Original article

Smartphone breast applications − What's the evidence?

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ABSTRACT

Introduction: There are around 40,000 healthcare applications (apps) available for smartphones. Apps have been reviewed in many specialties. Breast cancer is the most common malignancy in females with almost 1.38 million new cases a year worldwide. Despite the high prevalence of breast disease, apps in this field have not been reviewed to date. We have evaluated apps relevant to breast disease with an emphasis on their evidence base (EB) and medical professional involvement (MPI).
Methods: Searching the major app stores (apple iTunes, Google Play, BlackBerry World, Windows Phone) using the most common breast symptoms and diseases identified relevant apps. Extracted data for each app included target consumer, disease focus, app function, documentation of any EB, documentation of MPI in development, and potential safety concerns.
Results: One-hundred-and-eighty-five apps were reviewed. The majority focused on breast cancer ($n = 139$, 75.1%). Educational ($n = 94$) and self-assessment tools ($n = 30$) were the most common functions demonstrated. EB and MPI was identified in 14.2% and 12.8% of apps respectively. Potential safety concerns were identified in 29 (15.7%) apps.
Conclusions: There is a lack of EB and MPI in the development of current breast apps. Safety concerns highlight the need for regulation, full authorship disclosure and clinical trials. A robust framework for identifying high quality applications is necessary. This will address the current barrier pertaining to a lack of consumer confidence in their use and further aid to promote their widespread implementation within healthcare.

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Introduction

Mobile phones have become a ubiquitous technology in both the developed and developing worlds [1]. Earlier handsets offering only phone call and text messaging capabilities have been replaced by increasingly sophisticated devices known as smartphones.

Smartphones are powered by computer operating systems and offer increased functionality such as touch screen technology, audio, video, internet access and house a host of in-built sensors such as wi-fi, Bluetooth, GPS (global positioning system), accelerometers, and cameras. These devices are capable of running standalone software applications known as apps.

App markets have grown rapidly with the increasing usage and acceptance of smartphones [2]. The most popular examples of such markets include Apple iTunes, Android Google Play, BlackBerry World, and Windows Phone Stores. It is estimated that there were 102 billion app downloads in 2013 generating revenues of $26 billion [3].

Mobile health (mHealth) is defined as the delivery of healthcare or health related services through the use of portable devices [4]. Smartphone and app technologies have been responsible for expansion within this sector. There are currently around 40,000 healthcare related apps (mHealth apps) available through app stores and their use in clinical practice is becoming increasingly

common [5]. Examples of medical apps in widespread use currently include the Medscape and Epocrates apps which are clinical reference tools, and the MedCalc app which provides physicians with access to complex medical formulae, scoring systems, scales, and classifications.

The use of mHealth apps has been evaluated in various fields of medical practice including obesity surgery [2], colorectal surgery [6], vascular surgery [7], hernia surgery [8], pain management [9], urology [10] and more [11–15]. Concern regarding misleading content, a lack of evidence base, and an absence of medical professional involvement in app development has emerged through these studies, with repeated calls for regulation and robust clinical trials to prove efficacy [2,6,8,9,13,16–18].

Despite the high prevalence of both benign and malignant breast disease mHealth apps within this field have not been reviewed to date. Breast pathology is responsible for a large proportion of presentations to general practitioners and breast cancer is the commonest malignancy in females worldwide with the highest incidences occurring in Europe, Australia, new Zealand and North America [19,20]. A woman's lifetime risk of developing breast cancer in the United Kingdom (UK) is 1 in 8 [19]. There are almost 1.38 million new cases a year worldwide and breast cancer accounts for 23% of all cancers and 14% of deaths from cancer [21].

The aim of this study is to assess the status of contemporary apps targeted at breast disease with particular focus on their documented evidence base (EB) and the degree of medical professional involvement (MPI) in design.

Methods

Smartphone mHealth apps specifically relating to breast disease were identified by searching the four largest app stores (Apple iTunes, Google Play, BlackBerry World, Windows Phone). Each app store was searched using terms related to the most prevalent breast diseases and presentations. With respect to breast disease the terms breast cancer, fibroadenoma, fibrocystic breast disease, fibroadenosis, breast cysts, gynaecomastia, mastitis, breast abscess, breast infection, and Paget's disease were used. With respect to breast presentation the terms breast lump, breast mass, breast pain, mastalgia, nipple discharge, galactorrhoea, and breast augmentation were used. Searches were performed in February 2014.

For each app data was extracted from the app store overview provided by the developer and from the developer website, and consisted of: 1) app store category, 2) year of release and publisher information, 3) app price, 4) target consumer, 5) focus of the app within the field of breast medicine, 6) app function, 7) documentation of EB, 8) documentation of MPI, 9) potential safety concerns, 10) commercial interests, 11) number and length of written reviews, and 12) number and score of star rating reviews.

Only apps in the English language and specifically targeting breast disease were included. Apps that incorporated breast disease as a small component of a larger remit were excluded (for example, apps that provided users with information on multiple cancers such as bowel, lung, prostate, and breast, were excluded as their primary focus was not breast disease). Apps targeted at breast-feeding were also excluded.

Results

The app store search revealed 215 relevant apps (Fig. 1). Thirty of these were identified as duplicates, available for download in both the Google Play app store and one other. In all cases duplicates were removed from the less popular app market, resulting in the exclusion of 28 apps from the Apple App Store, and a single app from each of the Windows Phone and BlackBerry World app stores. The remaining 185 apps were included in the study for further analysis (118 apps in Google Play, 59 in Apple iTunes, 6 in Windows Phone, and 2 in BlackBerry World app stores).

The first breast app was released in 2009. A total of 3 apps were released that year with a general year on year increase thereafter.
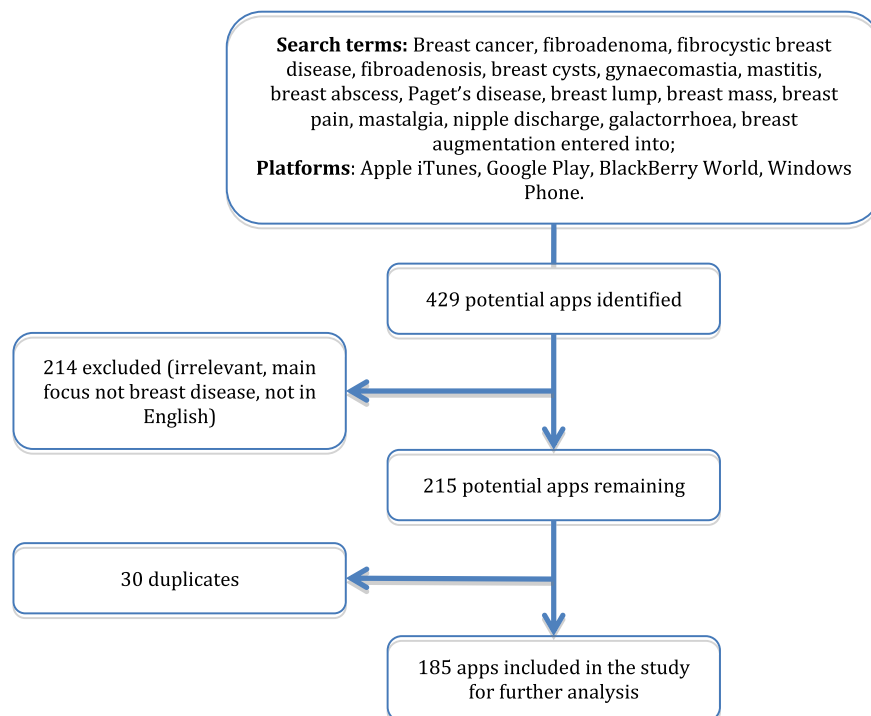
Search terms: Breast cancer, fibroadenoma, fibrocystic breast disease, fibroadenosis, breast cysts, gynaecomastia, mastitis, breast abscess, Paget's disease, breast lump, breast mass, breast pain, mastalgia, nipple discharge, galactorrhoea, breast augmentation entered into;
Platforms: Apple iTunes, Google Play, BlackBerry World, Windows Phone.

429 potential apps identified

214 excluded (irrelevant, main focus not breast disease, not in English)

215 potential apps remaining

30 duplicates

185 apps included in the study for further analysis

Fig. 1. Search methodology.