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Growth of mobile applications in dermatology - 2017 update

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Abstract

Background: More than 80% of households in the US have a smartphone. Growth of mobile applications (apps) has grown in parallel with access to smartphones. Mobile health apps are used in medical fields, including dermatology. These apps allow patients to access information regarding dermatology conditions as well as access physicians via teledermatology.

Purpose: To analyze changes in number of dermatology mobile apps since 2014 and discuss benefits and drawbacks of mobile application growth to dermatology.

Methods: Apple, Android, and Windows were queried for dermatology-related apps. The apps were categorized by purpose and compared to previously published data to assess growth and change in dermatology apps.

Results: A total of 526 dermatology mobile apps were found corresponding to an 80.8% growth in dermatology apps since 2014. The market share of teledermatology increased from 11.0% in 2014 to 20.1% in 2017.

Conclusions: Dermatology apps continue to grow at a pace comparable to general app growth. Teledermatology apps experienced significant growth from 2014 to 2017. This growth has allowed time-efficient and cost-effective access to dermatologists, especially in rural areas. The growth of dermatology apps targeting patients allows for patient autonomy but also can result in access to inaccurate information regarding dermatology conditions.

Keywords: dermatology, teledermatology, mobile apps, mobile health

Introduction

As of November 2016, 77% of Americans owned a smartphone, compared to less than 60% of Americans in 2014 [1]. Smartphones are in 84% of US households whereas laptops or desktop computers are found in only 80% of households [2]. Mobile applications (apps) are estimated to account for 57% of digital media usage [3]. In March 2017, Google Play offered 2.8 million apps for Android devices and Apple offered 2.2 million for iOS devices [4]. There was an estimated growth of 200,000 apps in Google play from December 2016 to March 2017 [4]. Both patients and healthcare professionals are increasingly relying on mobile health apps for education and access to information [5, 6]. Apps are used in health settings including surgical training [7], infectious disease treatment [8], medical education [5], smoking cessation [9], and diabetes education [10]. In dermatology, mobile apps are used by patients to track disease or consult with a physician [11]. Dermatologists use apps as general references and medical students use apps as study aids [11]. Given the rapid development of mobile health apps and near ubiquitous access to smartphones in the U.S., we conducted a follow up query of dermatology-related mobile apps to analyze changes since the last search in 2014.

Methods

In August 2017 Apple, Android, and Windows apps were searched. These platforms were selected based

on their popularity as platforms on smartphones. Search terms included: (1) dermatology, (2) psoriasis, (3) rosacea, (4) acne, (5) skin cancer, (6) melanoma, (7) eczema, and (8) teledermatology. Researchers manually excluded apps that were classified as cosmetics, general medicine, private practice, non-English, product advertisements, Photoshop, or claims to cure skin disease.

Once the list of apps was tailored to meet inclusion and exclusion criteria, the apps were categorized as one of the following: (1) conference, (2) dermoscopy, (3) disease guide, (4) educational aid, (5) general dermatology reference, (6) journal, (7) photograph storage/sharing, (8) self-surveillance/diagnosis, (9) teledermatology, and (10) other. These values were compared to reported values in 2014. Growth by percent in each category was calculated.

No IRB approval was obtained as these data are publicly available and do not involve human subjects.

Results

This study analyzed a total of 526 dermatology apps. The apps were sorted into their respective categories: conference (43 [8.2%]), dermoscopy (13 [2.5%]), disease guide (80 [15.2%]), educational aid (62 [11.8%]), general dermatology reference (77 [14.6%]), journal (24 [4.6%]), photograph storage/sharing (21 [4.0%]), self-surveillance/diagnosis (90 [17%]), teledermatology (106 [20.1%]), other (10 [1.9%]). Most apps fell within the category of teledermatology, followed by self-surveillance/diagnosis, disease guide, and general dermatology reference (Table 1).

A total of 235 new dermatology-related apps existed on the market in 2017 compared to 2014 (Table 2). There was an increase in all categories aside from apps categorized as other. The number of teledermatology apps increased in market share from 11% of total apps in 2014 to 20% in 2017 (Table 2). There was a 3.3-fold increase of teledermatology apps from 2014 (n=32) to 2017 (n=106), (Table 2).

Discussion

In 2014, Apple offered 1.2 million apps in its app store. At the time of this study in 2017, Apple offered 2.2 million apps corresponding to an 83% increase of Apple apps in the previous three years. This value closely corresponds to an 81% increase from 2014 to 2017 of dermatology apps offered on Apple, Android, and Windows. Teledermatology apps grew at a striking 3.3-fold increase (231% growth, Table 1). Teledermatology is a growing field and has been shown to be accurate, reduce wait times, increase access to dermatologists, and save costs in outpatient settings [12-15].

There are two types of teledermatology supported on mobile apps. One method includes a live consult with a dermatologist. The other option is a store-and-forward method in which the patient takes and sends a photograph to the dermatologist for review at a later time. Some insurance plans will cover telemedicine but there are stringent requirements. Medicare and Medicaid cover live teledermatology if certain criteria are met such as the patient being located in a Health Professional Shortage Area. Since Medicaid varies from state to state, many of the teledermatology services are specific to residents of only one state [17]. Patients who do not qualify for insurance coverage of teledermatology can pay a flat fee for a consultation with a dermatologist via a smartphone app. These fees are comparable to copays and often range from \$40-60 but can be as low as \$25 if the patient is willing to upload a picture and wait 48 hours. In an economy driven by time, the convenience for both patients and providers contributes to growth and success of teledermatology.

Another explanation for the rapid growth of teledermatology apps is the different regulation of teledermatology by state which necessitates state-specific apps. The American Academy of Dermatology (AAD) published criteria for high quality teledermatology and the AAD's first requirement is that physicians delivering teledermatology services must be licensed in the state within which the patient receives services [16]. The erosion of the patient-physician relationship is a potential concern surrounding the growth of

teledermatology. However, the AAD has laid out best practices to foster patient relationships. These guidelines include suggestions to i) see the patient in person prior to use of teledermatology or ii) create a relationship through live, interactive consultation before use of store-and-forward technology [16].

Dermatology apps provide patients with an opportunity to take charge of their own dermatologic health. There are 90 self-surveillance and diagnosis apps offered on the three platforms queried. This category has doubled since 2014 (Table 2). In addition, patients have access to 80 apps that function as disease guides (Table 1). These apps allow patients to learn more about their condition and available treatments. In addition to dermatology apps for patients, there are many apps whose target audience includes dermatologists and students. General dermatology reference apps grew by 33% from 2014 to 2017 and educational aid apps grew by 32% demonstrating demand for apps from the provider and student perspective (Table 2).

This study also demonstrates an increase in app use by dermatology providers. The market share of conference apps increased from 1.7% in 2014 to 8.2% in 2017 (Table 2). The trend corresponds with an increase in communication and sharing during dermatology conferences.

The present study excluded apps that claimed to "cure skin disease." There is an abundance of unvetted information on the internet, including information on apps, available to dermatology patients. Patients are not equipped to critically evaluate the available information for accuracy. In

the age of easily accessible information, patients also encounter misinformation. It is imperative to educate patients regarding their diseases and to help them find accurate dermatology resources.

Limitations of this study include an inability to estimate precise use of teledermatology as the apps do not reveal how many patients they serve. In addition, previous studies have evaluated the number of apps on Nokia and Blackberry. However, because these platforms together account for <1% of the 2017 market share of operating systems for smartphones these platforms were not considered in the present study [4].

Conclusion

Dermatology apps are growing at a rate similar as apps overall (81% and 83% respectively). There are a variety of apps that target both patient and provider audiences. Teledermatology apps have experienced notable growth and have tripled in number from 2014 to 2017. The growth trends indicate that mobile apps will continue to shape the future of dermatology in realms including patient-provider relationship, patient education, and provider communication. Mobile apps and other electronic resources have the potential to improve access and outcomes for patients, but these resources must be utilized with appropriate guidelines and protocols. In an age of readily accessible information and misinformation, it is important to educate patients regarding accurate dermatology resources. Further studies must be conducted to evaluate the reliability of dermatology resources used by patients.

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