ORIGINAL RESEARCH

Smartphone Use During Inpatient Attending Rounds: Prevalence, Patterns, and Potential for Distraction

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BACKGROUND: While there are numerous benefits of smartphone use for physicians, little is known about the negative effects of using these devices in the context of patient care.

OBJECTIVE: To assess resident and faculty smartphone use during inpatient attending rounds and its potential as a source of distraction during transfer of clinical information.

DESIGN: Cross-sectional survey.

SETTING: University-affiliated public teaching hospital.

PARTICIPANTS: All housestaff and inpatient faculty in the departments of Medicine and Pediatrics.

METHODS: Participants were asked about smartphone ownership, usage patterns during attending rounds, and whether team members had ever missed important data during rounds due to distraction from smartphones. Attendings were asked whether policies should be established for smartphone use during rounds.

RESULTS: The overall response rate was 73%. Device ownership was prevalent (89% residents, 98% faculty), as was use of smartphones during inpatient rounds (57% residents, 28% attendings). According to self-reports, smartphones were used during rounds for patient care (85% residents, 48% faculty), reading/responding to personal texts/e-mails (37% residents, 12% faculty), and other non-patient care uses (15% residents, 0% faculty). Nineteen percent of residents and 12% of attendings believed they had missed important information because of distraction from smartphones. Residents and faculty agreed that smartphones "can be a serious distraction during attending rounds," and nearly 80% of faculty believed that smartphone policies should be established.

CONCLUSIONS: Smartphone use during attending rounds is prevalent and can distract users during important information transfer. Attendings strongly favored the institution of formal policies governing appropriate smartphone use during inpatient rounds. *Journal of Hospital Medicine* 2012;7:595–599. © 2012 Society of Hospital Medicine

Healthcare market research has predicted that over 80% of physicians will use smartphones by 2012.[1] These handheld devices allow users immediate access to various forms of electronic media such as Internet, instant messaging, and e-mail. Smartphones provide numerous benefits to physicians, including rapid access to medical references, research applications, and patient information.[2] These devices have been used for teleconsultation[3] and patient education,[4] and applications have been developed for numerous clinical specialties.[4–8]

Housestaff perceive that communication improves when they use smartphones rather than traditional pagers on the inpatient service,[9] and patients may have a positive view of physicians' use of handheld computers.[10] Medical schools and residency programs are increasingly requiring smartphone ownership for their trainees, with the expectation that smartphone use will enhance the educational experience, ensure the highest level of patient care, improve user efficiency, and help control the costs associated with purchasing updated textbooks.[7,11–13] In the future, hospitals may rely on smartphone technologies to help reduce the enormous economic burden created by inefficient communication.[14]

Despite their numerous benefits for physicians and patients, little is known about the potential for smartphones to distract users in clinical care settings. Studies from the psychology and traffic safety fields have documented untoward consequences when individuals use electronic devices to multitask.[15–19] Given these concerns, we investigated the prevalence and patterns of smartphone use during inpatient attending rounds, and whether these devices can distract team members in this period of important information transfer.

METHODS

At our institution, "attending rounds" are faculty-led inpatient teaching rounds that focus on clinical care and patient management; these sessions may be conducted either in the classroom or at the bedside, depending on patient and learner needs, and faculty preference. Inpatient teams are comprised of 1

attending, housestaff, and third and fourth year medical students. Each team conducts attending rounds independently; these rounds range in length from 1 hour (Pediatrics) to 2 hours (Medicine).

A survey instrument was designed to evaluate smartphone usage patterns during hospital inpatient attending rounds, and perceived distraction from smartphones in this setting. A preliminary version of the survey was pilot tested by a group of housestaff for face validity, redundancy, and ease of use, and it was subsequently revised. For the purposes of this study, a smartphone was defined broadly as any mobile, personal communication device (cellphone, iPhone, Android, Blackberry, iPad, etc). Residents were asked about their own smartphone use, as well as their observations of supervising attendings and other learners' devices use during rounds (see Supporting Appendix 1 in the online version of this article).

In February 2011, the anonymous online survey was administered using Survey Monkey (www.surveymonkey.com) and was distributed via e-mail to medical and pediatric housestaff at Jacobi Medical Center, a public teaching hospital located in Bronx, NY, affiliated with the Albert Einstein College of Medicine of Yeshiva University. A similar survey was distributed to faculty who were known to conduct inpatient attending rounds (see Supporting Appendix 2 in the online version of this article). The e-mail solicitation process was repeated for both groups of respondents at 2 and 4 weeks after the initial request. The study was approved by the Institutional Review Board of the Albert Einstein College of Medicine.

Respondents were not required to answer each question in order to complete the survey. With the exception of free-text comments, all responses were either yes/no or were graded on a 5-point frequency scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). This scale was chosen because it allowed for adequate dispersion of responses, and for the identification of meaningful smartphone usage among respondents (score ≥ 3) and data dichotomization. The z test was used to compare the proportions between independent groups.

All free-text comments were imported into a Microsoft Word table. Comments were separated into 2 groups: "housestaff" and "attending." Each comment was hand-coded by 2 authors (R.J.K.-S. and R.S.) to reach consensus for 1 of the following 4 categories: the comment was a "positive" statement; a "negative" statement; a "positive/negative" statement; or a neutral one, ie, neither positive nor negative. The terms positive and negative here refer to whether the statement explicitly highlighted benefits of smartphone use or a negative aspect of smartphone use, respectively. A comment was coded as "positive/negative" if it highlighted both benefits and drawbacks in the same comment. In addition, each comment that mentioned texting or call functions was secondarily coded as

TABLE 1. How Often Are Smartphones Used During Inpatient Attending Rounds?

Smartphone User	Self-Report % (n/N)	Resident Observations of Other Team Members % (n/N)	Faculty Observations of Trainees % (n/N)
Resident	57% (59/103)	91% (103/113)*	73% (29/40)
Faculty	28% (11/39)	43% (49/113)*	n/a

NOTE: Respondents reporting regular use, defined as score ≥ 3. Abbreviations: n/a, not applicable. *N reflects that 3 residents skipped the question.

TABLE 2. Reasons That Housestaff Use Smartphones During Attending Rounds

Reason	Based on Housestaff Self-Report (n = 85)*	Based on Trainee Observations of One Another (n = 112)†	P Value
Patient care-related use (ePocrates, MedCalc, Medline, Google Scholar)	85%	86%	NS
Reading or responding to personal texts or e-mail	37%	55%	<0.01
Other non-patient care-related use, Web surfing	15%	37%	<0.01

NOTE: Score ≥ 3. Abbreviations: NS, not significant. *n excludes 31 smartphone non-owners and those who "never" use the device during rounds. † n reflects that 4 residents skipped this question.

"personal," "patient," "both," or "unknown" depending on the purpose of the texting or calls described in each comment. Comments were also reviewed for possible subthemes.

RESULTS
The overall response rate was 73% (156/214), with 81% (116/143) of housestaff and 56% (40/71) of faculty participating. The mean tenure of faculty respondents was 13 years. Eighty-nine percent (103/116) of residents and 98% (39/40) of faculty owned devices, with 57% of housestaff and 28% of attendings reporting regular personal use of smartphones during attending rounds (Table 1).

Respondents reported that they used their smartphones during attending rounds for the following reasons: 1) patient care (85% residents, 48% faculty); 2) reading/responding to personal texts/e-mails (37% residents, 12% faculty); and 3) other non-patient care uses, such as "Web surfing" (15% residents, 0% faculty) (Tables 2 and 3). Nineteen percent of residents reported that they missed important clinical information due to distraction from smartphone use, as did 12% of attendings (Table 4). Respondents reported observing other team members using smartphones and missing important clinical data at higher rates than they reported for themselves (see Tables 1, 4, and 5). A majority of both residents (56%) and faculty (73%) agreed (score >3) that smartphones "can be a serious distraction during attending rounds," and 77% of attendings affirmed that teaching hospitals should establish "smartphone use codes of conduct" in order to

TABLE 3. Reasons That Faculty Use Smartphones During Attending Rounds

Reason	Based on Faculty Self-Report (n = 25)*	Based on Housestaff Observations of Faculty (n = 91)†	P Value
Patient care-related use (ePocrates, MedCalc, Medline, Google Scholar)	48%	48%	NS
Reading or responding to personal texts or e-mail	12%	47%	<0.01
Other non-patient care-related use, Web surfing	0%	20%	<0.05

NOTE: Score ≥3. Abbreviations: NS, not significant. *n excludes 15 smartphone non-owners and those who "never" use the device during rounds. †n reflects a reduced number of resident responses to this question.

TABLE 4. Do You Think You Ever Missed an Important Piece of Clinical Information Because You Were Distracted by Smartphone Use During Rounds?

Smartphone User	Self-Report % (n/N)
Housestaff	19% (18/85)*
Faculty	12% (3/25)*

NOTE: Respondents who answered "yes." *All eligible faculty and residents answered this question; N excludes smartphone non-owners and those who "never" use smartphones during rounds.

TABLE 5. Have You Ever Witnessed Another Team Member Miss an Important Piece of Clinical Information Because He/She Was Distracted by Smartphone Use During Rounds?

Smartphone User	Based on Housestaff Observation % (n/N)	Based on Faculty Observation % (n/N)
Trainee	34% (38/112)*	43% (17/40)
Faculty	20% (18/91)*	n/a†

NOTE: Respondents who answered "yes." Abbreviations: n/a, not applicable. *N reflects a reduced number of responses for these questions. †At our institution, rounds take place with only 1 faculty member per team.

minimize unnecessary distraction during attending rounds.

Despite not requiring responses in order to complete the questionnaires, we found that, in general, few eligible faculty or residents skipped questions on the survey. Nevertheless, there was a substantial drop in responses (91/116) for the last 2 questions on the housestaff survey. These questions asked for resident observations of attending smartphone usage patterns during rounds, and whether they had seen attendings miss clinical information because of distractions from smartphone use.

There were 25 free-text comments from residents and 11 from attendings. The resultant comments highlight differences in residents' and attendings' perspectives toward smartphone use during attending rounds. Housestaff comments included 7 positive comments, 7 positive/negative comments, 1 negative comment, and 10 neutral comments. A subtheme that emerged in 2 of the housestaff comments was the importance of personal autonomy in being able to use one's smartphone. Attending comments included 2 positive comments, 0 positive/negative comments, 4 negative comments, and 5 neutral comments. Faculty comments revealed that attendings use their smartphones' e-mail/texting and call capabilities during rounds both for patient care issues (3 comments) and/or urgent family concerns (2 comments). In 2 other attending comments, the reason for calls/texts during rounds was not specified.

Housestaff comments included: "I do not know why it is that attendings never use it … these phones are so easy to use and [enhance] patient care in a number of ways," "Depending on how they are used, if strictly for pt care then they can be a great mobile tool," "Of course they can be a distraction, but they are also a very good tool. You take the good with the bad," "If you are bored you will find other things to occupy your mind. If you can look up some info at the time of rounding you are actively participating. Please, do not make it worse than it is already," and "It is a personal choice." Faculty negative comments highlighted the potential for distraction from "the e-mail beeps," the fact that "some of the housestaff will be tuned into their SmartPhones," that "residents frequently check their phones during rounds—a distraction and frankly rude when the attending or fellow are giving a brief lecture," and that "sometimes more focus is on the SmartPhone than rounds."

DISCUSSION

Physicians and their patients benefit from the wide-ranging capabilities of personal, mobile communication devices in the healthcare environment. Smartphones house the latest medical references, provide access to patients' medical records and imaging studies, can photograph or video physical findings, and educate and monitor patients.[2–8] Smartphones can facilitate information transfer in the medical setting and may improve housestaff efficiency and communication.[9]

Despite their significant benefits, smartphones introduce another source of interruption, multitasking, and distraction into the hospital environment. There is increasing awareness that breaks-in-task in the clinical setting may have negative consequences.[20–24] While some types of interruptions are beneficial and can facilitate patient care (eg, an alarm ringing to indicate abnormal vitals signs on a patient),[20–24] other forms of interruptions, even those that are self-initiated,[22] can be distracting and detrimental. Along these lines, recommendations for safe handoffs and information transfer have specifically included advice to minimize potential distractions.[25]

In addition, studies from the psychology and education literature have previously documented negative consequences on learning when individuals use

electronic devices to multitask.[15–17] Students who used a laptop in class were likely to multitask, become distracted, and distract others; the more a student used the laptop in class, the lower the student's class performance.[15] Multitasking with a cellphone during driving can be especially hazardous.[18,19] According to National Highway Traffic Safety Administration data, 20% of injury crashes in 2009 involved reports of distracted driving, and cellphones were implicated in 18% of distracted driving deaths that year.[18]

Little is known about any negative effects of using personal electronic devices in the context of patient care. A 2011 study of Internal Medicine residents who used smartphones for team communication documented both positive and negative consequences of smartphone use in the hospital setting. Negative consequences included frequent interruptions, a weakening of interprofessional behaviors as housestaff relied on texting over direct communication with nurses, and unprofessional housestaff behaviors.[26] The Agency for Healthcare Quality and Research published a case report in which a resident's smartphone use during clinical care resulted in patient harm.[27] To our knowledge, this is the first study to detail housestaff and faculty smartphone usage patterns and potential for user distractibility during inpatient attending rounds.

Our data show that device use during attending rounds is prevalent among residents and faculty alike, with the majority of use related to patient care. However, attendings were half as likely as residents to report using devices regularly during rounds. This finding may reflect attendings' inability to multitask while leading the rounds, or a deliberate role-modeling of desired conduct during rounds. Generational differences may also play a role, with residents more likely than their older attendings to multitask and self-interrupt. Along these lines, traffic safety research has found that younger drivers are more likely to text during driving; approximately 30% of drivers under 30 years old reported texting while driving in the previous 30 days, compared to 9% of respondents over 30 years old.[19] Increased smartphone use by housestaff during rounds may also reflect attitudinal differences between the 2 groups. As seen in the free-text comments, housestaff tended to emphasize the benefits of smartphone use, and with 1 exception, all negative housestaff comments were balanced by a positive statement. Faculty more commonly underscored the negative aspects of smartphone use during rounds, including the devices' adverse effects on housestaff professional behavior in this setting.

Faculty and housestaff consistently reported observing others using smartphones at higher rates than they reported for themselves. This discrepancy may reflect underrecognition of self-use, or a discomfort in reporting self-use during attending rounds. In addition, residents' observations of other trainees' usage of smart-

phones (91%) was higher than faculty observation of the same group (73%). Trainees' smartphone use may be less obvious to attendings who are involved in facilitating rounds. Alternatively, trainees may use their smartphones in subtle ways to prevent attending awareness.

There are several limitations to our study. Our research focused specifically on attending rounds. Smartphone usage patterns by faculty and housestaff at other times in the work day, such as during resident handoffs, at a patient's bedside, or during academic conferences, may differ. Nevertheless, we specifically chose to study smartphone use during attending rounds, as these sessions are discrete time frames during which important teaching occurs and clinical management decisions are made. With recent Accreditation Council for Graduate Medical Education (ACGME) work hour restrictions, these faculty-led rounds may become increasingly important in ensuring the safe transition of patient care. Secondly, despite asking respondents how often they use their smartphones for ''personal'' texts or e-mails, it was clear from the free-text comments that respondents use their smartphone e-mail/texting capabilities and take urgent calls during rounds for both patient care and/or family issues. It is not possible from the data to sort out the subset of respondents who use texting or e-mailing exclusively for patient care during rounds. Third, we did not survey medical students on the teams, so it is possible that their device use on rounds differs from that of housestaff and faculty. Fourth, since the survey could be completed without answering every question, response rates for some items varied slightly; there was a substantial reduction in the number of eligible residents who answered the final 2 questions on the survey about their observations of attendings' smartphone usage patterns and distraction during rounds. While the flexibility in survey completion was intended to enhance overall study participation, it is unknown how nonresponders might have affected the study results; as such, those specific results should be interpreted with some caution. Finally, our findings were based on respondents' retrospective recall, and therefore may not accurately reflect true usage patterns. Time–motion studies with real-time observation of smartphone use would provide more accurate data.

A majority of residents and attendings in our study agreed that smartphones can pose a serious distraction during attending rounds, and attendings strongly favored the institution of formal codes of conduct for smartphone use during inpatient attending rounds. The development of such policies are important for patient safety; at the same time, they are in line with medical institutions' increasing awareness about the need for guidelines regarding other aspects of ''digital professionalism.''[28] In February 2012, our hospital instituted a policy regarding appropriate device use

during inpatient attending rounds (see Supporting Appendix 3 in the online version of this article). Because our research found differences in housestaff and faculty attitudes toward smartphone use during rounds, we developed our policy after discussion with, and feedback from, all members of the inpatient team, including faculty, residents, and medical students. Incorporating the various perspectives of all stakeholders can be helpful to institutions in developing guidelines that maximize the benefits of smartphone use in the learning environment, while reducing the potential for distraction and adverse outcomes.

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