The Cost and Causes of Medication Omission Errors: A Discussion and Literature Review

By

Michael Duda

Senior Honors Thesis
School of Nursing
University of North Carolina at Chapel Hill

April 6, 2018

Approved:

Jennifer T. Alderman, MSN, RN, CNL, CNE, Thesis Advisor
Abstract

Medication errors are a constant source of strife to both patients and healthcare providers alike since time immemorial. Regardless of our level of technology, the fallible nature of humans makes medication errors a common occurrence in healthcare. One type of medication error that can often be overlooked is the omission error. An omission error occurs when a patient does not receive a medication without a justification for that omission.

Few healthcare providers would argue that medication errors do not contribute greatly to hospitalization costs. Unfortunately, because most medication errors are reported on a voluntary basis, it is extremely difficult to accurately estimate the total cost (Choi, Lee, Flynn, Kim, Lee, Kim, & Suh, 2016). Estimates vary widely and are often unique to the healthcare system that they occur in due to methodology used to classify and study the data (Choi et al., 2016). Few data exist on medication omission errors (MOEs) exclusively, despite this type of error being one of the most common kind of errors (Grissinger, 2017). Two prior literature reviews on medication errors found multiple contradictory causes, however, some common themes will be explored in this review (Lasserter & Warnick, 2003; Berdot et al., 2015). This discussion and literature review examines the existing data on the causes, and the costs associated with medication omission errors.
The Cost and Causes of Medication Omission Errors: A Discussion and Literature Review

Medication errors plague the United States (U.S.) healthcare system. The mean number of medication error-related sentinel events reported by The Joint Commission (2018) over the last four years is 33.5 per year, with a fluctuating course of increases and decreases. A sentinel event is defined as an event that causes, or has the potential to cause, severe injury, impairment, or death (The Joint Commission, n.d.). Despite increased public and media attention since the publishing of the Institute of Medicine’s (IOM) ‘To Err is Human: Building a Safer Health System’ in 1999, the rates of medication errors have remained high, and indeed remain the most frequent cause of patient harm in hospitals (Parry, Barriball, & While, 2014, p. 404). A follow up study by the IOM in 2006 entitled ‘Preventing Medication Errors’ noted that medication errors cause harm to 1.5 million patients a year in the US alone, and cost somewhere in the realm of $3.5 billion U.S. annually (Riaz, Riaz & Latif, 2017, p. 921).

The purpose of this paper is to examine types of medication errors with a focus on medication omission errors (MOEs). Reasons for why MOEs are difficulty to study will be provided. Costs and causes of MOEs will be described as well. Finally, a discussion, including recommendations to prevent MOEs, will be offered.

Types of Medication Errors

A medication error can occur at any stage of the medication use process: ordering, transcribing, dispensing, and administration (American Society of Hospitalist Pharmacists, 2018). Within these four categories there are a plethora of subcategories. Beyond this, medication errors may occur at any stage of hospitalization; everything from the storage of the medication to how it is packaged may be contributive to an error. The American Society of Hospital Pharmacists (ASHP), publishes exhaustive guidelines to definitions, types of errors, and
methods for reducing errors yearly (ASHP, 2018). For the sake of this paper, we will mostly be examining the administration aspect of medication errors.

Multiple studies have noted that administration errors are the most common type of medication error (Berdot, 2016; Choi et al., 2016; Fitzhenry et al., 2007; Parry et al., 2015; Scott, Considine, & Botti, 2014; Tyynismaa, Honkala, Airaksinen, Shermock, & Lehtonen, 2017), with omission errors being the most common type of administration cited in multiple sources (Fitzhenry et al., 2007; Grissinger, 2017; Scott et al., 2014).

According to Grissinger (2017), “drug omission can be defined as an event in which a medication is not provided to a patient, because the medication has either not been prescribed or has not been administered” (p. 66). Put even more simply, a drug omission error occurs when a patient needs to receive is not administered for any myriad of reasons.

One can extrapolate from this information, that medication administration errors, and MOEs in particular, are common. In fact, Grissinger (2017), notes that MOEs affect up to 17% of patients, and possibly even 20% of all medications prescribed in an acute care setting (p. 66). Of these MOEs, many are related to high-risk medications. In one study as high as 24% of unexcused omissions involved high risk medications (Munzner, Welch & Richardson, 2012). In fact, very commonly administered medications are in the top five high-risk medications that result in patient harm such as anticoagulants, antibacterials, and antipsychotics (Newbould, Meur, Goedecke & Kurz, 2017; Tyynismaa et al., 2017).

Choi et al. (2016), mentions that $3.5 billion is spent on medication errors annually (p. 428). These costs are not just related to increased length of stay or acute care costs. They also lie within the time and resources diverted to correcting medication errors that do not cause any
patient harm (Choi et al., 2016). With MOEs affecting so many and costing so much money, why does such little data exist on this issue?

**Difficulty of Studying Omission Errors**

There are multiple reasons that MOE’s are difficult to study. Some reasons seem obvious, but others less conspicuous. In this section, reasons including cost of direct observation studies, legal issues, classification of errors, and error reporting will be examined.

**Direct Observation Studies**

Berdot et al. (2016) wrote a systematic review of medication administration errors and concluded that direct observation methods are the gold standard of study design for accurate representation of medication errors. Out of 5,306 studies identified, by Berdot et al. (2016), only 7 studies met this gold standard (p. 344). Additionally, Berdot et al. (2016), noted that nearly all medication error studies “had a high risk of bias in at least one domain. The most common source of bias risk was a lack of blinding to outcome” (p. 345).

Direct observation studies utilize trained personnel (often pharmacy students) to follow healthcare staff and directly witness and record medication administration, typically under the guise of doing some other task to minimize the Hawthorn effect (Berdot et al., 2016). This is obviously costly, requires a lot of permissions, and is limited in scope each time.

**Legal Issues**

Although anecdotally mentioned in multiple articles something that certainly warrants further attention, is the effect of litigation or threat of litigation on research in this area (Lasseter & Warnick, 2003; Newbold et al., 2017; Wolf, 2016). One study specifically mentions having litigation possibly skewing their data pool (Newbold et al., 2017). Interestingly, this litigation wariness was not only present in American studies (Wolf, 2016), but was also featured in
European studies (Newbold et al., 2017). Unfortunately, the actual impact of litigation or fear of litigation on research in this area is not expanded upon. How much data may be excluded by pending litigation or sealed medical records is also unclear.

**Classification of Errors**

Another common issue that this author encountered is the plethora of categories in which medication errors are divided up. While there are common themes and agreements on general categories, multiple researchers with multiple methods of study, have multiple categories of medication errors that may or may not fit anyone else’s design. Specifically, when it comes to MOEs, much of these omissions are not considered true errors if they can be rationally explained secondary to patient refusal, contraindication, or clinical decision making at the sharp-end of treatment (Coleman, McDowell & Ferner, 2012). However, as any healthcare provider can attest to, not all decisions made at the administration point of treatment are correct. In these instances, if a medication is omitted for whatever reason, it falls under the definition of an MOE, although it may not be recorded as such.

Most authors divide omission errors into two and sometimes three separate categories of the medication-use process. Grissinger (2017), describes three main categories, prescribing MOEs, in which an order is not written, transcribing MOEs, in which documentation after the prescribing process is lost or not transferred, and admission MOEs, which occur at the sharp-end of service. The latter is the most common type of MOE and the focus of this article (p. 67-68). Lasetter et al. (2003), classified MOEs as different types of timing errors when analyzing prior studies, which further obfuscates generally accepted terminology when searching for this type of data.
THE COST OF MEDICATION OMISSION ERRORS

Reporting Medication Errors

Lastly, identification of most medication errors relies on voluntary reporting, to which there are many barriers (Farag, Blegen, Gedney-Lose, & Perkhounkova, 2017). The most common barriers are related to time constraints and punishments (Choi et al., 2016, p. 343), although other reasons like humiliation and retaliation from peers or superiors play a part as well (Farang et al., 2017). Generally, most studies agree that a just culture in an organization that shifts from a punitive culture increases overall voluntary reporting (Farang et al., 2017; Newbould et al., 2017; Wolf, 2016). Interestingly, Tyynismaa et al. (2017), suggested that medication errors are rarely captured at all, with a mere 14% of all medication errors reported through voluntary tools (p. 7).

The Actual Cost of Medication Omission Errors

Costs vary widely regarding medication errors with some studies suggesting costs exceeding $33,000 in hospitalization costs per event if they cause an adverse medication reaction (Muroi, Shen, & Angosta, 2016). In contrast, Choi et al. (2016), noted that prior studies estimated that medication errors could cost as little as $89 per event. Although through a robust analyzation of cost, they ultimately concluded that each medication error likely increases costs by about 8% or $7000 per hospitalization (Choi et al., 2016 p. 434). However, almost no one can agree on even a range of costs.

Many authors’ focus is away from cost entirely, focusing mostly on either the causes and/or the prevention of the errors (Farag et al., 2017; Fitzhenry et al., 2007; McMullen et al., 2017; Munzner, Welch & Richardson, 2012; O’Shea, Spalding & Carter, 2009).

Complicating this issue is what constitutes costs and how they are calculated. For example, many studies focus on cost only if an adverse event or other complication occurred and
few focus on costs due to diverted resources and time to address the error itself (Choi et al.,
2016; McCarthy, Tuiskula, Driscoll & Davis, 2017). Notably, although The Joint Commission
(2018), has recorded over 13,500 sentinel events over the last 22 years, none of the articles in
this review discuss the cost of or feature a sentinel event, which one would assume to be the
costliest consequence of a medication error.

**Causes of Medication Omission Errors**

Parry, Barriball & While (2015), note that medication administration is possibly the most
dangerous aspect of bedside nursing. Two studies highlight the vulnerability of the Registered
Nurse (RN) at the administration end of the medication use process as nurses are the last defense
between a patient and an incorrect medication administration (Muroi, Shen & Angosta, 2016;
Wolf, 2016). At the administration end of the medication use process there are a few common
themes that contribute the most to error when it comes to nursing practice itself. These themes
include increase in patient acuity and workload and the role of technology.

Many studies correlate an increase in medication errors, including omission errors, with
an increase in patient acuity and workload (Lassetter & Warnick, 2003; Muroi, Shen & Angosta,
2016; Newbould et al., 2017; Parry, Barriball & While, 2015; Tyynismaa et al., 2017; Wolf,
2016). Part of the workload distribution and acuity issues can also be linked to inadequate
staffing and lack of experienced RN’s on a particular unit. Scott, Considine & Botti (2014) noted
that omission errors increased by over 19% when there were one or more unfilled nursing
positions on just one shift in the Emergency Department.

The role of technology in healthcare, especially medication administration, is ever
increasing. Many studies suggest computerized physician order entry (CPOE) also contribute
their own errors into the medication use process through complexity of design, built-in work-
arounds, or inherent errors in the programs themselves (Fitzhenry et al., 2007, Grissinger, 2017; Riaz & Latif, 2017).

**Recommendations to Address Medication Omission Errors**

Two common recommendations in literature for reducing medication errors is the need for some type of continuing education with or without simulation-based learning experiences (Muroi, Shen & Angosta, 2016; Tyynismaa et al., 2017), and the need for overall increased communication efforts between interdisciplinary healthcare staff (Fitzhenry et al, 2007; Lassetter & Warnick, 2003). Most studies recommend computerized physician order entry (CPOE) and barcode medication administration (BCMA) systems for reducing medication errors (Fitzhenry et al., 2007; Grissinger, 2017; Muroi, Shen & Angosta, 2016; Riaz & Latif, 2017). As medication administration becomes more complex with new delivery systems, the communication and the training associated with them also needs to be clear and effective.

**Discussion**

After reviewing the literature about MOEs, several discussion points emerge, including, medication errors are expensive, result in real patient harm, are sometimes preventable, and have been an ongoing problem (Muroi, Shen & Angosta, 2016; Parry, Barriball & While, 2015). Despite the wide range of numbers, medication errors are costly. Even when examining the low range, the result annually is typically in the billions of dollars in the United States alone. These dollars are not just wasted from federal, insurance, and hospital dollars, but directly cost patients, families, and even non-profit organizations money. Like all money losing propositions, the so-called buck is passed on to the consumer through increased taxes, insurance premiums, and out-of-pocket expenses (McCarthy et al. 2017).
Money aside, many of these MOEs result in real patient harm. This exists on a continuum from mild harm like increased monitoring for tachycardia, to sentinel events resulting in death or permanent dysfunction. There exists also the opportunity cost of missed care and earlier rehabilitation/recovery efforts, much of which cannot be accurately calculated as a hypothetical.

Technically, most of these errors are preventable (Muroi, Shen & Angosta, 2016). That is to say, that under the right institutional culture with adequate training, vigilance, and technology, the literature states that the majority of omission errors could be eliminated (Muroi, Shen & Angosta, 2016).

These errors are not new, however. Neither are the reasons for their occurrence. Technology aside, inadequate staffing, lack of training, and poor communication are issues for nearly all professions. In healthcare, the stakes are higher, therefore the mistakes costlier, both in dollars and in human life. Despite these common recommendations for improvement there is no formal consensus on how to improve these chronic conditions of humanity. Much of it seems to drive at some impossible way to enlighten healthcare practitioners while simultaneously balancing the acuity of our overburdened healthcare system. These are fundamental issues which plague most of the healthcare industry and remain unsolved, but not for lack of effort.

**Unanswered Questions**

Is it possible that we have reached a nadir in technology and human behavior for reducing medication errors? Are the increases that we see in errors simply due to increased willingness to report errors as a result of improved just culture in organizations? After all, theoretically, reports of errors should increase if the literature is correct about shifting from a train and blame culture to a non-punitive environment (Farag et al., 2017; Lassetter & Warnick, 2003).
Without some type of as-yet undiscovered paradigm shift or innovation, are humans doomed to repeat the same errors over and over again as part of our inherently fallible nature? There are thousands of articles reaching back decades discussing the same problems with medication errors over and over again. Even the technology we add to reduce errors contribute to errors themselves because they are designed and programmed by humans.

Humans make mistakes all the time, it is part of how we learn. Healthcare providers continue to take care of increasingly higher acuity patients with multiple comorbidities and complex courses of care. Twenty years ago, many of these comorbidities would have been considered end-of-life conditions. Now people can live decades with them, cheating death every day with modern technology and medicine. As complexity grows we open ourselves up to greater numbers of opportunities to make mistakes. As much as we strive for perfect care and good outcomes, this is not always a realistic goal.

Also, we should never forget that dangerous things are dangerous. High-risk medications are dangerous by design, giving these medications to a high acuity patient makes them even more dangerous. Unfortunately, many healthcare providers have resigned dangerous drugs and situations to an unexceptional and typical status. After all, it isn’t uncommon for one patient to receive multiple high-risk medications at once. It isn’t even unusual for all of a nurse’s assigned patients in one shift to receive high-risk medications multiple times during that shift.

**Conclusion**

Continual research in this area of MOEs, perhaps examining sensitive topics such as the effect of ongoing litigation involving medication errors, should be pursued. Adequate staffing and a balanced acuity distribution is a common-sense issue that is not so common. Decades of evidence support this, however, in reality this is very difficult to achieve.
This author suggests a three-fold strategy for combatting MOE’s: 1) Establish a non-punitive just culture; good habits cannot blossom without a nourishing milieu, 2) Encourage an autodidactic ethos within your organization that includes self-reflective behaviors, and 3) Do not lean on technology as the last barrier between the patient and the medications they receive; a vigilant human eye should always be the final check.
Reference


