J Nurs Care Qual
Vol. 31, No. 4, pp. 335–341

Nursing Strategies to Increase Medication Safety in Inpatient Settings

CE 2.0 Contact Hours

Katherine Bravo, PhD, RN, CPNP-PC; Gary Cochran, PharmD, SM; Ryan Barrett, MS

Using data obtained through 2 multidisciplinary studies focused on medication safety effectiveness, this article provides nursing recommendations to decrease medication delivery errors. Strategies to minimize and address interruptions/distractions are proposed for the 3 most problematic time frames in which medication errors typically arise: medication acquisition, transportation, and bedside delivery. With planned interventions such as programmed scripts and hospital-based protocols to manage interruptions and distractions, patient safety can be maintained in the inpatient setting.
Key words: *critical access hospitals*, *distractions*, *interruptions*, *medication administration*, *medication safety*, *nursing*

INCREASED PUBLIC AND PRIVATE AWARENESS related to patient safety has generated many calls to eliminate health care–associated errors[1] and decrease costs associated with these errors.[2] Medication safety is one area that is consistently cited as problematic and constitutes the most frequent type of nursing error in inpatient settings.[3] Drug administration is a subset of medication errors and can be an area in which the most devastating problems occur. Medication administration errors are costly in terms of both patient safety[4] and financial implications.[5] Current research indicates that every time a hospital-based medication error is intercepted, $7000 is saved.[6] Interruptions and distractions occurring during drug delivery processes are common contributors to medication administration errors.[7,8]

Developing processes to minimize distractions and lend structure during hectic periods of time will allow nurses to deliver care that is timely and free of errors. This article describes interruptions and distractions identified during observed inpatient medication passes in Midwestern rural hospital settings. Considering these data, nursing-based recommendations are provided to decrease interruptions during medication delivery periods.

METHODS

Initial study data pertaining to medication delivery was obtained from 12 critical access hospital sites that participated in 2 multidisciplinary studies on medication safety effectiveness.[9] On-site pharmacy support and nursing practices in medication delivery were the focus of these studies. After institutional review board approval was obtained for each participating site, medication errors were identified using the direct observation methodology. Training was provided by the CALNOC (Collaborative Alliance for

Author Affiliations: *College of Nursing (Dr Bravo), College of Pharmacy (Dr Cochran), University of Nebraska Medical Center, Omaha. Mr Barrett was affiliated with institute for Clinical Outcomes Research during this study.*

The authors declare no conflict of interest.

Correspondence: *Katherine Bravo, PhD, RN, CPNP-PC, College of Nursing, University of Nebraska Medical Center, Omaha, NE 68198 (kbravo@unmc.edu).*

Accepted for publication: February 7, 2016

Published ahead of print: March 3, 2016

DOI: 10.1097/NCQ.0000000000000181

Nursing Outcome) personnel. The reliability of data collection techniques was verified by the CALNOC professionals before allowing the data gatherers to participate. During these studies, the specially trained nurses and nurse managers working at each facility observed 6497 medications passed to 1374 unique patients. Detailed information including patient demographics, inpatient unit of care, and nursing workload on each shift was recorded for each medication administered. Also, any associated interruptions and/or distractions were recorded and categorized into location of occurrence and action.

Location (pharmacy, medication room, medication cart, nurse station, unit, bedside) and nurse activity (acquisition, preparation, transportation, administration) were recorded for each interruption. If an interruption occurred during the medication pass, the observer recorded who was involved in the event (nurse, patient, physician, family/visitor, other discipline) and whether it was a routine or urgent matter. A free-text general comments field was available to the study observers to record any additional factors pertaining to the specific medication pass and/or interruption. These free-text comments were reviewed by the first author to identify trends and common themes. Descriptive statistics were prepared using SAS 9.2 (SAS Institute, Cary, North Carolina).

RESULTS

Combined data from our 2 studies indicate that there were 848 patients who experienced medication passes without recorded interruptions or distractions. However, there were 526 patients who had interruptions and/or distractions during their medication administration times. Of those patients, the average number of interruptions/distractions was 1.4 per patient. The interruptions were dichotomized into routine or urgent, with the latter comprising 8.3% of the total number of interruptions.

Interruptions and distractions were recorded by location and activity. The most frequent location for an interruption to occur was the patient bedside, followed by the medication room and the hospital unit (Table). Examples of interruptions that occurred at the bedside are need for patient and/or family education, patient request for toileting assistance, and coordination of patient schedules with other members of the health care team. Medication room interruptions were the second most prevalent in our studies. An example of a distraction occurring in the medication preparation area was miscellaneous banter by other nurses unrelated to medication administration protocols. An interruption taking place on the hospital unit was the third most common

Table. Location and Type of Nursing Activity During Interruptions/Distractions[a]

Location of Interruption/Distraction, n (%)		Activity During Interruption/Distraction, n (%)	
Patient bedside	366 (46.06)	Administration	345 (46.25)
Med room	203 (27.21)	Acquisition	190 (25.47)
Hospital unit	101 (13.54)	Transportation	120 (16.09)
Nurses station	34 (4.56)	Preparation	88 (11.80)
Med cart	32 (4.29)	Unrecorded activity	3 (0.40)
Pharmacy	9 (1.21)		
Unrecorded location	1 (0.13)		

[a]Total number = 746.

location for an interruption to occur. An example in that category was the nurse moving toward the patient room to deliver medications but being stopped by a provider to give additional patient orders or clarify a patient status.

The nursing actions identified during interruptions, in order of prevalence, were medication administration, medication procurement and acquisition, and transportation of medications. Examples of distractions that occurred during medication administration were patients and family members who talked during the delivery period and those who requested to delay medications so that they could finish meals. Difficulty with medication acquisition and preparation were the second most common activities in which interruptions occurred. Problems with automated dispensing cabinets (low stock, no stock) and forgetting necessary equipment (pill cutters, intravenous pumps, etc) were noted.

Observers also recorded who initiated the interruptions. Nurses initiated the majority of interruptions (43.3%). This included occasions when they interrupted their own medication passes due to competing demands and being interrupted by other nurses. Other common parties initiating interruptions were fellow members of the health care team (25.1%), patients (18.1%), and family and/or visitors (7.6%).

The overall medication error rate was very low for these combined studies. Of 6497 observations, there were 44 errors that reached a patient (0.8%). This translates to approximately 3% of patients who experienced a medication error in our studies. The most common error types were wrong dose and omission. Human factors and communication were the 2 most frequently identified causes of errors in our studies.[9]

DISCUSSION

Strategies to address

Work interruptions are described as stemming from a secondary task within a multitask environment. Attention needs to be diverted from the original task to monitor or attend to the secondary task.[10] In nursing, work interruptions are expected and oftentimes innocently encouraged as nurses instruct the patients and families to "call if they need anything." Nurses are expected to be visible, willing, and ready to lend a hand to assist others on their work teams. While this type of behavior contributes to a collegial work environment, it also can predispose the nurse to information overload and costly interruptions. Novice nurses may be especially vulnerable to workplace interruptions as they are acclimating to a new environment and accompanying role expectations. To overcome the interruptions commonly encountered in an inpatient unit, this article proposes 2 different strategies: a programmed script to raise awareness of the need for interruption-free time during medication delivery periods and implementation of a hospital-based protocol such as the 3 Ds of Distraction Management to manage the inevitable distractions that occur.

As patients and families enter inpatient settings, they are most likely focused on their own health status and recovery. Consumers expect prompt attention and care by health care providers. Whenever possible, the health care team, specifically those assisting patients with admission duties, should use language to raise awareness of patient safety standards. Creation of a specific script to address interruptions can help nurses remain professional in their interactions with patients, families, and other members of the health care team. Clear language to assure the patient that their needs and concerns are important is mandatory. The nurse should then go on to set guidelines with patients and families pertaining to the need for quiet during times of high concentration such as medication delivery and while performing procedures. Incorporating patients and families into medication safety protocols has been successful in potentially reducing medication errors.[11,12]

Inpatient health care settings are complex with fluctuating and sometimes unpredictable demands for the nurse's time. Patient safety is paramount, but the nurse also needs to manage multiple competing interruptions

while completing tasks, including medication administration. Processes structured to address interruptions in a systematic fashion will prepare nurses to anticipate and overcome interruptions before they become barriers to care. Mechanisms such as the 3 Ds of Distraction Management (developed by the first author) can help the nurse determine a course of action when faced with an interruption. The 3 Ds are Deflect, Defer, and Determine. If an interruption arises, the nurse quickly assesses the urgency level of the situation. A decision should be made to proceed with one of the following: Deflect—to manage or modify the need so that it is no longer an issue; Defer—to briefly postpone the action or event, with the nurse still handling the need but at a later time; or Determine—to determine if someone else can safely assist and manage the need.

Through training, simulations, and implementation, the 3 Ds of Distraction Management can facilitate communication and efficiently address patient concerns. Development of a structured process sets a tone of cooperation and uniform expectations for all unit members. The nurse can manage the interruptions and concentrate on medication administration.

Environment of care

To further illustrate the usefulness of planned interventions to successfully maintain workflow, 3 common medication-associated operations (acquisition, transportation, and bedside delivery) are presented, with ideas to address potential interruptions/distractions at each stage. The most common area for nurses to retrieve medications is from an automated dispensing cabinet (such as a Pyxis or another type of medication dispensing system). While approaching the acquisition stage, nurses must focus their thinking to ensure concentration on the match between the intended medication and what they are obtaining. Prompt, focused attention should be maintained to move through the process expeditiously. A "no-interruption" zone should be maintained in the medication acquisition/preparation area. Common practice is to have brightly colored tape on the floor around the station as a reminder to concentrate on necessary steps in this physical area. These areas are frequently located away from direct patient care areas, and nurses may feel free to "let their guard down" and chat with others. Instead, the nurse should avoid interruptions and remind others to do the same. Inattention at this stage sets the entire medication pass astray. If a priority phone call or urgent patient need is encountered at this stage, the medication pass should be halted and the medication returned to the original location until the nurse can return and reinitiate the entire process from the beginning.

The process of medication transport is a common period for interruptions and distractions. This period places nurses at an especially vulnerable time because the medication has been removed from the safe storage area, and the chance to encounter patient visitors and other members of the health care team is high. Nurses in our study described challenges during this phase pertaining to answering questions from other health care team members, such as pharmacists, occupational therapists, and others, and many requests to take the patient to the bathroom after entering the room with medications. One strategy to manage this pattern of patient needs is to coordinate care with the patient care assistant during medication delivery times. Nurses should communicate with the care assistant that they are starting medication preparation and ask them to check with the patient to determine whether they need assistance with toileting and what is their preferred liquid for taking oral medications, if ordered. The care assistant can be accomplishing these tasks while the nurse is obtaining the medication and preparing it for patient delivery, thus minimizing interruptions at the patient bedside when the nurse has the medication in hand to be administered. This sequence would help eliminate interruptions and streamline the process.

The majority of interruptions in our study occurred during the administration phase. This time frame can be especially prone to error because at this point in the workflow, there are fewer "checks and balances" in

place. The provider has ordered the medication, the pharmacist has released the script, and the drug has been obtained. Concentration is vitally important during this phase. The provided script (Figure)[13] can also be used while addressing potential patient and family interruptions and distractions during the drug administration phase. After assessing the urgency of the patient's needs, specific and direct communication regarding the importance of maintaining patient safety is relayed to the patient and the family. The 3 Ds technique can be implemented to decide the best course of action: deflect, defer, or determine.

Other facilities have enacted protocols as part of overall medication safety initiatives and have found success in reducing interruptions while their nurses are passing medications. One Northern California hospital reported that its rate of interruptions during the medication administration process decreased from 19% to zero after training and implementation of a Medication Pass Time Out.[14] In that facility, the nurses established an interruption-free 1-hour time period early in their shift to focus solely on medication administration. During the Medication Pass Time Out period, nursing assistants and resource nurses answered call lights and took care of other patient needs while the primary nurse for each patient delivered scheduled medications uninterrupted. This type of process may not only be implemented most effectively institution-wide but could also be useful on a per unit basis as long as the rest of the facility was aware. These types of interventions may be better suited to lower-acuity units with somewhat predictable routines. However, such protocols also could be valuable in intensive care settings, with modifications of recommended time frames, allowing nurses to concentrate on routine tasks that have shown to be problematic in high-intensity patient care units.[15]

Recommendations for future research

The medication error rate was low for our combined studies. While these findings are encouraging, interruptions and distractions have been associated with an increased risk of

SCRIPT FOR HANDLING INTERRUPTIONS/DISTRACTIONS[13]

If you are interrupted in the no-interruption zone or elsewhere by health care professionals or in the room by patients, family members, or friends of the patient:

Let the person know that you are in the middle of medication administration. Ask the person: "Is this something that requires my IMMEDIATE ATTENTION or is a MEDICAL EMERGENCY regarding my patient?"

IF THE RESPONSE IS YES, ATTEND TO THE SITUATION.

After addressing the situation, refocus:

Refer back to the medication administration checklist protocol for medication safety, starting at least two steps prior to the interruption.

IF THE RESPONSE IS NO, IMPLEMENT THE 3 D'S of DISTRACTION MANAGEMENT:

A decision should be made to proceed with one of the following:

DEFLECT – to manage or modify the need so it is no longer an issue for the patient/family

DEFER – to briefly postpone the action or event to be handled later by the nurse – communicate this timeline to the person initiating the interruption/distraction

DETERMINE – if there is someone else who can safely assist/intervene/manage the need, and communicate this to the person initiating the interruption/distraction and the other health care member whom you have determined needs to be involved

Figure. Script for handling interruptions and distractions. Modified with permission from Williams et al.[13]

medication administration errors.[8] During our studies, there was not a statistically significant association between medication passes with interruptions and distractions for the category of all errors reported (those that reached the patient and near misses) or for the subcategory of errors that actually reached the patient. Our findings may be due to a smaller sample size or the particular characteristics of rural medical practice.

Nurses need to strive toward the goal of zero medication errors. By raising awareness of interruption management, nurses can work toward increased patient safety. After systematic literature reviews, 2 groups of authors found that the current evidence related to effectiveness of interventions to significantly reduce interruption rates is limited, and the findings may be too focused on counting interruptions instead of actual patient safety.[7,16] Recommendations were made for researchers to design and conduct controlled pre- and postintervention studies across multiple sites to provide evidence of effectiveness.

One idea for a controlled study would involve incorporating the protocols proposed here. Two of the same categories of hospitals (based on pharmacy support for medication use processes) could participate in an intervention with specialized nurse training in mechanisms to decrease interruptions and distractions. A mobile simulation van equipped with low-fidelity manikins could travel to each rural hospital site that was randomly chosen to participate in the intervention arm of the study. Nursing staff could participate in simulations directed at processes to recognize and manage interruptions and distractions. Focus would be on the most problematic areas found through the initial study data of bedside and medication room locations, especially during the administration and medication acquisition phases. The intervention would include preassessment data on interruptions in each particular site, using the direct observation method; training and simulation with accompanying rationale; and then collection of postintervention data at 3 and 6 months to assess for adherence to the protocols of interruption-free script and the 3 Ds of Distraction Management. This information could be compared with a site of the same category of medication use processes where direct observation data would be collected, but the nursing staff would not participate in the mobile simulation center activities.

Using a mobile simulation van allows the researchers to present content in a uniform manner to each group of nurses. Participation outside of the standard hospital unit would stimulate critical thinking and application of these protocols and clinical reasoning to a unique setting. The interventions could be tailored to fit the needs of specific institutions.

CONCLUSION

These studies demonstrated that interruptions and distractions are commonplace in the nursing workflow. Real-time data on medication administration were obtained across multiple facilities and patient acuity levels. The most common locations for interruptions were the environments where the majority of patient interactions occur and involve administration of medications. Areas where nurses interact with other members of the health care team were also problematic.

Interruptions and distractions will never be completely removed from health care settings. However, development, implementation, and refinement of tools to address and manage interruptions and distractions should be an expectation to minimize errors and maintain patient safety. A systematic and planned approach allows stability and facilitates communication for all health care team members.

REFERENCES

1. Sitterding MC, Ebright P, Broome M, Patterson ES, Wuchner S. Situation awareness and interruption handling during medication administration. *West J Nurs Res.* 2014;36(7):891-916.

2. Classen D, Resar R, Griffin F, et al. Global trigger tool shows that adverse events in hospitals may be ten times greater than previously measured. *Health Aff*. 2011;30(4):581-589.
3. Weeks KW, Sabin M, Pontin D, Woolley N. Safety in numbers: an introduction to the nurse education in practice series. *Nurs Educ Pract*. 2013;13(2):e4-e10.
4. Lawton R, Carruthers S, Gardner P, Wright J, McEachan RR. Identifying the latent failures underpinning medication administration errors: an exploratory study. *Health Serv Res*. 2012;47(4):1437-1459.
5. Kliger J, Blegen MA, Gootee D, O'Neil E. Empowering frontline nurses: a structured intervention enables nurses to improve medication administration accuracy. *Jt Comm J Qual Patient Saf*. 2009;35(12):604-612.
6. Flynn L, Suh D, Dickson G, Xie M, Boyer C. Effects of nursing structures and processes on med errors. Poster presented at: the 2010 State of the Congress on Nursing Research; 2010; Washington, DC.
7. Hopkinson SG, Jennings BM. Interruptions during nurses' work: a state of the science review. *Res Nurs Health*. 2013;36(1):38-53.
8. Raban MZ, Westbrook JI. Are interventions to reduce interruptions and errors during medication administration effective? A systematic review. *BMJ Qual Saf*. 2014;23(5):414-421.
9. Cochran GL, Haynatzki G. Comparison of medication safety effectiveness among nine critical access hospitals. *Am J Health Sys Pharm*. 2013;70(24):2218-2224.
10. Hopp PJ, Smith CA, Clegg BA, Heggestad ED. Interruption management: the use of attention-directing tactile clues. *Hum Factors*. 2005;47(1):1-11.
11. Xu C, Li G, Ye N, Lu Y. An intervention to improve medication management: a before and after study. *J Nurs Manag*. 2014;22:286-294.
12. McLeod M, Barber N, Franklin BD. Facilitators and barriers to safe medication administration to hospital inpatients: a mixed methods study of nurses' medication administration processes and systems (the MAPS study). *PLoS ONE*. 2015;10(6):1-12.
13. Williams T, King MW, Thompson JA, Champagne MT. Implementing evidence-based medication safety interventions on a progressive care unit. *Am J Nurs*. 2014;114(11):53-62.
14. Nguyen EE, Connolly PM, Wong V. Medication safety initiative in reducing medication errors. *J Nurs Care Qual*. 2010;25(3):224-230.
15. O'Byrne N, Kozub EI, Fields W. Reducing continuous intravenous medication errors in an intensive care unit. *J Nurs Care Qual*. 2016;31(1):14-16.
16. Bower R, Jackson C, Manning JC. Interruptions and medication administration in critical care. *Nurs Crit Care*. 2015;20(4):183-195.

For 4 additional continuing nursing education activities on medication safety, go to nursingcenter.com/ce.