involved. Phase validation of the data collection tool was completed by study investigators and an external expert in medication error reporting. The modified version of the tool was then piloted using ten medication error reports completed by two investigators. Inconsistencies in data collection were discussed openly and final clarifications were made to the data collection tool. Data collection from all medication error reports were completed by two investigators. Medication errors reports included in this study were analyzed using Statistical Package for Social Sciences SPSS version 22. Frequencies were described using qualitative variables. Chi squared test was applied on categorical variables.

Results

During this study period, a total of 201 medication error reports were collected and reviewed. All errors were identified and reported by pharmacists. 51.8% of reports involved male patients. 27.4% of error reports developed from the NICU occurred in patients from birth to one day of age while 42.3% of error reports occurred in patients during the first week of life. The three most frequent categories of medication errors included wrong dose of medication (45.5%), wrong dosing frequency (31%) and documentation error (24%). Wrong frequencies were significantly associated with newborns on days 0–1 of life ($p < 0.05$). None of the medication errors identified reached the patient. 98.5% of medication errors were classified as causing no harm to the patient involved while the remaining 1.5% were re-evaluated as medication discrepancies after further review. A majority of medication errors were identified as being made by the primary prescriber (98.5%) while the remaining medication errors were identified as being made by the primary nurse in charge of the patient at the time the error was made. 98.5% of errors were stated to have occurred at the stage of prescribing while the remaining 1.5% of errors occurred at the dispensing, administration and transcribing stages. In 194/201 (96.5%) of medication errors, primary physicians were notified to modify the related prescription. The most common causes of medication errors included: calculation errors (118/201; 58.7%), documentation errors (35/201; 17.4%) and protocol errors (16/201; 8%). The class of medication resulting in the greatest number of medication errors were antibiotics (38.8%) while within this class, amikacin, gentamicin, and teicoplanin were the most likely medications to be involved in the error. The second most frequent medication classes resulting in medication errors were supplements (14.4%) including ferrous sulfate and vitamin D. Intravenous additives were the third most frequent class of medications that resulted in medication errors (8%). The most common days of the week for medication errors to be reported occurred on Wednesday (37 errors), Sunday (36 errors), and Thursday (35 errors). The days of the week with the fewest medication error reports generated were Friday and Saturday with 16 reports each. The time range where the greatest number of medication errors was identified was between 09:00 – 12:00 (37.8%). The fewest medication errors were identified between 03:01 – 06:00 (2.0% each). There was no association between the type of medication error and the time with which it occurred.

Discussion

Several studies have described the frequency and preventability of medication errors in the NICU [6]. This is the first study in Qatar that focuses on this area. We identified several deficiencies with the current error reporting system in that much of the demographic information useful for medication error reporting in neonates (ie. weight, gestational age, and diagnosis) are not necessary to complete the report. As only pharmacists completed all medication error reports it appears that education and training of other health care professionals may be needed to improve overall reporting. Reporters are also not anonymous which may contribute to underreporting. The most common medications involved in errors were antibiotics which is similar to existing studies [7]. Some limitations of this study included the inability to calculate the rate of errors occurring per patient or prescription as the total number of prescriptions written in the unit during this time was

not available. Also, due to the retrospective nature of this study, there is the limitation of underrepresentation of medication errors as investigators were only able to describe medication errors that were reported through the online reporting system and did not use other sources for identifying medication errors in the unit.

Conclusion

Based on the reports generated through this online reporting system, medication errors that do occur in the NICU appear to be identified before they reach the patient. However, it is difficult to determine if underreporting does occur. Special care must be taken when selecting doses and frequencies of medications for patients in the NICU. Education and training on medication error reporting would likely have a positive influence on reporting by other health care professionals in the NICU.

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