

Distractions and Their Impact on Patient Safety

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ABSTRACT

Distraction is a common source of potential error that is well established within the fields of human factors research and cognitive psychology. High levels of distraction in healthcare settings pose a constant threat to patient safety. New technologies have increased the number and types of distractions present in these settings. Analysis of reports submitted to the Pennsylvania Patient Safety Authority in 2010 and 2011 containing relevant terms, namely “distract,” “interrupt,” or “forgot,” identified 1,015 reports that could be attributed to distraction. The majority of events were classified as medication errors (59.6%), followed by errors related to procedures, treatments, or tests (27.8%). Thirteen events were reported that resulted in patient harm. A total of 40 reports specifically mention distractions from phones, computers, or other technologic devices contributing to errors. This article examines the broader issue of distractions that cause medical errors and outlines strategies for decreasing the potential for distraction and harm. These risk reduction strategies include developing systems and processes that reduce or eliminate distractions and teaching effective techniques for handling distractions. (*Pa Patient Saf Advis* 2013 Mar; 10[1]:1-10.)

INTRODUCTION

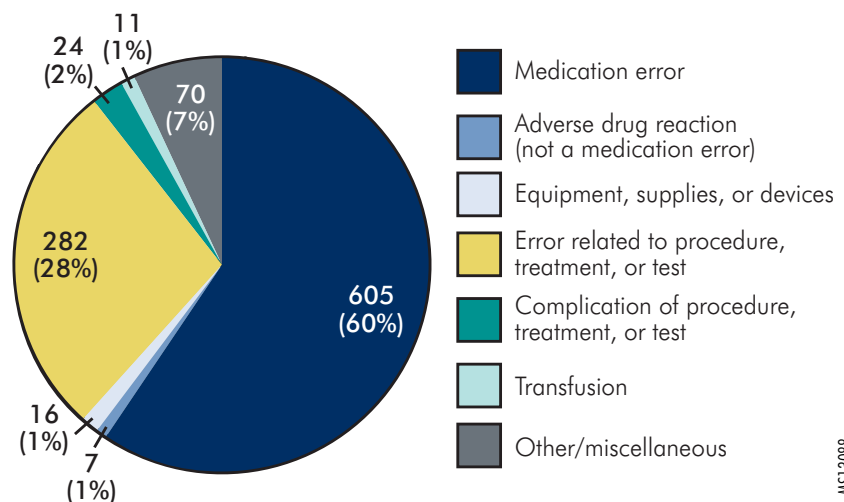
The definition of “distract” is “to draw or direct (as one’s attention) to a different object or in different directions at the same time.”¹ Distraction is especially detrimental to human functioning in situations requiring cognitive processing of large amounts of complex and rapidly changing information. Such situations occur almost constantly in healthcare settings. When presented with new information, the mind of the health-care worker must be able to focus attention and encode information to be retrieved at a later time. Diverting attention during these key points of information encoding or retrieval may result in human error.²

DISTRACTIONS IN PENNSYLVANIA

A query of the Pennsylvania Patient Safety Authority’s Pennsylvania Patient Safety Reporting System (PA-PSRS) database for events reported in 2010 or 2011 containing the terms “distract,” “interrupt,” or “forgot” produced 1,202 reports, of which analysts identified 1,015 reports describing events that could be attributed to distraction. The majority of these events were reported as medication errors or errors related to procedures, treatments, or tests (see Figure). Nearly all events were reported as Incidents (i.e., events resulting in no harm to patients). However, it is important to note that even in cases of no harm, additional costs may be incurred during follow-up. For example, nearly one in five events (17.7%, n = 180) were reported with a harm score of D, which is defined as an event that requires monitoring to confirm that it results in no harm and/or requires intervention to prevent harm.³

Of the 13 Serious Events (i.e., events resulting in harm to patients) reported, the majority were split equally between medication errors and errors related to procedures, treatments, or tests. See Table 1 for events reported according to event type and harm score.

Figure. Event Reports to the Pennsylvania Patient Safety Authority Attributed to Distraction, by Event Type, 2010 through 2011



MST3088



Table 1. Serious Event Reports to the Pennsylvania Patient Safety Authority Attributed to Distraction, by Event Type and Harm Score, 2010 through 2011

EVENT TYPE BY HARM SCORE	NO. OF REPORTS
Harm score E: An event occurred that contributed to or resulted in temporary harm and required treatment or intervention	12
Medication error	5
Extra dose	1
Wrong dose (overdosage)	2
Wrong rate (intravenous)	2
Adverse drug reaction (not a medication error)	1
Error related to procedure/treatment/test	4
Surgery/invasive procedure problem—other	1
Radiology/imaging test problem—wrong site	1
Radiology/imaging test problem—other	1
Other	1
Complication of procedure/treatment/test	2
Complication following surgery or invasive procedure—other	1
Other	1
Harm score G: An event occurred that contributed to or resulted in permanent harm	1
Error related to procedure/treatment/test	1
Laboratory test ordered, not performed	1
Total events with harm	13

Sixty-six percent (n = 672) of reports describe distraction of nurses as directly contributing to the events. Fewer reports identify the following individuals as the distracted parties: laboratory technician/phlebotomist (7.9%, n = 80), patient (6.7%, n = 68), pharmacist (6.7%, n = 68), physician (5.3%, n = 54), radiology technician (2.3%, n = 23), secretary (1.4%, n = 14), respiratory therapist (1.2%, n = 12), nursing assistant (0.9%, n = 9), nurse practitioner/nurse anesthetist/physician’s assistant (0.6%, n = 6), and “other” (4.0%, n = 41). Caution must be taken in interpreting these percentages, as nearly all events appear to have been reported by nurses. The role of the reporter is not

identified within PA-PSRS, but analysis revealed the majority of narratives were written in the first- or third-person perspective of nurses.

The majority of events do not directly identify the source of distraction; however, the following key search terms appeared in the event reports (with their frequency provided in parentheses): forgot (80.8%, n = 820), distract (14.1%, n = 143), and interrupt (7.3%, n = 74). Together, these percentages total greater than 100% because, in a small number of reports, more than one of the key search terms was identified. In general, the narratives describe some element of patient care being forgotten without

identification of the reason for the lapse in memory or attribute the reason for the memory lapse to a general cause, such as being “busy” (5.4%, n = 55). Use of this term may reflect multitasking. In fact, many of the report narratives describe this phenomenon using a variety of terms. Of note, 40 event reports (3.9%) specifically identify distractions from phones, computers, or other technologic devices as contributing to errors.

Event Reports

The following examples from PA-PSRS reports illustrate the variety of events attributed to distraction and the resulting influence on various clinicians.

Pharmacy

I saw that unusual custom traces were ordered. I informed the technician to make the special dilutions (which was done without incident). When I entered the prescription into the compounding computer, I forgot to “zero-out” the neonatal trace mix, which provides the standard traces. Because of other unusual events in the area, I did not catch my error that day, and the double-dose was dispensed. (Persons were talking to me while I was entering and while I was checking, and I was stressed due to a drug shortage and multiple new procedures required, and I was striving to meet delivery deadlines despite late-received adult orders.) I am very sorry. In the future, if someone is talking to me while I am entering or checking a prescription, I will stop until I can fully concentrate. I caught my mistake when I entered the new prescription for today.

Anesthesia

Patient had PCA [patient-controlled analgesia] and nerve block. Pumps were side by side. The anesthesiologist identified the nerve block pump and tubing to administer a bolus via

the route. He was distracted and, upon returning to give bolus, did not reidentify the pump. He programmed the wrong pump for the bolus. The patient received HYDROMORPHONE PCA bolus, requiring naloxone rescue.

Laboratory

While logged into this patient's report screen, I inadvertently viewed the slide of another patient and reported the results from that slide. I immediately realized my error and notified the nurse taking care of the patient. I was distracted and trying to do too much at the same time.

Nursing

[The night before, the] patient was ordered to have a potassium level drawn, with the results to be called to the attending [physician's attention]. It was learned the following morning that the test had not been ordered. The nurse had gotten distracted with seven admissions in eight hours and missed the order.

Surgeon

The assisting surgeon was placing a central venous catheter. The procedure was interrupted . . . prior to getting started by a nurse asking when the doctor would be coming to the OR [operating room]. She informed him she would be there in 30 minutes. After closing the door and placing the "Do Not Enter" sign up, the anesthesiologist came into the room and again asked when she would be coming to the OR. She told him that she would be there as soon as she found a vein. I turned to get something and heard the doctor yell "ouch." When I turned back around, I saw that she was pulling the scalpel out of her finger.

Radiology

Patient was ordered a stat chest x-ray. I began to run the x-ray and was

distracted by a fellow technologist's question regarding another patient. I returned to the workstation to identify the image. I glanced at the highlighted first name of the patient I had pulled up and assumed that I had the correct patient information. I sent the image across. The next day it was brought to my attention that the image was not in the computer system. When looking for the exam on the workstation, the patient was not listed. I thought through what I might have done and looked for a patient with a similar first or last name close to my patient and discovered that I had entered the results for the wrong patient and misidentified the results as an abdominal x-ray.

Medication Errors

More than half of the events reported (59.6%, n = 605) describe distractions during the medication administration process that were associated with medication errors (see Table 2). Within this category, the largest percentage of events involved dose omissions (46.8%, n = 283), followed by errors with some aspect of medication administration labeled as "wrong" (33.9%, n = 205). The two most frequently reported errors of this type were wrong time (n = 49) and wrong dose/overdosage (n = 47). Examples of distraction can be found impacting all disciplines and at every step involved in the medication administration process.

Prescribing

Physician entered midazolam order incorrectly. Physician intended to write for 10 mg but scrolled to the bottom of the electronic list, ordering 15 mg. Child's weight would indicate maximum standard dose of 10 mg. Physician was distracted during entry by another clinical question.

Transcribing

Orders were written for patient A, faxed to satellite pharmacy, and processed. The pharmacist began entering the orders and was then interrupted by nurse taking care of patient B. The pharmacist pulled up the profile of patient B to answer questions. At that time, he finished processing orders but entered them on patient B instead of patient A. The error was found within one hour, and the orders were corrected. Unfortunately, the nurse taking care of patient B confirmed, charted, and gave the medications to patient B.

Preparation and Dispensing

The patient was ordered 1100 mg of a chemotherapy agent. The pharmacist pulled two 1 gram vials to prepare the dose, then realized that we carry 500 mg vials and pulled a 500 mg vial also. He forgot to put one of the 1 gram vials back and used all three vials to prepare the dose. The patient ended up receiving 2100 mg of the drug. The pharmacist performing the double check confirmed the calculation and verified that there was a 1 gram vial and a 500 mg vial used to prepare the dose. He did not notice the other vial and assumed that the other vials were sterile water vials for reconstitution. The next day, the pharmacist who prepared the dose went to reorder the drug and realized his error.

Administration

The patient had a heart rate in the 170s. The physician ordered metoprolol 2.5 mg IV [intravenous] x 1 dose. The nurse pulled the dose from the automated dispensing cabinet and scanned it. Before he had a chance to draw up the medicine, he was distracted by another patient. When he came back to his workstation, he ended up drawing up 2.5 mL from an insulin vial and giving it to the



patient. He realized the error, and the doctor was notified; dextrose was given and fingerstick blood glucose testing was ordered. The blood sugar dropped as low as 52 but returned to normal by 2 p.m.

Errors Related to Procedures, Treatments, or Tests

The next most frequently reported event type associated with distraction was error related to procedures, treatments, or tests (see Table 2), with 27.8% (n = 282) of reports falling into this category. Within this category, laboratory test problems accounted for the largest percentage of events (45.0%, n = 127). The two most commonly reported laboratory test problems were test ordered and not performed (n = 36) and result missing or delayed (n = 30).

Following laboratory test problems, the subcategory of “other” contained the second-highest number of reports in this category (22.7%, n = 64). Close examination revealed that most reports labeled “other” refer to errors surrounding procedures, treatments, or tests performed by nursing staff that were not medication-related, nor did they fit clearly into the existing subcategories. Examples are as follows:

Nurse prepared infant’s 17:00 feeding in syringe, then was interrupted to provide care to another infant. Nurse overlooked feeding and noted omission at 20:00 feeding. Doctor notified; no adverse outcome.

Patient with a known history of SVT [supraventricular tachycardia] called and left a message on our clinic voice mail that she had to download her EKG [electrocardiogram] tracings. The pacemaker technologist recorded the tracings into the database and printed the tracings when he noted that the patient was in rapid SVT. He then placed the tracings in a folder to show the provider; however, he got distracted with other things and charts got placed on top of the

folder. The folder was found two days later and the provider was notified. The patient is to be scheduled for an ablation procedure.

Following laboratory test problems and “other,” the remaining subcategories represented in the reports consisted of problems relating to surgery or invasive procedures (15.6%, n = 44), radiology or imaging tests (11.0%, n = 31), respiratory care (3.5%, n = 10), referrals or consults (1.4%, n = 4), and dietary issues (0.7%, n = 2).

DISCUSSION

Distraction and Memory

Memory loss is common to all humans. A certain amount of information is expected to be lost over time (a phenomenon labeled “transience”) with the rate of forgetting being highest immediately following the initial encoding of information.

However, with more elaborate encoding of information, less information is lost over time. “Working memory” is a specific form of memory that holds on to small pieces of information, for a few seconds at a time, as people cognitively process them for encoding. Divided attention at the time new information is being encoded directly interferes with “working memory” and is the first point at which distraction interferes with memory.²

Distraction also creates problems during information retrieval. Divided attention at this point results in a failure to remember information that was either never encoded properly or is available in memory but overlooked.²

Distraction is of particular concern to “prospective memory,” or remembering to do things in the future. This form of memory can be event-based (i.e., when X happens, do Y) or time-based (i.e., do Y at a specific time in the future). Event-based

Table 2. Reports to the Pennsylvania Patient Safety Authority Attributed to Distraction for the Two Most Frequently Reported Event Types, 2010 through 2011

EVENT TYPE	NO. OF REPORTS
Medication error	605
Dose omission	283
Wrong (e.g., wrong drug, wrong rate, wrong route)	206
Extra dose	54
Monitoring error (includes contraindicated drugs)	23
Other	18
Prescription/refill delayed	11
Medication list incorrect	7
Unauthorized drug	3
Error related to procedure/treatment/test	282
Laboratory test problem	127
Other	64
Surgery/invasive procedure problem	44
Radiology/imaging test problem—wrong site	31
Respiratory care	10
Referral/consult problem	4
Dietary	2

cues are less likely to be forgotten, but problems occur when attention is diverted at the time of the event. Time-based cues require self-initiated recall and are more likely to be forgotten without converting them to events (e.g., setting an alarm on a watch converts a time-based cue to an event-based cue—“turn off the Heparin infusion at 5 p.m.” becomes “when the alarm sounds, turn off the Heparin infusion”). Of note, the event-based cue must contain sufficient information about what is to be done, and must be available at the time necessary, in order to be effective. Ideally, these events should also be distinct (e.g., infusion pump alarms are set with different tones to indicate the completion of an infusion versus indicating the battery charge is low and the pump needs to be plugged into a wall outlet).

Multitasking and Interruption

Balancing multiple tasks, also known as multitasking, is a universal and constant challenge in healthcare settings. Being able to continually process incoming information while balancing and responding to

competing priorities and completing necessary tasks is an essential skill for healthcare workers. Multitasking creates a stream of interruptions that may in fact be necessary and may increase efficiency. However, more research is needed on the optimal level of interruptions that minimize error and maximize efficiency.^{4,5}

Unfortunately, there is a very real limit to the ability of the human brain to multitask. Cognitive neuroscientists have identified a specific region of the brain responsible for encoding and retrieving information, particularly in relation to working memory. This region of the brain is unable to process more than one task simultaneously, severely limiting human capacity for perception and decision making in multitasking situations.⁶

Observational studies of nurses and physicians have been conducted that have found multitasking to be highly prevalent—with interruptions occurring anywhere from 1.4 times per minute⁷ to once every 14 minutes⁸—and observable multitasking occurring more often than

perceived by the clinicians themselves.⁹ Differences in frequency of interruptions and prevalence of multitasking found in the clinical literature are due to variation in study designs and definitions for these variables. The psychological literature on interruption as it correlates to patient safety is more consistent in this respect. The six experimental variables most often studied are working memory load, interruption similarity, interruption position, interruption modality, practice/experience, and interruption-handling strategies.⁵ The implications for clinicians related to each of these experimental variables are shown in Table 3.

Sources of Distraction

Interruptions or distractions can be defined as self-initiated or other-initiated. Research has shown the prevalence of self-initiated distraction ranges from 28%¹⁰ to 38%,⁷ while other-initiated distraction ranges from 34% to 69%.¹⁰ In studies of distractions and medication errors, the majority of interruptions were found to be self-initiated by nurses or other members of

Table 3. Top Six Experimental Variables Identified in the Psychological Literature Investigating Interruptions and Their Implications for Clinicians

EXPERIMENTAL VARIABLE	IMPLICATIONS FOR CLINICIANS
Working memory load	Interruption during times of high working memory load is associated with decreased performance of the primary task.
Interruption similarity	Interruption that is similar to the primary task is more disruptive than a dissimilar interruption.
Interruption position	Interruption occurring during task performance is more detrimental to performance than interruption occurring between tasks.
Interruption modality	Interruption presenting through a modality different from the primary task (e.g., auditory versus visual) is less disruptive to performance than interruption presenting through the same modality.
Practice/experience	Practice of the primary task is important to procedural tasks because it increases association between steps in the primary task process, freeing up cognitive resources to be able to handle interruption. Practice of interruption-handling strategies is important to decision-making tasks because it improves performance of the primary task.
Interruption-handling strategies	Being able to control when to deal with interruption is less disruptive than having no control. Task performance and effective response to interruption are improved when clinicians have a repertoire of strategies for handling interruption.

Source: Li SY, Magrabi F, Coiera E. A systematic review of the psychological literature on interruption and its patient safety implications. *J Am Med Assoc* 2012 Jan-Feb;19(1):6-12.



the nursing team, through face-to-face interaction, occurring for purposes of patient management, and of short duration.¹¹

Self-initiated distraction may also be the by-product of increased intrinsic cognitive load, which is determined by the complexity of information being processed. In other words, the internal processing of complex information creates a distraction that interferes with processing other information. Other-initiated distractions may be a source of increased extraneous cognitive load, determined by the kind and amount of new information being perceived and encoded. Decreasing the cognitive load required for either has been shown to free up cognitive resources necessary for the other¹² (i.e., decreasing the difficulty level of the primary task increases one's ability to handle interruptions or distractions without impairing performance, while decreasing interruptions and distractions increases one's ability to complete tasks that require more complex cognitive processing).

A common source of self- or other-initiated distraction is communication of information irrelevant to the primary task at hand. In an observational study of distracting communications in the OR, psychologists observed for case-irrelevant communications (CICs). Half of all CICs consisted of "small talk." Although surgeons initiated and received the majority of CICs, visitors to the OR initiated CICs with the highest levels of distraction. Also, communications directed to nurses and anesthesiologists provided higher levels of distraction than communications directed to surgeons.¹³

Distraction Due to Technology

Anything that diverts attention away from the primary task is a source of distraction. Sources of distraction can be broadly attributed to individuals (e.g., clinicians, patients, family members) or to technology (e.g., medical equipment, computers, communication devices). "Distractioned

doctoring" is a term recently coined in the media to describe the interruptions to workflow caused by the introduction of new technological devices in the clinical setting. This has been elevated to new levels of concern within the healthcare community and the general public due to the widespread implementation of computerized provider order entry (CPOE) systems and electronic medical records, along with the growing use of cell phones and smartphones.¹⁴⁻¹⁶ In fact, distractions from smartphones and other mobile devices have been identified for the first time as one of the top 10 health technology hazards for 2013 by ECRI Institute.¹⁷

A case study published in December 2011 by the Agency for Healthcare Research and Quality (AHRQ) highlights just how serious the impact of these distractions can be in the healthcare setting:

*During rounds with the attending, a medical resident was using a smartphone to access the CPOE to discontinue an order for warfarin. The resident was distracted by an incoming personal text message and failed to complete her primary task—discontinuing the warfarin order. The patient continued to receive warfarin for the next three days. As a result, the patient developed hemopericardium requiring emergency open heart surgery.*¹⁸

In a large study of computer-related patient safety incidents, 55% of incidents were attributed to technical problems (i.e., hardware, software, or networking infrastructure problems), while 45% were due to human-computer interaction. The majority of technical problems resulted in delays or failures to complete clinical tasks. As described in the AHRQ case study, the majority of human-computer interaction problems were related to data entry (e.g., incorrect or missing data, failure to update data). High cognitive workload and multitasking were highlighted as contributing factors.¹⁹

Studies examining the impact of cell phone use on driving may inform research on the impact of cell phone and smartphone use in the clinical setting. These studies have shown cell phone use to be as detrimental to driving performance as operating a vehicle while intoxicated. This impact on driving ability appears to be due to the diversion of attention away from the primary task of driving, regardless of whether or not a hands-free device is used.²⁰

Investigation of this phenomenon is just beginning in healthcare. Surveys of clinicians are being published that show that cell phone and smartphone use is prevalent, with the majority of clinicians voicing concern over the significant potential safety risks they introduce. There is a generational difference found across surveys, with older clinicians reporting less trust of the new technology. Interestingly, clinicians report witnessing others being distracted or committing errors related to cell phone or smartphone use at rates higher than they report for themselves.^{21,22} This mirrors the findings in studies of cell phone use and driving showing that drivers did not perceive the detrimental impact that cell phone use was observed to have on their driving performance.²³

Lack of insight into the impact technology is having on performance and patient safety may explain the low number of reports in PA-PSRS that specifically mention these sources of distraction. Out of the 1,015 reports involving distractions, 10 identify phones as the source of distraction, 15 identify computers, and 15 identify other technologies (e.g., automated medication dispensing cabinets, infusion pumps).

RISK REDUCTION STRATEGIES

Effort should be made to limit distractions in healthcare settings whenever possible. However, total elimination of distractions is not an achievable goal.

Dr. Atul Gawande, author of *The Checklist Manifesto*, summarized the challenge facing modern healthcare as follows: “Medicine has become the art of managing extreme complexity—and a test of whether such complexity can, in fact, be humanly mastered. . . . Substantial parts of what hospitals do . . . are now too complex for clinicians to carry them out reliably from memory alone.”²⁴ Checklists are just one of the strategies suggested to ameliorate the impact of distraction in healthcare settings. Mindfulness meditation training is another such strategy, one that has been found to improve focused attention and working memory while effectively managing distractions—particularly in multitasking situations.^{25,26} These and other risk reduction strategies are suggested to avoid the detrimental effects of variables shown in Table 3 that contribute to increased distraction and decreased performance:

- Educate clinicians about distraction and its potential detrimental effect on patient safety.^{10,27}
- Raise awareness of the potential for distraction, and promote vigilance through sharing deidentified narratives of patient safety events and near misses that occurred due to distraction.^{28,29}
- Teach clinical staff interruption-handling strategies⁵ (e.g., teach staff how to forward calls to a colleague or voice mail when they are performing a procedure, show staff how to save documentation in the computer system so that it can be resumed after the distraction is addressed).
- Consider offering a course in mindfulness meditation for clinical staff.^{25,26}
- Avoid communication of irrelevant information whenever possible, but especially when performing tasks with high cognitive loads^{13,27,30} (e.g., avoid small talk when performing safety-critical tasks such as the preoperative time-out or programming an infusion pump to deliver an intravenous anticoagulant).
- Designate routinely encountered tasks that are not to be interrupted, and develop a system to communicate when staff are engaged in these tasks^{10,27,30,31} (e.g., close the door to the patient’s room and post a sign instructing other staff to avoid interruptions when performing an invasive procedure at the bedside).
- Minimize interruptions during performance of any tasks that place high demands on working memory^{5,27} (e.g., close the door to the patient’s room and silence or forward any calls when performing an unfamiliar procedure for the first time, select and prepare medications in a dedicated medication room instead of at busy nurses’ stations or in high-traffic hallways).
- Practice tasks, particularly those that are complicated or known to be distraction-prone⁵ (e.g., encourage preceptors to seek out opportunities during the orientation period for novice staff to perform tasks that are encountered infrequently in their clinical area, provide opportunities to role-play distraction-prone clinical scenarios in simulation training).
- Develop and utilize checklists for complex tasks that require multiple steps or are known to be distraction-prone²⁴ (e.g., central-line insertion, ventilator-associated pneumonia prevention measures, continuous renal replacement therapy).
- Implement communication strategies that do not involve oral communication,¹⁰ especially in busy clinical areas with high noise levels (e.g., outline a protocol for sending and responding to text messages in facilities that provide text-pagers or smartphones to clinical staff).
- Use written reminders as event-based cues to complete future tasks. Ensure that written reminders contain sufficient information about what is to be done and that they are placed in a location that will be visible at the time the task needs to be completed² (e.g., write a note to call for more bags of bladder irrigation fluid and attach it to the second-to-last bag in the case that is currently being used).
- Batch communications to minimize distraction to the recipient^{10,27} (e.g., use a report sheet to communicate missing medications for a nursing unit to pharmacy rather than having each nurse call the pharmacist individually).
- Do not batch tasks for multiple patients concurrently⁵ (e.g., do not prepare medication for more than one patient at a time, avoid switching back and forth between patient electronic records when entering new orders in a CPOE system).
- Provide environmental cues to assist in recovery from distraction in order to complete the primary task^{5,24,30,31} (e.g., using checklists, building CPOE systems that alert prescribers when an order has been partially entered but abandoned after a period of inactivity).
- Use concepts from human factors engineering when evaluating and redesigning care processes and workspaces in order to decrease the potential for distraction^{7,32} (e.g., conduct observations of processes known to be distraction-prone in order to identify sources of distraction and develop a plan to minimize them, redesign medication preparation areas to limit outside distractions).

CONCLUSION

Distractions are encountered in health-care settings on a nearly continuous basis. These distractions originate internally and externally to clinicians. There are many



and varied stimuli that divert attention away from primary tasks. With each new technology introduced to the healthcare setting, new sources of distraction are recognized. The relatively recent addition of computerized health information systems, cell phones, and smartphones has brought new attention to the study of distraction and its impact on patient safety.

The work of clinicians places high demands on working memory. This is due to the high complexity and large amounts of continuously changing information that

must be processed, resulting in high intrinsic and extraneous cognitive loads. Under these circumstances, distraction can be particularly detrimental to performance.

Most of the patient safety event reports to the Authority that were attributed to distraction by reporters involved medication errors or errors related to procedures, treatments, or tests. Multitasking is frequently the culprit in these patient safety events. In some cases, multitasking increases efficiency by eliminating down-

time. But in many more cases, efficiency is decreased because of the limited ability of the human brain to process more than one task at the same time.

Clinicians can take steps to reduce the impact of distraction by recognizing common sources of distraction and situations that are distraction-prone, identifying clinical tasks or procedures that are most likely to result in medical error and patient harm as a result of distraction, and applying specific risk reduction strategies.

NOTES

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LEARNING OBJECTIVES

- Assess sources of distraction present in healthcare settings and the means by which they can lead to error.
- Recall the predominant safety event types associated with distraction, according to reports submitted to the Pennsylvania Patient Safety Authority.
- Distinguish between interruptions that convey greater potential to disrupt performance of the primary task and those that convey less potential to disrupt performance of the primary task.
- Identify strategies for decreasing the potential for distraction and harm.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or develop your own questions.

1. Assess the following scenarios and determine which one describes an interruption during *information encoding*?
 - a. A physician is completing placement of a nasoduodenal feeding tube in a patient and is interrupted by a medical student asking a question about a prescription missing from the discharge instructions for another patient who is leaving the hospital. The physician forgets to order the x-ray to confirm placement of the feeding tube.
 - b. A nurse is receiving critical blood gas results over the phone from the laboratory during a patient emergency situation. While writing down the results, the anesthesiologist asks the nurse to bring the respiratory emergency equipment box with her when she comes back to the room. When reading the blood gas results to the emergency response team, she discovers she did not write down the bicarbonate level.
 - c. A pharmacy technician is about to restock an automated dispensing cabinet with HYDROcodone. A nurse interrupts to ask if the technician has brought the HYDROmorphine that had been ordered from the pharmacy 30 minutes ago for a patient in severe pain. The technician checks the stock of HYDROmorphine, finds the drawer empty, and tells the nurse to call back down to the main pharmacy. The technician proceeds to place the HYDROcodone tablets in the HYDROmorphine drawer.
 - d. A patient asks the nutrition hostess for extra sugar and ketchup. On the way to the kitchenette, another patient stops the hostess and asks for their lunch to be reheated. The hostess takes the tray to the kitchenette, and when she arrives, she grabs some salt and pepper and ketchup packets to take back to the first patient.
2. Which of the following event types associated with distraction were reported most frequently to the Authority from 2010 through 2011?
 - a. Medication error: dose omission
 - b. Medication error: overdosage
 - c. Medication error: wrong patient
 - d. Medication error: unauthorized drug

**SELF-ASSESSMENT QUESTIONS (CONTINUED)**

A nursing assistant set an alarm on her watch to remind her to return to a patient's room to perform a repeat fingerstick blood sugar test. When the alarm sounded half an hour later, she was unable to recall which patient needed the fingerstick.

3. The nursing assistant was using the alarm to support prospective memory, or remembering to do something in the future. The alarm failed to achieve its desired result in this instance because of which of the following?
 - a. The alarm provided a time-based cue that did not offer information about what was to be done.
 - b. The use of alarms to aid prospective memory has been found ineffective in multitasking environments, such as hospitals.
 - c. The alarm provided an event-based cue that did not offer information about what was to be done.
 - d. The nursing assistant was suffering from alarm fatigue.

4. Each of the following statements regarding interruptions are true *except*:
 - a. Interruptions similar to the primary task are more disruptive than interruptions that are dissimilar.
 - b. Interruptions during task performance by novice practitioners are more disruptive than interruptions during task performance by experienced practitioners.
 - c. Interruptions occurring during performance of tasks requiring high working memory load are more disruptive than interruptions occurring during tasks requiring low working memory load.
 - d. Interruptions presenting through a different modality than the primary task (e.g., auditory versus visual) are more disruptive than interruptions presenting through the same modality.

5. All of the following statements regarding multitasking are false *except*:
 - a. Multitasking can increase efficiency for healthcare professionals by eliminating downtime.
 - b. Multitasking is not a highly valued skill for healthcare professionals.
 - c. Multitasking is only a contributor to errors in high-acuity care areas, such as critical care areas and the operating room.
 - d. There is no limit to the human brain's ability to multitask, given enough simulation training.

6. All of the following are risk reduction strategies that a hospital can use to decrease the potential for distraction and harm *except*:
 - a. Move the automated medication dispensing cabinet and medication carts to an area away from high traffic flow and clinical alarms, preferably behind closed doors.
 - b. Implement a strict no "small talk" policy for all staff working in clinical areas, except during meal breaks.
 - c. Have novice staff practice clinical tasks in a simulation lab setting using scenarios designed to include multiple interruptions.
 - d. Require staff to forward all calls to another staff member when entering a patient room to perform an invasive procedure.

PENNSYLVANIA PATIENT SAFETY ADVISORY

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