

Pitfalls with Smartphones in Medicine

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INTRODUCTION

Smartphones are popular for internet access, team coordination, information transmission, and other tasks in modern clinical care.¹ Their proliferation was unanticipated a decade ago (when pagers were the dominant method of connecting mobile clinicians), and their application remains unmentioned in medical textbooks. However, new technologies can produce unintended adverse consequences. The purpose of this Commentary is to describe ten potential pitfalls associated with using smartphones in medical settings in the hope that doing so will raise awareness and potentially reduce the negative consequences for health care practitioners and their patients. Some of the problems described here are shared by desktop forms of communication, but are exacerbated by smartphones that encourage communication ‘on the run’.

DISRUPTED CLINICAL COMMUNICATION

Audio Distortion

The transmission fidelity of a conversation through a smartphone is sometimes distorted due to network barriers, antenna miniaturization, or other design compromises. Ironically, these devices work better as internet browsers or text messengers than as actual telephones. Hence, verbal dialogue may require extremely careful articulation to avoid misheard words (e.g., “sixty units of insulin” substituting for

“sixteen units of insulin”). The opportunity for mistakes is further accentuated if a call connects to a land-line colleague because the smartphone user will have high-fidelity reception, fail to recognize the low-fidelity transmission, and presume that a dialogue is equally clear in each direction. Asking the recipient to repeat critical elements of the message may help.

Faulty Monologues

Clinicians also use smartphones to send text communication that sometimes contain mistaken content. At one extreme, a smartphone provides the dangerous opportunity for an impulsive mood to produce lasting embarrassment. The more frequent error is to send a message with typos or minor mistakes that lead to misunderstandings (sometimes exacerbated by auto-correct software). In addition, the small screen size of a smartphone often prevents a reader from viewing the entire message at once and sometimes causes the reader to miss key points. All these errors create a need for subsequent clarifications and a potential cascade of overlapping correcting messages. Information exchanged by interactive conversation provides better opportunities for error interception, as well as supplementary emotional tone.²

Fumbled Messages

A smartphone provides a sophisticated technology where one communication can have many components, such as the subject line, main text, recipient list, and attachments. As a result, there are many opportunities for inadvertent error or irritation. For example, a busy clinician might compose a hurried email that omits a thoughtful subject line to organize and facilitate later retrieval. Other common slips are to forget an intended attachment, transmit a message to the wrong destination, exclude

someone who should have been copied, or use ambiguous language such as “here” or “soon”. Unfortunately, the mobile functionality sometimes encourages an unduly rapid response. The powerful efficiencies inherent to smartphones contribute to an increased (not decreased) need for careful deliberation by clinicians.

Missive Avalanches

Many text messages are well intentioned but not important. A particularly vexatious annoyance occurs with congratulatory messages broadcasted to multiple recipients. Instead of selectively replying to the complimented person, some recipients quickly hit “reply all”. Such casual habits rapidly clog the inboxes of many people with redundant text. Similarly, an email debate among even a few people can irritate innocent bystanders on the recipient list who do not wish to participate. Serious mistakes might occur if the mob chatter entangles two specific clinicians who were otherwise exchanging information about an urgent patient problem. One way to mitigate the collateral exasperation is to send replies only to those essential and to begin every message with a named addressee (not a perfunctory “Dear all” or no identified recipient).

SOCIAL DISENGAGEMENT

Mindless Checking

Smartphone users tend to receive a large volume of text that is not essential. As such, some of the clinician’s time is wasted by scanning, considering, and deleting extraneous messages. These chores often occur during relatively peaceful moments that could have been reserved for mindful reflection to ponder a recent patient complication or plan for the next clinical event.³ The magnitude of such opportunity costs for each clinician depends on both the signal-to-noise ratio and volume of incoming messages. Additionally, a valuable message is easily buried in the pile of other valuable messages. Inevitably, a clinician will mistakenly delete an important message and will face the embarrassing task of asking the originator to send it again.

Surrounding Neglect

Attention spans are limited and individuals are generally unaware of their lapses. At the extreme, smartphones can be distracting while operating an automobile, and

several laws now prohibit talking or texting while driving. A similar type of absentmindedness might also prevail among physicians who scan their smartphones during rounds, lectures, or administrative meetings. The inattention may also cause smartphone users to miss the social cues that signal the discourtesy of ignoring people who are immediately present.⁴ Clinicians are perhaps particularly susceptible to repetitive checking because their messages sometimes contain important patient updates that require urgent action. A great deal of self-discipline or external authority is required to counteract this addictive behavior.

Unanticipated Loss

All forms of technology can break and necessitate replacement or repair. Moreover, the compromises in designing attractive smartphones sometimes contribute to low durability (e.g., fragility following falls, spilled liquids, or other misadventures). Smartphones are also a target for theft because of their multi-functionality, glamorous marketing, and high purchase price. Unlike a faulty pen or lost umbrella, however, a missing smartphone is not readily borrowed, purchased, or exchanged. A smartphone is also a personalized comfort object that, when gone, provokes intense separation anxiety in some people. One way to mitigate the disruption is for clinicians to know how to quickly obtain a replacement smartphone (obviously, don’t store the sequence in the smartphone).

Myth of Dependability

No technology is perfectly reliable, especially when human-machine interactions are involved. Temporary smartphone malfunctions can arise from diverse sources including the individual (e.g., failing to recharge a battery) or the system (e.g., Blackberry network outage October 12, 2011). Throughout, a clinician may remain unaware of the gaps and mistakenly interpret an absence of received messages as indicating an absence of inbound messages. Similarly, a clinician may mistakenly assume that a transmitted message arrives immediately at the intended destination. And of course, smartphones can be triggered by accidental activation inside clothing during what should have been otherwise a private moment. Like many other aspects of care, clinicians need to follow-up and double-check because no form of communication is always reliable.

DIRECT PATIENT HARM

Nosocomial Infections

Inanimate objects can become colonized by organisms and propagate infections. For example, one study identified a 42% contamination rate for at least one type of microbe on smartphones at a large teaching hospital.⁵ These devices have distinctive potential risks of nosocomial pathogen transmission because they are usually operated by the ungloved hands of a clinician and because their fragile electronics typically preclude regular disinfection. The potential risk of communicable disease transmission is most relevant if a clinician washes his or her hands at the start of a patient visit, checks a contaminated smartphone during the encounter, and then continues with patient contact. In the future, engineers may develop an encasing technology that allows easy decontamination akin to the features in modern colonoscopes.

Breached Confidentiality

Smartphones in clinical practice often contain sensitive patient data that needs to be protected to maintain confidentiality. Examples include digital photographs, sign-out lists, or patient messages. Password protection helps mitigate the risks of a breach, yet such safeguards are never perfect. The ubiquity and portability of smartphones may make the security risks higher than with hardcopies of patient charts confined to hospital property. The memory size and searching functions also mean that a confidentiality breach could involve multiple patients and encounters; moreover, a memory chain for stored passwords could enable a landslide of subsequent breaches of linked hospital systems. Clinicians, therefore, might wish to develop a protocol for disabling their smartphone remotely as soon as a violation is detected.

SUMMARY

The purpose of this review is to describe ten potential pitfalls for practicing clinicians who use smartphones during active patient care (Textbox). These devices are an integral element of modern medical care and will certainly endure for the years ahead; hence, a listing of latent caveats does not nullify their many advantages toward efficient medical care. An awareness of specific pitfalls might help clinicians harness more of the benefits and avoid some of

the problems. This list may also help guide future engineering research that seeks to mitigate problems with current smartphones. The toughest problems to solve are the ones you don't know you have and the ones that your predecessors never encountered.

SUMMARY TEXTBOX: PITFALLS OF SMARTPHONES IN CLINICAL PRACTICE

DISRUPTED CLINICAL COMMUNICATION

- Audio Distortion
- Faulty Monologues
- Fumbled Messages
- Missive Avalanches

SOCIAL DISENGAGEMENT

- Mindless Checking
- Surrounding Neglect

FAILURES OF TECHNOLOGY

- Unanticipated Loss
- Myth of Dependability

DIRECT PATIENT HARM

- Nosocomial Infections
- Breached Confidentiality

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