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After the Medication Error: Recent Nursing Graduates' Reflections on Adequacy of Education

Linda A. Treiber, *Kennesaw State University*
Jackie H. Jones, *Kennesaw State University*

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Linda A. Treiber, PhD, MSN; and Jackie H. Jones, EdD, MSN

ABSTRACT

Background: The purpose of this study was to better understand individual- and system-level factors surrounding making a medication error from the perspective of recent Bachelor of Science in Nursing graduates. **Method:** Online survey mixed-methods items included perceptions of adequacy of preparatory nursing education, contributory variables, emotional responses, and treatment by employer following the error. **Results:** Of the 168 respondents, 55% had made a medication error. Errors resulted from inexperience, rushing, technology, staffing, and patient acuity. Twenty-four percent did not report their errors. Key themes for improving education included more practice in varied clinical areas, intensive pharmacological preparation, practical instruction in functioning within the health care environment, and coping after making medication errors. **Conclusion:** Errors generally caused emotional distress in the error maker. Overall, perceived treatment after the error reflected supportive environments, where nurses were generally treated with respect, fair treatment, and understanding. Opportunities for nursing education include second victim awareness and reinforcing professional practice standards. [*J Nurs Educ.* 2018;57(5):275-280.]

Dr. Treiber is Professor of Sociology, Department of Sociology and Criminal Justice, and Dr. Jones is Professor of Nursing, WellStar School of Nursing, Kennesaw State University, Kennesaw, Georgia.

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Address correspondence to Linda A. Treiber, PhD, MSN, Professor of Sociology, Department of Sociology and Criminal Justice, WellStar School of Nursing, Kennesaw State University, 402 Bartow Ave. NW, MD#2204, Kennesaw, GA 30144; e-mail: ltreiber@kennesaw.edu.

As many reports have noted, medical errors are frequent, costly, and a leading cause of death in the United States (Kohn, Corrigan, & Donaldson, 1999; Makary & Daniel, 2016). Unfortunately, their incidence has been vastly underestimated, making it impossible to quantify with any degree of accuracy (Makary & Daniel, 2016). Medication administration errors represent a significant percentage of all medical errors ranging from sentinel events (i.e., those that cause death) to those with less severe consequences (Anderson & Townsend, 2015; Aspden, Wolcott, Bootman, & Cronenwett, 2007; Keers, Williams, Cooke, & Ashcroft, 2013b). As the health care provider most likely to directly administer medications to patients, nurses are frequently involved in these events (Koehn, Ebright, & Draucker, 2016).

When an error occurs, blame is often assigned at the individual or personal level (Perrow, 1984; Reason, 2000). Medication errors are considered to be human errors, thought to arise from knowledge deficits, negligence, carelessness, or lack of concern (Mattox, 2012; Page, 2004). Indeed, some errors are caused by reckless behavior, but other errors are inadvertent or the result of failure to correctly assess the risks of the situation (Marx, 2001). Nurses often blame themselves for such failures, feeling guilty regardless of whether the error resulted in harm to the patient (Jones & Treiber, 2010). As a result, some may fail to report their errors, fearing punishment or disciplinary action (American Nurses Association Board of Directors, 2010; Unver, Tastan, & Akbayrak, 2012). Making an error can be devastating to any nurse, leading to questioning his or her own competence and skill (Scott, 2015; Scott et al., 2009). This is particularly salient when the nurse is new to the profession (Unver et al., 2012).

Despite the negative impact of making a medication error on one's nursing career, relatively little in the nursing curriculum prepares new graduates to cope with these events or their aftermath (Dolansky, Druschel, Helba, & Courtney, 2013). Although nursing education is mandated to instruct students in safe medication practices, questions of adequacy remain: Is it good enough? Is there more that can be done? The answers to such questions can best be obtained from recent nursing graduates.

System-level approaches acknowledge that errors result from the failure of safety systems designed to protect against

them. Thus, errors can be expected in tightly coupled, complex systems (Perrow, 1984; Reason, 2000). When asked to provide details of an error event, nurses identify multiple system-level causes, including interruptions, time pressures, staffing, fatigue, and unfamiliarity with, or malfunctioning of, technologies such as computers, infusion pumps, and automated medication-dispensing machines (Cohen, 2014; Keers, Williams, Cooke, & Ashcroft, 2013a; Westbrook, Rob, Woods, & Parry, 2011). When the context and complexities of the nursing environment are considered, the error, although regrettable and even tragic, is better understood. Nevertheless, nurses still blame themselves.

In 2010, the American Nurses Association Board of Directors (2010) adopted the position that the health care environment should operate under a Just Culture framework to improve patient safety (American Nurses Association Board of Directors, 2010). As outlined by David Marx (2001), the Just Culture model recognizes that errors can be the result of problems with the system and encourages reporting of errors and near misses, so as to better determine underlying root causes and identify possible remedies. Although the Just Culture framework supports a non-punitive environment, advocates maintain that when errors are the result of negligent or reckless actions, negative sanctions should occur (American Nurses Association Board of Directors, 2010; Marx, 2001). Many health care organizations have subsequently embraced the Just Culture concept, one that balances safety and accountability (Dekker, 2012).

The *second victim phenomenon* refers to those in health care who have made errors and subsequently are treated badly, often without regarding the reason for the mistake. Dr. Albert Wu (2000) initially coined the term in reference to a young physician who had made an error and then was harshly singled out for his actions by colleagues. It subsequently became clear that all health care providers, including nurses, are at risk of becoming second victims (Dekker, 2013; Harrison et al., 2015; Scott et al., 2009; Seys et al., 2013).

How the nurse is treated after making an error can be a critical component of the recovery process (Scott, 2015; Scott & McCoig, 2016). According to Dr. Charles Denham (2007), "few organizations provide a systematic approach to care for those involved in unintentional events that harm patients" (2007, p. 108). Denham (2007) advocated a five rights of the second victim model, organized by the TRUST acronym: Treatment that is just, Respectful, Understanding and compassionate, Supportive, in an environment of Transparency that provides an opportunity to problem solve (Denham, 2007). Unfortunately, even when TRUST is present, obstacles exist that erode the support received. For example, individuals may be reluctant to use support services, fearing the stigma attached to mental health care (Edrees, Paine, Feroli, & Wu, 2011). There may also be fears related to confidentiality, efficacy, and judgment by colleagues (White et al., 2015).

The goal of the current study was to understand recent nursing school graduates' perceptions of adequacy of nursing education, their experiences after making medication errors, and subsequent organizational responses. The authors also sought to gain greater understanding of individual- and system-level factors in medication administration practice, particularly from the perspective of those new to the nursing field.

METHOD

The study used a descriptive mixed-methods approach employing both qualitative and quantitative items. Data were collected using a survey that was distributed in February 2015 to graduates of a large state-sponsored Bachelor of Science in Nursing (BSN) program in the southeastern United States.

A multipart 12-question survey instrument was developed based on the review of relevant literature. Demographic items included gender, race/ethnicity, type of facility of current practice, and current position. Following the demographics, the first part of the instrument addressed the BSN curriculum, including perceptions of preparation adequacy for a clinical environment and how the BSN program could be improved. The second part incorporated questions about making a medication administration error since becoming an RN. As applicable, these included a description of the error, contributing factors, feelings about making an error, and how the nurse was treated after making an error.

Prior to distribution, the survey was piloted among university faculty both in and outside of the school of nursing. Based on their feedback, items were adjusted to improve clarity and face validity. University institutional review board approval was received prior to distributing the survey. The survey link was sent via the e-mail addresses of recent BSN alumni using Qualtrics® software. If the e-mail was undeliverable, a hard copy of the survey and a return envelope were mailed through the U.S. postal service. Consent to participate was established by completion of the survey. All responses remained anonymous unless the respondent voluntarily offered information about future contact. All information remained confidential.

Quantitative items were analyzed using Qualtrics data tools and Microsoft Excel®. Open-ended text items were analyzed using NVivo 11 qualitative software. Narrative texts were examined for key themes, patterns, and trends. These included recent BSN graduates' opinions about how the nursing curriculum could be improved. For those who had made a medication error, accounts of the event were analyzed for details of the error, including type of medication, route of administration, contributing factors, situational context, and whether patient harm occurred. Descriptions of emotional responses and accompanying narratives were evaluated for common themes.

RESULTS

Surveys were sent to all 969 BSN graduates of our program for the years 2009-2013. Of these, we were able to deliver 842 surveys to either e-mail or physical addresses. A total of 168 responses were received, yielding a response rate of 19.95%. Response rates for the different cohorts ranged from 18.1% to 21.9%. The self-identified race and ethnicity of the respondents were White (71%), African American (11%), Hispanic (5%), Asian (5%), Native American (1%), other race or ethnicity (1%), and 6% were unidentified. The majority of the respondents were female (89%), and nearly all of the respondents (98%) were currently practicing nursing. The types of

employment included acute care (62%), intensive care (16%), clinic (7%), not currently practicing (2%), and other type of employment (13%). Employment types in the "other" category included home health/hospice, school nursing, psychiatric and behavioral, public health, and maternal health.

Adequacy of Nursing Education

All respondents were asked, "In your opinion, how could (the university's) nursing curriculum be improved to better prepare you for medication administration?" Although nearly three quarters of the respondents indicated that the nursing curriculum had prepared them well or very well to administer medications, most had ideas for improvement. We received 106 separate comments, from nurses who had made errors and who had not. Several key themes were evident.

More Practice With Medication Administration. The first theme that emerged was a request for more nursing instruction—more clinical hours, more hands-on practice, and more specific pharmacological education were among the top suggestions for improvement. Several respondents commented that they wanted varied experience outside the traditional medical–surgical areas. Respondents requested more experience administering medications of all types, particularly those given intravenously. Also noted was a need for more experience administering high-risk, vasoactive, and titrated medications.

Typical comments included:

- We practiced drawing up IV [intravenous] medications but had very little opportunity to give the medications. More could be done to allow practicing giving IV medications.
- Allowing more hands-on practice during practicums.
- Spend more time studying high-alert drugs such as heparin, insulin, and the heavy cardiac drugs that are pushed. Explaining to students why they are "high-alert" drugs would also help.
- Practice, practice, practice.

Real World Versus Classroom. Another theme was the dissimilarity between nursing instruction and the realities of practice. Several respondents indicated they felt unprepared to handle the stress and demands of giving multiple medications to multiple patients and that greater instruction on managing time pressure would have been helpful. One nurse who had made a medication error wrote of the need for "more focus on time management and how to handle stress—this has been a contributing factor to medication errors, in my opinion."

Others specified the need for medication administration training that was grounded in the "real world." For example, one nurse wrote, "focusing more on what real nursing is like, i.e., many distractions, multiple patients, phone calls, etc., would be helpful." Another stated that:

> The challenges in the "real world" of nursing practice go beyond simply knowledge of medication and how to give it. The challenge is having several patients, several with similar medications but different routes of administration, other nurses in the medication room with you, family members, and physicians with comments and questions. It's very overwhelming as a new nurse and very different than passing an [examination] about dosage calculations, needle size, drip rate.

One respondent commented that making a mistake was the ultimate teacher, asserting that "I don't really think that the pro-
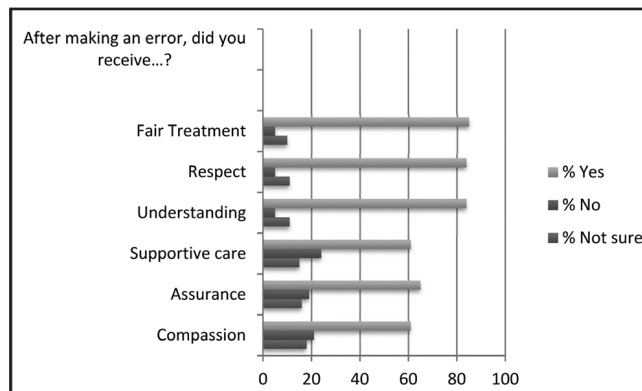

Figure. Nurse perception of treatment after making a medication error (*n* = 80).

gram could have prepared me better, it is just a matter of getting the experience. Unfortunately, sometimes it takes a mistake to learn a lesson."

Several nurses called for specific training for coping with making a medication error, including simulations in the skills laboratory, case-based scenarios, and panels of nurses who had made errors. Examples included:

- Prepare us for mistakes made by doctors, and pharmacy—many times meds [medications] are ordered and the patient has an allergy. Pharmacy can put the wrong med or dose in [the] computer.
- Reviewing litigations involving medication errors.
- A guest speaker—either a practicing RN or pharmacist—who could speak to actual errors made and how the situations were resolved would resonate with students preparing for practice.

Making an Error

Of the 168 respondents, over half (55%) indicated that they had made a medication error since becoming an RN. Five percent indicated that they were "not sure" if they had made an error. Approximately one quarter (24%), of the nurses indicated that the error had not been reported.

Respondents who had made an error were subsequently asked, "How did your facility react after you made a medication error? Would you say that your facility was supportive (counseling, additional training, etc.)? Would you say that your facility was punitive (written up, blamed, chastised, etc.)?" These were phrased as two separate multiple choice questions, each with *yes*, *no*, or *not sure* options. The majority thought their facility's reactions were supportive (*yes* = 79%, *no* = 8%, *not sure* = 14%). A small number found the environment punitive (*yes* = 11%, *no* = 75%, *not sure* = 15%).

Respondents who had made an error were presented with six multiple choice items reflective of Denham's (2007) second victims' rights. Each question could be answered with the options of *yes*, *no*, or *not sure* (**Figure**). The majority of the respondents indicated they had experienced fair treatment (85%), respect (84%), and understanding (84%) after making a medication error. Over half (61%) received supportive care. Nearly two thirds (65%) were assured there were multiple factors

	TABLE			
Nurse Perception of Treatment After Making a Medication Error				
Statement	**Agree** (**n**)	**Neither Agree Nor Disagree** (**n**)	**Disagree** (**n**)	**Total**
I was blamed for making the error.	18.75% (15)	42.50% (34)	38.75% (31)	80
I was included in future prevention efforts.	33.77% (26)	38.96% (30)	27.27% (21)	77
It was acknowledged that I had not made the error intentionally.	74.68% (59)	18.99% (15)	6.33% (5)	79
I was made aware of information (transparency).	64.94% (50)	28.57% (22)	6.49% (5)	77

contributing to the error. Over half (62%) reported they were treated with compassion.

Another series of multiple choice items assessed specific perceptions of treatment after making an error. Respondents were presented a list of statements and asked about their level of agreement on a three-item Likert scale (**Table**). Approximately one fifth (19%) of those making an error agreed that they had been blamed, although 42.5% expressed uncertainty, neither agreeing nor disagreeing with the statement. Three quarters (75%) agreed that it was acknowledged that the error had not been intentional, and the majority (65%) agreed that they had been made aware in a transparent way. However, only one third indicated they had been included in prevention efforts (34%).

Descriptions of Errors and Contributing Factors

Of those who had made an error, 71 respondents provided additional narratives of the event. Although there were cases where the patient suffered a change in status, there were no descriptions of long-term patient harm. A wide variety of medications were mentioned in the narratives. These included many high-risk intravenous and injectable drugs, such as heparin, insulin, sedatives, and narcotics. On the other end of the continuum were errors involving oral medications that could be purchased over the counter.

Because the survey focused on relatively new nurses, it was not surprising that "being new" was frequently mentioned as a contributing factor. Several noted the contrast between being on orientation and functioning on one's own with a full patient load. Others felt overwhelmed by high patient acuity, multiple medications, and low staffing.

New nurses sometimes commented that they should be performing at a higher level of competence, despite their inexperience. Many respondents mentioned being fatigued and making an error near the end of a long shift, when trying to help coworkers, or in the midst of a resuscitation code. Respondents also identified misunderstandings when receiving verbal orders from physicians. One nurse felt that pressure by a coworker led to the error, noting, "I was a new nurse on a busy unit. The nurse I was helping was very intimidating and I think I let a fear of making a bad impression cloud my judgment."

Rushing or hurrying due to time pressures were also contributing factors. This was often coupled with neglecting to "double check" themselves and others. Time pressures were also linked to loss of focus and distractions. For example:

- Being too busy and not following the 5 rights in totality.
- I did not scan the medication before giving as I usually do. I was in a rush.
- Being rushed and pulled in many different directions at the same time.
- The biggest factor was being rushed due to the emergent nature of the situation.

Errors that came about as a result of problems with malfunctioning technologies such as computers, intravenous medication pumps, scanners, and automatic medication dispensing machines were also noted. A frequent complaint was that hospital pharmacies sometimes placed the wrong medications in the dispensing machines. Others commented that changes in medication packaging or procedures led to the error. For example, one nurse noted that "hospital pharmacies change suppliers and medication vials may look different one day than they used to."

Emotions and Feelings

Nurses tended to have visceral reactions to making a medication administration error, regardless of error severity. Examples of this theme included, "It made me feel sick and the error never even reached the patient." Another nurse wrote, "As soon as a realized I had made the error I felt physically sick. I was disappointed in myself." Emotions included fear, anger, guilt, shame, and disappointment. Descriptors such as "horrible," "terrible," and "awful" were frequently offered to describe the nurse's emotional state.

A recurring theme was fear or concern about the well-being of the patient, often followed by an expression of fear for themselves. For example, a nurse wrote, "My immediate feelings were panic and fear. I was concerned about my patient, what the additional dose would do to her. Then I was worried about myself and what consequences I would face." Many expressed feelings of gratitude that the patient was not harmed.

The qualitative comments also revealed how the nurse had been treated after an error. Several nurses described the help and support they received. Some were assisted in monitoring the patient and notifying the appropriate practitioners and others received emotional support. For example:

> I realized it right after I had administered it and took a deep breath and went to tell my supervisor, who was very helpful and understanding. I then called the doctor, who was also understanding and gave no further orders.

There were few instances of negative treatment, with the exception of a traveling nurse who was new to that assignment and

"felt angry about the way I was treated after the error." Although personally distressed by the error, some nurses noted that reporting the error did not seem to elicit strong reactions from others. For example, a new nurse recounted that, "The senior nurse I reported it to did not seem too bothered." Another nurse noted that the physician indicated the error had actually helped the patient, as receiving the extra dose of medication "finally relieved her [the patient's] pain" and changed the order to accommodate the increased dosage.

In another example, the nurse wrote, the "error was never discussed with me. The doctor did not seem to care, the patient had no adverse reactions and no one (not charge nurse, manager, or anyone) ever spoke with me about the situation." In this case, it appeared that because there was no significant harm, there was no follow-up action.

Nonreporting of Errors

Nearly one quarter (24%) of the respondents indicated they did not report the medication error. Qualitative accounts offered a variety of rationales. Reasons included protecting themselves from shame and disciplinary action. Some also justified nonreporting in terms of being too busy and the paperwork was too time consuming. This was particularly the case if they judged the error to be nonserious. Examples include:

- I did not report the error…honestly, because I was scared, and my research on our medication sources at the hospital indicated that this would not result in any harm to the patient.
- Not reported. I did call it a "near miss" event and told my manager about it. I left out the detail where I actually administered the [medication].
- I did not report the error. I have heard of nurses having to take classes. I did not want to waste my time. The patient was for hospice and I did not feel the error made a difference.

Another nurse explained:

I'm not sure why we don't want to report. Maybe we have too many other tasks to complete or we just want to protect ourselves. The nursing culture is quite unique. The autonomy we have can actually be a double-edged sword.

DISCUSSION

The results demonstrate the complex nature of the problem of medication administration errors and its relationship to nursing education. The recently graduated nurses in this study identified both system-level and individual-level factors as contributors and offered suggestions on how the nursing curriculum might have helped them avoid the error. It is likely that self-blame and emotional distress resulted from personalizing the medication administration mistake. The negative emotions displayed bore this out. Nurses' ability to identify system level causes demonstrated an awareness that errors resulted from organizational factors beyond individual control.

System-level and individual-level factors are synergistic. Being new means that the nurse has not yet mastered the social environment and its subtle cues. A seasoned nurse might be able to decipher what the new graduate cannot, thus avoiding communication failure. Not knowing how to use technology,

or what to do when it malfunctions, also make an error more likely. It slows one down, thus adding to stress, which could lead to mistakes. Stress is an underlying factor, which can turn a positive challenge into a tragedy as a result. It is appropriate to feel bad after making an error and appropriate to put it into context and learn from the mistake.

Although the researchers did not ask about it, many respondents commented on how the patient was not harmed. It was as if the nurses were trying to reassure themselves (and the researchers) that there were no serious aftereffects. Patient well-being and safety seemed to be the number one priority, which is consistent with the patient advocate role.

In this analysis, we not only asked nurses if they had made an error, we also asked if it had been reported. The number of errors made was not necessarily surprising, nor was the percentage of errors not reported. Reasons for failing to report included fear, perception that the error was not serious, and the reporting processes were time consuming. It is plausible that nurses know whether their error would likely cause patient harm, but using their own judgment on whether to report it could lead to a slippery slope. Although there is support for second victim rights and a nonpunitive culture, an environment that fails to take medication errors seriously is problematic. To normalize nonreporting would take this a step too far. As greater transparency with the Just Culture occurs, it is hoped that reporting of errors would improve in health care organizations.

A somewhat unexpected finding was the positive treatment after the error event. For the most part, respondents reported largely nonpunitive environments, and in most cases, the five rights of the second victim identified by Denham (2007) had been observed. Of note, the qualitative analyses revealed that although many feared reporting the error, the consequences were not harsh, thus confirming the quantitative findings of nonpunitive environments. This absence of blaming and shaming may be evidence of the more recent focus on examining flaws in systems that create environments where errors are likely to happen.

Several nurses described making an error and then discussing it with their supervisor or preceptor and subsequently receiving reassurance, rather than ostracism or punishment. Some noted that doctors and coworkers judged the error to be of little to no concern. Should we conclude that most of the punishment from making an error comes from within?

Much has been written about the second victim phenomenon and the resultant stigma. The literature often points to an external focus—that the nurse is a victim because of the bad treatment by others. However, second victim suffering is also internal—that is, a nurse could feel badly about making an error even if no one else knew about it.

How can nursing education help? This analysis revealed that former students wanted more time to practice before setting out on their own. More information on medications was also requested. Helping prepare new graduates for multitasking and communicating with other members of the health care team could make errors less frequent. Offering specific instruction into how to cope with making a medication error in the clinical environment is sensible.

Limitations

Because this study queried only graduates of a single nursing program, results might not be generalizable. The survey instrument (developed by the authors) could be refined to clarify key terms and garner additional descriptive and explanatory data. The findings can be applied to the study program in terms of improving nursing education and medication administration. Subsequent research will build on this initial study.

CONCLUSION

The preceding analysis also makes clear that there is an important role for nursing education in the prevention of medication administration errors. Our research suggests several avenues for intervention. First, nurse educators must be mindful of the second victim phenomenon. There is no doubt that it harms nurses, but it is also important to stress that medication administration errors are serious. As advocated by the American Nurses Association Board of Directors, the balanced accountability of a Just Culture seeks to determine what circumstances contributed to the error rather than focusing on individual blame (American Nurses Association Board of Directors, 2010; Dekker, 2012; Marx, 2001). Responses should include a balance of punitive and nonjudgmental actions. No one wants nurses to be traumatized by medication errors, but neither should we fail to recognize and remedy problematic behaviors.

Second, graduates need to feel empowered to recognize structural and system-level contributing factors. System-level problems cannot continue to be seen as business as usual, but instead must be changed upon discovery with the recognition that sometimes system-level changes can have unintended consequences. In these cases, honest appraisals must be made.

Third, as others have suggested, it is important to stress the essentials of best practices, such as independent double checks for high-risk medications, managing care effectively, and advocating for safety in a clinical environment (Armstrong & Barton, 2012; Baldwin & Walsh, 2014). However, despite our best efforts, errors will be made. Therefore, graduate nurses will need skills for handling the aftermath of making an error. Successfully helping them navigate the experience would be an important contribution to nursing education.

REFERENCES

American Nurses Association Board of Directors. (2010). *Position statement*. Retrieved from http://nursingworld.org/psjustculture

Anderson, P., & Townsend, T. (2015). Preventing high-alert medication errors in hospital patients. *American Nurse Today, 10*(5), 18-23.

Armstrong, G., & Barton, A. (2012). Fundamentally updating fundamentals. *Journal of Professional Nursing, 29*, 82-87. https://doi.org/10.1016/j.profnurs.2012.12.006

Aspden, P., Wolcott, J.A., Bootman, J.L., & Cronenwett, L.R. (2007). *Preventing medication errors*. Washington, DC: National Academies Press.

Baldwin, K., & Walsh, V. (2014). Independent double-checks for high-alert medications: Essential practice. *Nursing, 44*(4), 65-67. doi:10.1097/01.NURSE.0000444547.64972.dc

Cohen, M.R. (2014). Medication errors. *Nursing, 44*(4), 72. doi:10.1097/01.NURSE.0000444551.88666.9d

Dekker, S. (2012). *Just culture: Balancing safety and accountability* (2nd ed.). Boca Raton, FL: CRC Press.

Dekker, S. (2013). *Second victim: Error, guilt, trauma, and resilience*. Boca Raton, FL: CRC Press.

Denham, C.R. (2007). Trust: The 5 rights of the second victim. *Journal of Patient Safety, 3,* 107-119.

Dolansky, M.A., Druschel, K., Helba, M., & Courtney, K. (2013). Nursing student medication errors: A case study using root cause analysis. *Journal of Professional Nursing, 29*, 102-108. https://doi.org/10.1016/j.profnurs.2012.12.010

Edrees, H.H., Paine, L.A., Feroli, E.R., & Wu, A.W. (2011). Health care workers as second victims of medical errors. *Polskie Archiwum Medycyny Wewnetrenej, 121*, 101-108.

Harrison, R., Lawton, R., Perlo, J., Gardner, P., Armitage, G., & Shapiro, J. (2015). Emotion and coping in the aftermath of medical error: A cross-country exploration. *Journal of Patient Safety, 11*, 28-35. doi:10.1097/PTS.0b013e3182979b6f

Jones, J.H., & Treiber, L. (2010). When the 5 rights go wrong: Medication errors from the nursing perspective. *Journal of Nursing Care Quality, 25*, 240-247. doi:10.1097/NCQ.0b013e3181d5b948

Keers, R.N., Williams, S.D., Cooke, J., & Ashcroft, D.M. (2013a). Causes of medication administration errors in hospitals: A systematic review of quantitative and qualitative evidence. *Drug Safety, 36*, 1045-1067. doi:0.1007/s40264-013-0090-2

Keers, R.N., Williams, S.D., Cooke, J., & Ashcroft, D.M. (2013b). Prevalence and nature of medication administration errors in health care settings: A systematic review of direct observational evidence. *The Annals of Pharmacotherapy, 47*, 237-256. doi:10.1345/aph.1R147

Koehn, A.R., Ebright, P.R., & Draucker, C.B. (2016). Nurses' experiences with errors in nursing. *Nursing Outlook, 64*, 566-574. http://dx.doi.org/10.1016/j.outlook.2016.05.012

Kohn, L.T., Corrigan, J.M., & Donaldson, M.S. (Eds.). (1999). *To err is human: Building a safer health system*. Washington, DC: National Academies Press.

Makary, M.A., & Daniel, M. (2016). Medical error—The third leading cause of death in the U.S. *BMJ, 353*(i2139). http://dx.doi.org/10.1136/bmj.i2139

Marx, D. (2001). *Patient safety and the "just culture": A primer for health care executives*. New York, NY: Columbia University.

Mattox, E.A. (2012). Strategies for improving patient safety: Linking task type to error type. *Critical Care Nurse, 32*(1), 52-78. doi:10.4037/ccn2012303

Page, A. (Ed.). (2004). *Keeping patients safe: Transforming the work environment of nurses*. Washington, DC: National Academies Press.

Perrow, C. (1984). *Normal accidents: Living with high-risk technologies*. New York, NY: Basic Books.

Reason, J. (2000). Human error: Models and management. *BMJ, 320*, 768-770.

Scott, S.D. (2015). Second victim support: Implications for patient safety attitudes and perceptions. *Patient Safety & Quality Healthcare, 12*(5), 26-31.

Scott, S.D., Hirschinger, L.E., Cox, K.R., McCoig, M., Brandt, J., & Hall, L.W. (2009). The natural history of recovery for the healthcare provider "second victim" after adverse patient events. *Quality & Safety in Healthcare, 18*, 325-330.

Scott, S.D., & McCoig, M.M. (2016). Care at the point of impact: Insights into the second-victim experience. *Journal of Healthcare Risk Management, 35*(4), 6-13. doi:10.1002/jhrm.21218

Seys, D., Wu, A.W., Van Gerven, E., Vleugels, A., Euwema, M., Panella, M., . . . Vanhaecht, K. (2013). Health care professionals as second victims after adverse events: A systematic review. *Evaluation & the Health Professions, 36*, 135-162. doi:10.1177/0163278712458918

Unver, V., Tastan, S., & Akbayrak, N. (2012). Medication errors: Perspectives of newly graduated and experienced nurses. *International Journal of Nursing Practice, 18*, 317-324. doi:10.1111/j.1440-172X.2012.02052.x

Westbrook, J.I., Rob, M.I., Woods, A., & Parry, D. (2011). Errors in the administration of intravenous medications in hospital and the role of correct procedures and nurse experience. *BMJ Quality & Safety, 20*, 1027-1034. doi:10.1136/bmjqs-2011-000089

White, A.A., Brock, D.M., McCotter, P.I., Hofeldt, R., Edrees H.H., Wu, A.W., . . . Gallagher, T.H. (2015). Risk managers' descriptions of programs to support second victims after adverse events. *Journal of Healthcare Risk Management, 34*(4), 30-40. doi:10.1002/jhrm.21169

Wu, A.W. (2000). Medical error: The second victim: The doctor who makes the mistake needs help too. *BMJ, 320*, 726-727.