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Editorial

Incorporating smartphones into clinical practice

With the widespread adoption of smartphones over the past decade, there has been increasing scrutiny over their role in medicine. Although health care providers and patients have long used mobile phones, these devices were initially limited technologically to basic voice transmission. Nowadays, even the most inexpensive models combine traditional functionality with powerful computing capability, an advanced operating system, deep interconnectivity, and an increasing number of sensors and peripherals. It is estimated that there were 2.1 billion smartphone globally at the end of 2014 [1]. Unsurprisingly, health care providers have been generally quick to adopt the devices for personal use [2—4]. Although early concerns about mobile phones interfering with health care equipment may have slightly slowed adoption, this nervousness has been rightfully defused [3,5]. In this issue of *Annals of Medicine and Surgery*, Patel et al. report a survey of health care-related smartphone use among surgeons in the United Kingdom [6]. Most respondents report willing and frequent use of their devices for point-of-care decision making and care-related communication. However, as highlighted by the authors, many surgeons are concerned about reliability of app content and how smartphone use is perceived among coworkers and patients.

First and foremost, smartphones are a communication tool. With their basic voice transmission and text messaging capabilities, they improve upon traditional pagers by minimizing disruptions and allowing health care providers to receive detailed messages, enabling notifications to be triaged. However, because of concerns over the reliability of signals and cost of smartphones, many hospitals continue to rely on numeric paging systems. Pagers have been criticized as outdated and inefficient tools that delay response times, create frequent interruptions, and hinder prioritization [2,4]. Moreover, the poor communication associated with the use of pagers results in suboptimal patient safety [2,4]. Evidence for the superiority of smartphones is mounting. The use of smartphones for care-related communications is perceived by residents to significantly improve their productivity and by nurses to reduce the time spent trying to communicate with clinicians [4]. One particular software package, WhatsApp, was shown to facilitate communication within the health care team and provided the attending physician a constant oversight of activities undertaken by junior team members, allowing clinical independence at minimal risk to patient safety [7]. The premium placed on reliability of communication in acute care hospitals means that, at least in that work environment, pagers and smartphones will likely continue to be used in parallel until signal fidelity and coverage improve.

The increasing use of smartphones among clinicians introduces some novel risks and exacerbates others. Decreased face-to-face oral conversations can potentially have a negative impact on the relationships between health care providers [4]. As providers start carrying devices that are able to capture and transmit large amounts of data—in the form of text, photographs, medical images, and other media—barriers to sharing that information are diminishing. This increase in the fluidity of personal health information may lead to an increase of patient privacy breaches. Although the interconnectedness of smartphones can be useful clinically and academically, access to the vast amount of information available on the internet can be misappropriated for entertainment and other non-work-related purposes. Communicating with smartphones during patient care or educational activities is perceived by some as unprofessional [4,6] and this concern was also revealed in Patel's study. The solution to these problems is evolving. For example, many hospitals have instituted policies to limit the information that can be transmitted by smartphone, introduced proprietary apps that are considered secure, and mandated regulations such as password protection or encryption of devices. The social appropriateness of smartphones in health care settings is changing as technology-savvy clinicians enter the workforce with expectations of using their smartphones productively for work.

Perhaps the most contentious aspect of smartphones in health care surrounds the proliferation of apps. Today, health-related apps exist for everything from helping patients manage chronic diseases to providing clinicians access to medical textbooks and even to controlling medical devices. These apps may be an important part of critical decisions. With patient safety on the line, many have asked if such apps should be certified or controlled and clinically significant errors have been reported [8]. An app designed to help calculate opioid dosage, for instance, was shown to be inaccurate and the content of several reference apps have been shown to lack evidence-based information [9—11]. The United States' Food and Drug Administration (FDA) provided counsel as recently as February 2015 with the release of its report *Mobile Medical Applications: Guidance for Industry and Food and Drug Administration Staff* [12]. Importantly, in this guideline the FDA distinguishes "mobile medical apps" from "mobile apps" and plans to control only the former. To warrant FDA scrutiny, an app must either modify or control an existing medical device or be used directly in diagnosis, medical device data analysis, or provide patient-specific diagnosis. Both the Medicines and Healthcare Products Regulatory Agency

from the United Kingdom and the Therapeutic Goods Administration of Australia have similar positions. Mobile apps, including those intended to act as medical references, may or may not be reliable. Very few thus far are peer-reviewed and clinicians remain ultimately responsible for using their judgement to determine the validity of these tools. Surrogates for quality include user ratings, written feedback, associated authors, brand and affiliation, and popularity. Websites such as iMedicalApps.com provide periodic reviews for consumers, however, a standardized approach for quality certification does not exist for health-related apps. This must be stressed to users since the most inexperienced team member are often the ones most likely to use apps, as highlighted by Patel et al. [6].

It is important that medical schools, professional associations, and health care organizations set an agenda to promote the adequate use of smartphones because a significant proportion of clinicians are using these devices as highlighted by Patel et al. Smartphones are becoming more and more important as a tool that health care providers can use to improve their knowledge and performance. With that in mind, it would be reasonable for medical schools to devote time to teaching about the appropriate use of apps and their potential dangers in order for clinicians to adequately incorporate them into their workflow. Given the tremendous growth of medical apps and their often unvetted quality, clinicians should be wary of the information provided and of possible commercial interests. The use of smartphones will soon be ubiquitous in clinical environments. This technology offers the potential to improve clinical communications, enhance learning, and improve patient care. However, numerous issues remain to be addressed in order to maximize the benefits of this new technology and avoid unintended consequences.

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