Smarter Palliative Care for Cancer: Use of Smartphone Applications

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ABSTRACT

Smartphones are technologically advanced mobile phone devices which use software similar to computer-based devices as a user-friendly interface. This review article is aimed to inform the palliative care professionals, cancer patients and their caregivers about the role of smartphone applications (apps) in the delivery of palliative care services, through a brief review of existing literature on the development, feasibility, analysis, and effectiveness of such apps. There is a dearth need for sincere palliative care clinicians to work together with software professionals to develop the suitable smartphone apps in accordance with the family/caregivers' necessities and patients' biopsychosocial characteristics that influence the technology driven evidence informed palliative cancer care.

Key words: Palliative care information technology, Palliative oncology, Telemedicine, Telephone triage

INTRODUCTION

Telemedicine[1] and Telerehabilitation[2] paved way for telephone triage which was extensively used for palliative cancer care.[3] The global observatory for eHealth defined mHealth or mobile health as medical and public health practice supported by mobile devices such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.[4]

SMARTPHONES AND HEALTHCARE

Smartphones are technologically advanced mobile phone devices which use software similar to computer-based devices as a user-friendly interface.[5] A single smartphone could simultaneously function as a pager, cellular telephone, and PDA.[6] The use of smartphones and their software applications (apps) provides the health professionals with opportunities to integrate the recent technology into clinical practice.[7] Applications are software installed in mobile devices such as smartphones.

Availability of smartphone apps

Mosa *et al.*[8] reviewed 55 articles that reported 83 smartphone apps of which: Fifty-seven applications for healthcare professionals focused on disease diagnosis (21), drug reference (6), medical calculators (8), literature search (6), clinical communication (3), Hospital Information System client applications (4), medical training (2), and general healthcare applications (7); 11 applications for medical or nursing students focused on medical education; and 15 applications for

Access this article online

Quick Response Code:

Website: www.jpalliativecare.com

DOI: 10.4103/0973-1075.173950

How to cite this article: Jamwal NR, Kumar SP. Smarter palliative care for cancer: Use of smartphone applications. Indian J Palliat Care 2016;22:108-10.

patients focused on disease management with chronic illness (6), ENT-related (4), fall-related (3), and two other conditions (2).

Nwosu and Mason[9] reviewed all smartphone apps targeted at palliative care professionals for the five most popular operating systems (iPhone, Blackberry, Android, Palm, and Windows) and found six apps-blog orientated apps (Pallimed and Geripal), an app containing guidelines for eight cancer networks (PalliApp), an educational app (Palliative Care), and opioid dose converter apps (eOpioid and PalliCalc).

Development of smartphone apps for cancer

Jibb *et al.*[10] developed the decision algorithm and system requirements that would inform the pain management advice provided by a real-time smartphone-based pain management app for adolescents with cancer. The authors performed a comprehensive literature review, the result of which was disseminated to 15 international experts (clinicians, scientists, and a consumer) in pediatric pain, pediatric oncology, and mHealth (mobile health WHO, 2015)[4] design, who participated in a 2-day consensus conference. They reached consensus on important pain inputs (or pain descriptors), pain management advice, and system design requirements. Their consensus-based recommendations included, "pain inputs by adolescents would require action (pain management advice) from the app, the appropriate advice the app should provide to adolescents in pain, and the functional requirements of the app."

Wu *et al.*[11] developed an intelligent colorectal cancer screening app on Android™ (Google™, Mountain View, CA) smartphones based on a data mining approach using the decision tree algorithms. The authors found that it could assist the clinicians with early screening, diagnosis, and treatment options, prevent the occurrence of complications and thus, reach the goal of preventive medicine.

Feasibility of smartphone apps for cancer

Min *et al.*[12] evaluated the feasibility of an app for sleep disturbance-related data (sleep patterns, anxiety severity, and mood status) from 30 breast cancer patients who were receiving chemotherapy over a 90-day period. The authors determined the acceptance and compliance rates by obtaining 1215 self-reported sleep disturbance data items, which were collected from 2700 daily push notifications sent to patients. Thus, they determined that the smartphone app was feasible for 90-day longitudinal data collection.

Analysis of smartphone apps on cancer

Bender *et al.*[13] characterized the purpose and content of cancer-focused smartphone apps available for use by the general public and the evidence on their utility or effectiveness in their systematic review of the four major smartphone platforms - iPhone, Android, Nokia, and BlackBerry, and a systematic review of literature from MedLine, Embase, and the Cochrane Library. Of the 295 apps found, 138 apps related to breast cancer, 95 were on awareness about cancer, 78 apps related to an educational interventions for cancer, 11 were on disease management, 6 were on cancer prevention, and 3 were on social support.

Pandey *et al.*[14] analyzed 77 cancer-related applications available on the Apple iTunes platform to evaluate the availability and content (cost, type of information, validity, and involvement of health-care agencies) of cancer-related smartphone applications. The authors found the need to improve the accountability and reliability of cancer-related smartphone applications, since they found that only 55.8% provided scientifically validated data which differed based upon whether they were aimed at the general population or health-care professionals.

Effectiveness of smartphone apps in cancer

Börve *et al.*[15] conducted an open, controlled, multicenter, prospective observational study in which they sent smartphone teledermoscopy referrals received from 20 primary healthcare centers to 2 Dermatology Departments for the triage of skin lesions of concern using a smartphone application and a compatible digital dermoscope. The authors compared the treatment outcomes of 816 patients referred via smartphone teledermoscopy with 746 patients referred via traditional paper-based system, and found shorter waiting times and reliable triage decisions for smartphone-assisted teledermoscopy.

DISCUSSION AND CONCLUSION

Before using or advocating the smartphone usage as a part of the telephone triage for cancer patients, it is imperative to accept the evidence of its usefulness as being insufficient and predominantly anecdotal. As Bender *et al.*[13] put forth "there are 100s of cancer-focused apps with the potential to enhance efforts to promote behavior change, to monitor a host of symptoms and physiological indicators of disease, and to provide real-time supportive interventions, conveniently and at low cost. However, there is a lack of evidence on their utility, effectiveness, and safety." Jibb *et al.*[10] (2014) opined that, "the use of

smartphone technology may facilitate rapid, in-the-moment pain support for this population."

Quicker access to care services may be enabled through the improvements in mobile telecommunication technologies, and clinicians may also be able to collect the patient-reported outcome data more frequently.[12] Whitlow *et al.*[16] found that smartphones significantly reduced the patient interruptions, allowed nurses to stay with the patients, and reduced waiting time for a returned call. However, we need to recall the disadvantages of using smartphones since McBride[17] reported the six different attributes of distraction as (1) An experience by a clinician; (2) an intrusion into a primary clinical task; (3) discontinuity of the clinical task; (4) externally or internally initiated; (5) situated in a healthcare setting; and (6) mediated by a smartphone or other mobile device.

There is a need for sincere palliative care clinicians to work together with the software professionals to develop suitable apps in accordance with the family/caregivers' necessities and patients' biopsychosocial characteristics that influence the technology driven evidence informed palliative cancer care.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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