PSNet
PATIENT SAFETY NETWORK

Order Interrupted by Text: Multitasking Mishap

December 1, 2011
Halamka J. Order Interrupted by Text: Multitasking Mishap. PSNet [internet]. 2011.
https://psnet.ahrq.gov/web-mm/order-interrupted-text-multitasking-mishap

Case Objectives

- State the prevalence of mobile devices among clinicians and their common health care uses.
- Describe the benefits of mobile technology to safety, quality, and efficiency.
- Appreciate the risks of using mobile devices in health care settings.
- List best practices and policies for using mobile devices in health care.

The Case

A 56-year-old man with dementia was admitted to an academic medical center from a nursing home for replacement of a percutaneous endoscopic gastrostomy (PEG) tube, which had become dislodged and was no longer functioning. The patient had a distant history of an intracardiac mural thrombus and was on long-term anticoagulation with warfarin. At the time of admission, his international normalized ratio (INR) was 1.4 (the INR is a measure of anticoagulation intensity in patients treated with warfarin). Since the goal INR was 2.0–3.0, he was not adequately anticoagulated and was at risk for stroke from the cardiac thrombus.

He underwent successful PEG tube replacement on hospital day one. Later that day, the resident on the team decided to prescribe warfarin 10 mg per day (an increase over his usual dose of 5 mg/day) for 3 days to try to increase his INR into the target range.

On hospital day two, when the resident and intern were rounding with the attending, they discussed the plan for ongoing anticoagulation. As the patient had been on warfarin for many years, the attending wanted to confirm that the intracardiac thrombus was still present to justify ongoing anticoagulation. The attending stated clearly to the resident that they should stop the warfarin until they could obtain an echocardiogram of the heart.

This academic medical center had a robust computerized physician order entry (CPOE) system that allowed providers to enter orders using handheld devices and smartphones. While the team was rounding with the attending, the resident was able to enter orders in real time as team members evaluated patients.

When the attending stated they should stop the anticoagulation for this patient, the resident began to enter the order into her smartphone. As she was entering the order, the resident received a text message from a friend regarding an upcoming party, and she confirmed her attendance through text messaging. The team moved on to the next problem.

The resident never completed the order to discontinue the warfarin, and the patient continued to receive 10 mg each day for the next 3 days. Because everyone on the team thought the medication had been stopped, no one checked the patient's INR. In addition, because of the robust CPOE system, neither the intern nor resident reviewed the medication list for the next few days so no one recognized that the patient was still receiving the warfarin.

On hospital day four, the patient developed shortness of breath, tachycardia, and hypotension (low blood pressure). An echocardiogram revealed hemopericardium (blood filling the sack around the heart) with evidence of tamponade (pressure from the blood limiting his heart function). He required emergency open heart surgery (pericardiocentesis and pericardial window) to remove the blood. His INR was 8.5 at the time, indicating he was overanticoagulated—his blood was too thin. The team felt he had suffered spontaneous bleeding into the pericardium from receiving the extra doses of warfarin.

The patient survived the operation and ultimately was discharged back to the nursing home after a 3-week hospital stay.

The Commentary

The Obama Administration is spending $27 billion dollars to accelerate the meaningful use of electronic health records (EHRs) in pursuit of three policy goals: enhanced safety, improved quality, and increased efficiency. However, despite some evidence that electronic health records (1) can achieve these goals, implementation can introduce new errors, new risks, and new challenges. Mobile devices, including smartphones and tablet computers, can be used in conjunction with clinical information systems, such as EHRs or computerized provider order entry (CPOE). As this case illustrates, there are important best practices and policies to consider when using such devices in patient care settings.

Mobile devices are increasingly common among medical students, residents, and attending clinicians. For example, at Beth Israel Deaconess Medical Center, physicians and nurses have purchased more than 1000 iPads and 1600 iPhones with personal funds.(2) Nearly 100% of our hospitalists and most of our emergency physicians use iPads for entering orders into the system, viewing test results, and documenting in the medical record. The literature on the widespread adoption comes largely from news stories and market research reports, with recent estimates of smartphone use by clinicians (for any purpose) ranging from 72%–94%.(3-4)

Mobile device uses in clinical care vary depending on the capabilities of hospital-based software systems and their compatibility with mobile technology. Typical clinical information system applications used on mobile devices include reviewing results, reading notes, entering orders, documenting findings, and reviewing images.(5,6) Numerous standalone and Web-connected applications (Table) bring medical reference information and evidence to the point of care and provide clinical decision support such as

customized calculators for clinical formulas.

Since smartphones are fundamentally communication devices, an important aspect of their use is supporting voice and text communication, as was a factor in this case. Video chat, exchange of clinical photographs (7), SMS messages, and e-mail (8) all have the potential to enhance communication (9) between members of the care team. Some studies (10,11) conclude that such communication improves the quality of the work environment, patient safety, and care without increasing bedside interruptions. Others (9), however, note a significant increase in interruptions and disruption of workflow because of the lowered barrier to instant communication.

The potential benefits of mobile devices in health care are many. First, they can move electronic documentation and computerized order entry closer to the point of care by obviating the need to leave a patient's room to find a distant computer terminal. This could improve recall of clinical details and allow better involvement of the patient in the care plan. Moreover, point-of-care documentation or order entry may also improve efficiency. In a recent study at BIDMC (12), we found that physicians using an iPad spent 39 minutes less at a computer workstation per 8-hour emergency department shift. Presumably this time was spent performing their information-related tasks (order entry, results viewing, and clinical documentation) at the bedside.

Another advantage of mobile devices is that they enable easy access to clinical data whenever and wherever it is needed. This is particularly important because the clinical condition of hospitalized patients so often changes without warning.(13) However, access to the electronic record itself via mobile devices may not be enough to enhance patient safety. Several studies (14,15) have concluded the real-time decision support at the bedside is the primary source of increased benefit. Mobile devices can notify clinicians in real time of critical lab results, a combination of events (low potassium in a patient taking digoxin), and significant patient events such as arrival to the intensive care unit.

One last positive side effect of using personal mobile devices in health care is that providers are likely to have the device with them at all times and keep it operational. Compared with hospital-provided pagers, providers are more likely to charge the battery and less likely to lose the device.

As illustrated in this case, mobile device use in hospitals can also have risks and negative consequences. For example, a mobile device could carry harmful bacteria if not disinfected between patient encounters.(16) In the BIDMC emergency department, caregivers are taught to wipe their mobile devices with alcohol at the same time they wash their hands. Wireless devices emit electromagnetic radiation, which may interfere with other hospital devices (e.g., remote telemetry monitoring) as well as patient devices (e.g., pacemakers).(17) Although such reports are rare, the potential risk could increase with the use of more advanced technologies.

The same portability that makes mobile devices so useful also makes them easier to lose, posing significant risk if protected health information (PHI) is stored on the device. Since many mobile devices are purchased by clinicians themselves and not provided by IT departments, they may lack the high-level enterprise-wide security controls used by most hospitals. For example, consumer devices may include convenience functions to store and replay passwords; if lost or stolen, a device with such a function could be used to access a clinical system and protected health information. Computer devices with PHI are

required by state laws to be encrypted (data is converted into code that can only be accessed by a password). However, mobile devices may not be similarly encrypted. Moving information-based tasks away from a secluded workstation may therefore increase the risk of inadvertent disclosure. Mobile devices are easily viewed by patients and colleagues, making it harder to protect health information from casual glances.

In this case, entering an order was interrupted by a personal text message. Such interruptions are a significant potential danger. One study (9) noted 4.6 average interruptions per hour for residents when considering calls, e-mails, and face-to-face communications. Such interruptions, however, were sometimes even more frequent. For example, within a 40-minute team meeting with the attending physician, seven interruptions were observed. Interruptions to workflow can be associated with medical errors and risks to patients.(18)

Mitigating these risks poses technology and policy challenges. At present, many hospitals allow clinicians to bring their own mobile devices to work, which creates a risk of mixing insecure personal applications with critical patient care applications.(2) New security protections for mobile devices such as those from Good Technology, Inc. (http://www.good.com) enable work related and consumer functions to be isolated from each other, minimizing the risk for example that an infected video game will breach the privacy of protected health care information. A policy solution would be to limit mobile devices to those that are employer provisioned and do not have personal functions. For example, in Defense Department settings, all cameras on employer-provided mobile devices are disabled automatically.

Relevant to this case, technology solutions to reduce interruption risks include building automated reminders into CPOE that alert clinicians to orders that are started but not completed. Also, the hospital information system could have had a standard order set/care plan that ensured INRs are measured if there is a change in warfarin dosing.

The anonymous case submitter wrote, "Rules of etiquette for smartphone usage during rounds and other important venues are needed to safeguard the integrity of communication." More than etiquette, providers should be ensuring that routine personal issues/interruptions do not impact the delivery of quality care. Clinicians have multi-tasked and worked in settings with multiple and varied interruptions long before mobile phones.

At Beth Israel Deaconess Medical Center, we have taken many steps to mitigate the potential hazards of smartphone use in the hospital. At present, our mobile device policies include requirements to encrypt all data, to comply with specific password complexity settings, and to follow infection control best practices. We are investigating technologies to segregate personal and patient functions in a given device. We are also investigating the possibility of providing mobile devices to health care workers that can be checked out for a shift. To try to reduce security and distraction risks, we will pilot test several new policies such as restricting access to personal e-mail and social networking sites.

The workflow in hospitals is changing as both systems and providers employ new technologies from a large robust full-scale EHR to a single handheld device. Mobile devices are becoming an increasingly important part of the clinical workday. Leveraging the benefits while applying technology and policy risk mitigations will result in their optimal use.

Take-Home Points

- Mobile devices can enhance communication, access to literature, and connectivity to clinical systems, enhancing quality, safety, and efficiency.
- Transmission of infection, risks of privacy breaches, and increased errors induced by multitasking are significant.
- Policies and technologies should be implemented to mitigate these risks, capturing the benefits of these new technologies while reducing the harm caused by them.

John Halamka, MD, MS

Chair, U.S. Healthcare Information Technology Standards Panel (HITSP)

Chief Information Officer, Beth Israel Deaconess Medical Center

Chief Information Officer and Dean for Technology, Harvard Medical School

Chair, New England Health Electronic Data Interchange Network (NEHEN)

CEO of MA-SHARE (the Regional Health Information Organization)

Faculty Disclosure: *Dr. Halamka has declared that neither he, nor any immediate member of his family, have a financial arrangement or other relationship with the manufacturers of any commercial products discussed in this continuing medical education activity. In addition, the commentary does not include information regarding investigational or off-label use of pharmaceutical products or medical devices.*

References

1. Cebul RD, Love TE, Anil K, Jain AK, Hebert CJ. Electronic health records and quality of diabetes care. N Engl J Med. 2011;365:825-833. [go to PubMed]

2. Halamka JD. Bring your own device. Life as a Healthcare CIO. October 3, 2011. [Available at]

3. Versel N. Report: 94 percent of docs have smartphones, but communication gaps persist. Fierce Mobile Healthcare. July 27, 2010. [Available at]

4. Dolan B. 72 percent of US physicians use smartphones. MobiHealthNews. May 5, 2010. [Available at]

5. Franko OI. Smartphone apps for orthopaedic surgeons. Clin Orthop Relat Res. 2011;469:2042-2048. [go to PubMed]

6. LaBounty TM, Kim RJ, Lin FY, Budoff MJ, Weinsaft JW, Min JK. Diagnostic accuracy of coronary computed tomography angiography as interpreted on a mobile handheld phone device. JACC Cardiovasc Imaging. 2010;3:482-490. [go to PubMed]

7. Lurie Y, Fainmesser P, Yosef M, Bentur Y. Remote identification of poisonous plants by cell-phone camera and online communication. Isr Med Assoc J. 2008;10:802-803. [go to PubMed]

8. O'Connor C, Friedrich JO, Scales DC, Adhikari NK. The use of wireless e-mail to improve healthcare team communication. J Am Med Inform Assoc. 2009;16:705-713. [go to PubMed]

9. Wu R, Rossos P, Quan S, et al. An evaluation of the use of smartphones to communicate between clinicians: a mixed-methods study. J Med Internet Res. 2011;13:e59. [go to PubMed]

10. León SA, Fontelo P, Green L, Ackerman M, Liu F. Evidence-based medicine among internal medicine residents in a community hospital program using smart phones. BMC Med Inform Decis Mak. 2007;7:5. [go to PubMed]

11. Richards JD, Harris T. Beam me up Scotty! Impact of personal wireless communication devices in the emergency department. Emerg Med J. 2011;28:29-32. [go to PubMed]

12. Horng S, Nathanson, L. iPad use at the bedside can decrease time spent at a computer. Acad Emerg Med. 2011;18(suppl 1):S103.

13. Park HI, Min WK, Lee W, et al. Evaluating the short message service alerting system for critical value notification via PDA telephones. Ann Clin Lab Sci. 2008;38:149-156. [go to PubMed]

14. Berner ES, Houston TK, Ray MN, et al. Improving ambulatory prescribing safety with a handheld decision support system: a randomized controlled trial. J Am Med Inform Assoc. 2006;13:171-179. [go to PubMed]

15. Sintchenko V, Iredell JR, Gilbert GL, Coiera E. Handheld computer-based decision support reduces patient length of stay and antibiotic prescribing in critical care. J Am Med Inform Assoc. 2005;12:398-402. [go to PubMed]

16. Brady RR, Fraser SF, Dunlop MG, Paterson-Brown S, Gibb AP. Bacterial contamination of mobile communication devices in the operative environment. J Hosp Infect. 2007;66:397-398. [go to PubMed]

17. Halamka JD. Safe wireless practices. Life as a Healthcare CIO. December 26, 2007. [Available at]

18. Westbrook JI, Woods A, Rob MI, Dunsmuir WT, Day RO. Association of interruptions with an increased risk and severity of medication administration errors. Arch Intern Med. 2010;170:683-690. [go to PubMed]

Table

Table. Mobile Applications in Health Care.

Electronic Health Records
e-Prescribing
Practice Management
Picture Archiving and Communication Systems
Provider Order Entry
Health Information Exchange Portals
Personal Health Record Portals

This project was funded under contract number 75Q80119C00004 from the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services. The authors are solely responsible for this report's contents, findings, and conclusions, which do not necessarily represent the views of AHRQ. Readers should not interpret any statement in this report as an official position of AHRQ or of the U.S. Department of Health and Human Services. None of the authors has any affiliation or financial involvement that conflicts with the material presented in this report. View AHRQ Disclaimers