

## Not Just Another App: Realizing the Potential of Mobile Healthcare Applications to Promote Adherence to Oral Cancer Therapy Medications

Kuang-Yi Wen, PhD

Oral cancer therapy agents are changing the treatment paradigm in oncology. In the past decade, the number of adult patients with cancer receiving oral cancer therapies has increased dramatically.<sup>1</sup> Oral cancer therapies offer convenience to patients and foster a sense of independence by increasing patient involvement in their own care. However, with less direct clinician–patient interaction and the lack of patient education and support resources readily available, poor adherence to oral cancer therapies, such as oral tyrosine kinase inhibitors in patients with chronic myeloid leukemia, has been consistently reported,<sup>2</sup> compromising treatment outcomes. Optimizing patient adherence and monitoring and managing toxicities from oral cancer therapies in the outpatient setting can be challenging for both clinicians and patients. Innovative adherence-promoting interventions are essential for increasing patients' understanding of medications and self-management skills.

Well-designed and empirically tested mobile healthcare applications, such as a smartphone app, can potentially help promote adherence to oral cancer therapies and improve side-effect management skills among patients. In particular, the penetration rate of smartphones continues to increase in the United States,<sup>3</sup> and mobile health applications have been shown to be highly scalable and cost-effective solutions for improving medication adherence and chronic disease management in other contexts.<sup>4</sup> In this issue of *JNCCN*, Greer et al<sup>5</sup> reported on a randomized trial that evaluated a smartphone app to improve management of symptoms and adherence to oral cancer therapies. The mobile app was previously developed through a user-centered design approach and includes a medication plan with reminders, a symptom reporting module, and patient education. In this study, 181 patients were randomized into either the standard care group or smartphone mobile app group for 12 weeks. App intervention participants received reminders to take their oral cancer therapy and were prompted to complete weekly adherence and symptom reports.

The findings did not show differences between the 2 groups in any outcome measure, including adherence, symptoms, quality of life, and healthcare use. Interestingly, however, compared with standard care, the mobile app was more beneficial in improving adherence among patients who reported baseline adherence problems or elevated anxiety. Given these results, the ability to identify at-risk patients in need of adherence-promoting supportive interventions and determining when and how to deliver these interventions is critical, particularly for patients with initial barriers. High-risk patients must be screened, including monitoring for anxiety and depression.

Furthermore, some evidence suggests that this effect might also be applicable for underserved and minority patients, who were underrepresented in the study by Greer et al.<sup>5</sup> Previous studies suggest that minority patients and those from lower socioeconomic backgrounds receive less information and support from providers, and they have been consistently reported to have a higher likelihood of discontinuing



**KUANG-YI WEN, PhD**

Kuang-Yi Wen, PhD, is an Associate Professor of Population Science Division in the Department of Medical Oncology, and Leader of the Digital Technology Core of the Transdisciplinary Integration of Population Science mechanism at Sidney Kimmel Cancer Center, Thomas Jefferson University.

doi: 10.6004/jnccn.2020.7532

The ideas and viewpoints expressed in this commentary are those of the author and do not necessarily represent any policy, position, or program of NCCN.

 [See page 133 for related article.](#)

medication.<sup>6</sup> Because ownership of smartphones among low-income populations has increased, future research must consider the mobile phone literacy of target populations so that the use of mobile technologies to improve oral cancer therapies will not further exacerbate health disparities.<sup>7</sup>

Mobile health interventions have shown their effectiveness in decreasing emergency department use in other chronic disease contexts.<sup>8</sup> Greer et al<sup>5</sup> did not find this effect between study groups but did find that greater engagement with the mobile app was associated with improved adherence and fewer emergency department visits that led to hospitalization. In particular, in the 12-week intervention, participants used the app for a mean of 57 minutes (range, 0–299 minutes) and accessed the app on 22 discrete days (SD, 21), highlighting a variety of app user behaviors. Many electronic or mobile health interventions suffer from poor long-term engagement. Future studies might consider eliciting “stickiness” that will produce effective engagement related to adherence outcomes.

The app in Greer et al’s study is a stand-alone system and did not electronically feed patient-reported data into the electronic medical records (EMR) system. Although the patient’s weekly reports were transmitted to oncology clinicians via

email, the utility and impact of these app-generated clinician reports were not evaluated. Integrating mobile health-enabled patient-reported outcomes such as medication adherence behaviors or side effects is an emerging trend that can not only promote adherence but also facilitate care coordination and communication, ultimately reducing resource use and improving outcomes. If the clinical care team can be notified promptly through the EMR system when a patient’s reported symptom reaches a predefined threshold or a patient discontinues the medication, then timely patient support and proactive follow-up care can lead to better treatment management.

Although Greer et al did not find that the intervention impacted adherence outcome, this modality can be easily leveraged by the healthcare community as a strategy to further engage patients on oral cancer therapies between visits to improve health outcomes and care quality.

**Disclosure:** The author has disclosed that she has no financial interests, arrangements, or affiliations with the manufacturers of any products discussed in this article or their competitors.

**Correspondence:** Kuang-Yi Wen, PhD, Division of Population Science, Department of Medical Oncology, Sidney Kimmel Cancer Center, Thomas Jefferson University, 834 Chestnut Street, Suite 314, Philadelphia, PA 19107. Email: Kuang-Yi.Wen@jefferson.edu

## References

1. O’Neill V, Twelves, C. Oral cancer treatment: developments in chemotherapy and beyond. *Br J Cancer* 2002;87:933–937.
2. Ganesan P, Sagar TG, Dubashi B, et al. Nonadherence to imatinib adversely affects event free survival in chronic phase chronic myeloid leukemia. *Am J Hematol* 2011;86:471–474.
3. Smith A. 46% of American adults are smartphone owners. Available at: <http://www.parksbynature.com/mobile-power-downloads/Pew-Research-2012-Smartphone-Study.pdf>. Accessed January 9, 2020.
4. Free C, Phillips G, Galli L, et al. The effectiveness of mobile-health technology-based health behaviour change or disease management interventions for health care consumers: a systematic review. *PLoS Med* 2013;10:e1001362.
5. Greer JA, Jacobs JM, Pensak N, et al. Randomized trial of a smartphone mobile app to improve symptoms and adherence to oral therapy for cancer. *J Natl Compr Canc Netw* 2020;18:133–141.
6. Mathes T, Jaschinski T, Pieper D. Adherence influencing factors—a systematic review of systematic reviews. *Arch Public Health* 2014;72:37.
7. Bailey SC, O’Conor R, Bojarski EA, et al. Literacy disparities in patient access and health-related use of Internet and mobile technologies. *Health Expect* 2015;18:3079–3087.
8. Arora S, Peters AL, Burner E, et al. Trial to examine text message-based mHealth in emergency department patients with diabetes (TEXT-MED): a randomized controlled trial. *Ann Emerg Med* 2014;63:745–754.