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Extending our Reach: Use of mHealth to Support Patients after Emergency Care

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mHealth is the use of mobile and wireless devices to improve health outcomes, healthcare services and health research.[1] Although mHealth is thought to have the potential to transform paradigms of health care delivery in general, it may be particularly useful for emergency department (ED) populations, for two main reasons[3,4]. First, cell phones are almost ubiquitous among our patients, with ~95% of U.S. ED patients reporting that they have cell phone access.[2] Mobile phone use and text-messaging (although not smartphone ownership) are largely independent of patients' age, gender, or socioeconomic status.[2] Some studies even show that SMS is used even more frequently among low SES, disadvantaged populations.[3] Second, patient-provider contact during emergency care is time-limited, and adequate follow-up after ED visits is often difficult to arrange. mHealth may be able to fill these gaps, by improving our delivery of preventive care [9] and extending support during the vulnerable period of care transitions, particularly for high-risk patients.

Yet evidence for the effectiveness, efficacy, and best practices around mHealth are lacking, [4] particularly in the emergency setting. The study by Arora et al[5] in this issue of *Annals of Emergency Medicine* represents an important step toward creating an evidence base.

Major strengths of Arora et al's study include using both English and Spanish-language messages; creating content that was informed by behavioral theory; and conducting follow-up assessments long after ED care. These elements of their study are critically important, helping to increase confidence that their intervention may be disseminable and valid. They support the contention that mHealth will play a key role in efforts to improve ED patients' long-term outcomes.

Of note, on the spectrum of mHealth interventions, the TExT-MED program is extremely basic. This simplicity can be both a strength and weakness. Unidirectional, broadcast "push" messages are easy to send, require no additional technology or downloads, and require minimal burden of involvement from patients. They may prompt self-monitoring, nudging

patients to take a more active role in their care. The lack of dialogue in one-way messaging, however, ignores much of the potential in mHealth.[6] An ideal mHealth intervention would fully exploit the capability of technology.[7] Such an intervention may be as simple as automated, interactive, tailored text-messaging; or it may be as complex as pre-programmed, graphically engaging presentations of patients' glucose data on a smartphone, accompanied by tailored motivational messages. [8] Automated text-message tailoring algorithms are relatively cheap to program and deploy, and are more responsive to patients' behavioral needs.

This study also leaves a number of important questions unanswered. These questions should inform the efforts of future emergency mHealth researchers.

First, we need to improve our *design* of mHealth interventions, to meet the unique needs of our patients. Important issues regarding design of an mHealth intervention are only minimally addressed by this study. For instance, how frequently and for how long should messages be sent? What type of content is most effective with patients? Are certain topics more amenable to mHealth interventions than others? Enlisting multi-disciplinary expertise in content areas such as behavioral science and human-computer interaction may help inform more patient-centered, usable mHealth designs.

Second, we need to adequately power our trials in mHealth. The field is currently limited by a large number of feasibility, effectiveness, and pilot studies. Although such studies are important first steps, they are not adequate to fully evaluate the effect of mHealth.

Finally, we need to address the role of mHealth in the context of routine emergency care. Many prior healthcare technologies have had mixed results when implemented in the real world.[9, 10] To avoid this fate for mHealth, we should address questions of provider workflow, post-discharge quality of care, and non-research-related patient enrollment at the same time that we are designing the interventions.

So where does this leave us? Although research on the topic is still in its infancy, mHealth will likely play at least some (and likely a large) role in how we care for patients in the future. As emergency physicians and acute care researchers, we have the opportunity to advance the understanding of which mHealth interventions are best for our patient populations, and how to best integrate them into systems of integrated care. The Arora et al paper will hopefully represent the first of many emergency medicine investigations into effective mHealth solutions to improve our patients' health.

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