Introduction to focused issue on mHealth and social media interventions for cancer

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Rapid advances in mHealth and social media technologies are contributing to a burgeoning number of novel clinical and public health interventions for preventing, controlling, diagnosing, and treating cancer (1,2). Exciting innovations in mHealth and social media applications are occurring across the cancer spectrum, from primary prevention to screening, early diagnosis, treatment, survivorship, and end-of-life care. Additional innovations in technologies are enhancing research data collection and patient recruitment and treatment adherence in oncology trials (2,3). The articles included in this focused issue of the journal highlight many of these important developments and future directions.

As noted by O'Leary *et al.* (3), mHealth and social media interventions are useful for improving the efficiency and reach of cancer screening interventions through the provision of educational messages and reminders about the importance of routine screening. Cellphone text messaging and smartphone apps for cancer screening, smoking cessation; weight management through caloric restriction, healthy diet and nutrition, and physical activity, and helping app users to avoid carcinogenic exposures at home and in the workplace are all relevant to cancer prevention (4-11). Coughlin *et al.* (12) discuss the potential for research-tested smartphone apps to provide a low-cost, effective strategy for preventing breast cancer in women. Of particular interest are apps that are suitable for people with varying levels of health literacy and eHealth literacy (12,13). Culturally tailored smartphone apps for preventing cancer among specific cultural, racial, and ethnic groups (for example, African Americans and sexual minorities) are also important, as discussed by Coughlin *et al.* (12) and Bowen

et al. (14). These papers provide encouragement for the use of mHealth applications to solve health disparities, not widen them. The paper by Quintiliani *et al.* (15) highlights the potential for using mHealth strategies for health promotion among very poor and marginal populations, such as public housing residents. Social media interventions have also employed Facebook to provide cancer-related health messages, as discussed by O'Leary *et al.* (3). Research-tested apps are also needed for people who have a positive family history of cancer. The article by Theiss *et al.* (16) in this focused issue of the journal highlights the U.S. Centers for Disease Control and Prevention's (CDC) Bring Your Brave campaign, which uses targeted, measurable social media to raise awareness of breast cancer among high-risk women younger than 45 years. In low- and middle-income countries, mHealth modalities have been used as adjuncts for the early detection of cervical cancer (17).

Two of the articles included in this focused issue highlight the utility and future promise of mHealth modalities to assist patients who are currently receiving oncology care (3,18). The examples provided by O'Leary *et al.* (3) include wearable technology to assist patients suffering from chemotherapy-induced peripheral neuropathy and telemonitoring solutions for pediatric cancer patients that improve the quality of life of these patients (19,20). Telemedicine is an important adjunct to oncology care where patients face barriers to receiving diagnostic and treatment services due to rural residence or geographic distances. Fu *et al.* (18) provide an important case study of an innovative mHealth self-care intervention for patient management of lymphedema following breast

cancer treatment. The patient-centered, web- and mobile-based educational and behavioral mHealth intervention provides safe and effective electronic assessment and self-care strategies for lymphedema symptom management. In addition to applications for cancer prevention, early detection, and treatment, there is an emerging literature on mHealth and social media interventions for cancer survivors and for patients who are receiving end-of-life care (21-24). For example, recent studies have tested mHealth interventions for uterine cancer survivors (an accelerometer to measure physical activity) and African American breast cancer survivors (a web-based app to promote adherence with dietary and physical activity guidelines) (23,24). The study by Smith *et al.* (24) is particularly interesting because community-based participatory research principles were followed in development the intervention.

There is an ongoing need for the evaluation of cancer-related mHealth and social media interventions to ensure they are safe and effective. An increasing number of guidelines have been proposed for successful smartphone app development (1). In the U.S. and other countries, government agencies have begun to regulate mHealth interventions such as those used in oncology care (25,26). The U.S. Food and Drug Administration (FDA) released guidance for mobile medical apps that distinguish between mobile medical apps that are subject to FDA regulation and unregulated apps such as those useful for health education in the general population (25). The FDA regulates mHealth devices such as apps that convert a smartphone or tablet computer into a medical device for clinical testing or displaying diagnostic images from X-rays or magnetic resonance imaging. Health Insurance Portability and Accountability Act (HIPAA) regulations may also apply such as when an app developed for covered entities and their business associates (e.g., health plans, hospitals, physicians) will include protected health information (1,27). Apps that store medical information or that send personal information over the Internet should be encrypted in accordance with privacy regulations and security best practices (1).

The articles included in this focused issue of the journal highlight the innovativeness, creativity, and flexibility that are hallmarks of recent developments in cancer-related mHealth and social media interventions. These ongoing technological advances are likely to contribute importantly to alleviating the burden of cancer, improving quality of life, empowering patients, and improving patient-provider communication.

Acknowledgements

Footnote

References

1. Coughlin S, Thind H, Liu B, et al. Mobile Phone Apps for Preventing Cancer Through Educational and Behavioral Interventions: State of the Art and Remaining Challenges. JMIR Mhealth Uhealth 2016;4:e69.
2. Panayi ND, Mars MM, Burd R. The promise of digital (mobile) health in cancer prevention and treatment. Future Oncol 2013;9:613-7.
3. O'Leary DP, Zaheer A, Redmond HP, et al. Integration of advances in social media and mHealth technology are pivotal to successful cancer prevention and control. mHealth 2016;2:38.
4. Wu HC, Chang CJ, Lin CC, et al. Developing screening services for colorectal cancer on Android smartphones. Telemed J E Health 2014;20:687-95.
5. Ubhi HK, Kotz D, Michie S, et al. Comparative analysis of smoking cessation smartphone applications available in 2012 versus 2014. Addict Behav 2016;58:175-81.
6. Abroms LC, Padmanabhan N, Thaweethai L, et al. iPhone apps for smoking cessation: a content analysis. Am J Prev Med 2011;40:279-85.
7. Stephens J, Allen J. Mobile phone interventions to increase physical activity and reduce weight: a systematic review. J Cardiovasc Nurs 2013;28:320-9.
8. Coughlin SS, Whitehead M, Sheats JQ, et al. A Review of Smartphone Applications for Promoting Physical Activity. Jacobs J Community Med 2016;2.
9. Middelweerd A, Mollee JS, van der Wal CN, et al. Apps to promote physical activity among adults: a review and content analysis. Int J Behav Nutr Phys Act 2014;11:97.
10. Coughlin SS, Whitehead M, Sheats JQ, et al. Smartphone Applications for Promoting Healthy Diet and Nutrition: A Literature Review. Jacobs J Food Nutr 2015;2:021.
11. Coughlin SS, Jacobs M, Thind H, et al. On the Need for Research-Tested Smartphone Applications for Reducing Exposures to Known or Suspected Breast Carcinogens in Work and Home Environments. J Environ Health Sci 2015;1.

12. Coughlin SS, Thind H, Liu B, Wilson C. Towards research-tested smartphone applications for preventing breast cancer. mHealth 2016;2:26.

13. Norman CD, Skinner HA. eHealth Literacy: Essential Skills for Consumer Health in a Networked World. J Med Internet Res 2006;8:e9.

14. Bowen D, Jabson, J, Kamen, C. mHealth: an avenue for health promotion among sexual minority populations? mHealth 2016;2:36.

15. Quintiliani LM, Reddy S, Goodman R, Bowen DJ. Information and communication technology use by female residents of public housing. mHealth 2016;2:39.

16. Theiss SK, Burke RM, Cory JL, et al. Getting beyond impressions: an evaluation of engagement with breast cancer-related Facebook content. mHealth 2016;2:41.

17. Ricard-Gauthier D, Wisniak A, Catarino R, et al. Use of Smartphones as Adjuvant Tools for Cervical Cancer Screening in Low-Resource Settings. J Low Genit Tract Dis 2015;19:295-300.

18. Fu MR, Axelrod D, Guth AA, et al. mHealth self-care inteventions for managing symptoms following breast cancer treatment. mHealth 2016;2:28.

19. Schwenk M, Grewal GS, Holloway D, et al. Interactive Sensor-Based Balance Training in Older Cancer Patients with Chemotherapy-Induced Peripheral Neuropathy: A Randomized Controlled Trial. Gerontology 2016;62:553-63.

20. Duregger K, Hayn D, Morak J, et al. An mHealth system for toxicity monitoring of paediatric oncological patients using Near Field Communication technology. Conf Proc IEEE Eng Med Biol Soc 2015;2015:6848-51.

21. Young-Afat DA, van Gils CH, Bruinvels DJ, et al. Patients' and health care providers' opinions on a supportive health app during breast cancer treatment: a qualitative evaluation. JMIR Cancer 2016;2:e8.

22. Puszkiewica P, Roberts AL, Smith L, et al. Assessment of cancer survivors' experiences of using a publicly available physical activity mobile application. JMIR Cancer 2016;2:e7.

23. Basen-Engquist K, Carmack C, Brown J, et al. Response to an exercise intervention after endometrial cancer: differences between obese and non-obese survivors. Gynecol Oncol 2014;133:48-55.

24. Smith SA, Whitehead MS, Sheats J, et al. A Community-Engaged Approach to Developing a Mobile Cancer Prevention App: The mCPA Study Protocol. JMIR Res Protoc 2016;5:e34.

25. Cortez NG, Cohen IG, Kesselheim AS. FDA regulation of mobile health technologies. N Engl J Med 2014;371:372-9.

26. U.S. Department of Health and Human Services, Food and Drug Administration. 2013 Sept 25. Mobile medical applications: guidance for industry and Food and Drug Administration staff. Available online: http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM263366.pdf

27. Greeen AH. MobilHealthNews. 2011. When HIPAA applies to mobile applications. Available online: http://boilhealthnews.com/11261/when-hipaa-applies-to-mobile-applications/