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Mobile health applications for asthma

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TO THE EDITOR:

Asthma affects 300 million people in the world,¹ and individuals with asthma are increasingly turning to mobile health to help with asthma management. Mobile health, or mHealth, refers to mobile computing, medical sensor, and communications technologies that can enhance chronic disease care.²

The number of medical apps has greatly increased over the past decade. As of 2012, there were more than 13,000 health care-related apps available to Apple iPhone users and more than 6,000 available in the Android store.³ It is becoming common for patients to ask their physicians to help them choose apps, but many physicians do not feel confident in recommending apps to patients.⁴ In this letter, we provide an overview of the types of apps that are currently available to aid patients with asthma. The apps reviewed are not endorsements of app quality.

We focused our review on the 2 most popular smartphone brands, the Apple iPhone and Google Android, which, as of February 2014, comprised more than 90% of the U.S. smartphone market.⁵ To identify asthma-related mobile apps, we used the general search bar in the iTunes store (for the iPhone) and Google Play (for the Android). We conducted our searches in April 2014 and separately entered the following search terms to identify apps that were related to asthma: “asthma,” “pulmonary,” and “inhaler.” We used the descriptions provided by app creators to confirm app relevance to asthma management and categorize apps. If an app served multiple functions, we grouped the app according to its primary category. In Table I, we present the number of apps in each category and subcategory. We did not include non-English apps and apps that were not specific to asthma in our results. In Table II, we provide examples of asthma-related apps and their functions, available devices, and prices. A complete, categorized list of all apps can be found in the Online Repository of this article at www.jaci-inpractice.org. Of 209 total distinct asthma-related apps, 50% (n = 105) were available for Android, 34% (n = 71) for iPhone, and 16% (n = 33) for both devices. The apps available for iPhone are also available for iPad. We did not include an assessment of the Galaxy app store as there is currently only one available app for asthma.

Over half (58%, n = 122) of apps were free and 39% (n = 81) were paid. The paid apps ranged in cost from \$0.99 to \$29.99, and some (3%, n = 7) had free but less comprehensive versions available. The remaining 2% of apps (n = 6) were free to download, but required a paid subscription to access all features, required the purchase of an external device, or were demo versions of paid apps or software applications.

The largest proportion of asthma-related apps (52%, n = 109) focus on teaching and training in techniques related to managing asthma. Most of these apps (39%, n = 42) teach users alternative methods for treating asthma, such as yoga postures, acupressure, and breathing exercises. Many apps (22%, n = 24) provide general information about asthma through text, video, and/or audio formats. Other apps (17%, n = 18) provide treatment information; for example, some demonstrate an inhaler technique. We identified 8% (n = 9) of apps with child-friendly interfaces designed to improve medication adherence and teach children how to manage their asthma through games or quizzes.

Approximately 22% (n = 47) of asthma apps allow users to track and display health information. Most apps (47%, n = 22) in this category are designed to help users monitor symptoms by logging peak flow and recording details about asthma attacks. Many apps (38%, n = 18) focus on medication use, which allows users to track inhaler use, set medication reminders, and monitor adherence.

Approximately 18% (n = 37) of apps are directed at health care providers rather than patients. Most apps in this category (49%, n = 18) provide medical reference information, whereas some (27%, n = 10) teach medical trainees lung sounds and general information about asthma and allergies. Approximately 6% (n = 12) of apps provide users with air quality information. Most of these apps (67%, n = 8) allow users to enter their location, whereas the rest (33%, n = 4) are directed at residents of a specific city. The remaining 2% (n = 1) of apps serve as social forums, which connect users with other asthma patients (25%, n = 1) and provide advice and emergency assistance (75%, n = 3).

The large number of available apps most likely mimic the interest in apps for asthma. Because self-management in assessing symptoms and adhering to medication regimens is especially important, individuals with asthma may be particularly interested in apps that offer help with symptom monitoring or adherence to medical regimens. Nevertheless, there is no accepted measure of app quality, and most apps are not regulated or approved by the Federal Drug Administration (FDA). Mobile medical apps that the FDA would regulate include apps that transform a mobile platform into a regulated medical device; connect to an existing device for purposes of controlling its operation, function, or energy source; and display, transfer, store, or convert patient-specific medical device data from a connected device.⁶ Thus, it is difficult for patients to know which apps offer legitimate clinical advice, have demonstrated utility to improve any health care measure, or are ideally suited to help them manage their or their children's asthma. Some independent organizations have noted this knowledge gap and are starting efforts to create formal reviews for medical apps.

In order for providers to recommend apps to their patients, efficacy and effectiveness evaluations are necessary; however, few such evaluations are currently available. A

Cochrane review of smartphone and tablet self-management apps for asthma in 2013 found only 2 trials of phone-based asthma self-management interventions that included randomized controlled trials to assess for efficacy.⁷ The authors deemed the utility of apps to be inconclusive and were unable to advise clinicians and the general public on the efficacy on apps for asthma self-management.⁷ Studies that include diverse asthma patients and providers, are designed to randomize interventions, and measure helpful patient-centered, as well as clinically relevant, outcomes are needed to determine which apps are truly helpful and should be recommended to patients.

In addition to requiring demonstrated clinical efficacy and providing scientifically sound advice, apps must also ensure data privacy and security before health care providers feel comfortable recommending them. The health visualization and tracking group of apps, for which individuals can enter personal data to monitor symptoms, log peak flow, and more, is the category most vulnerable for loss of privacy or possible unwanted disclosure of personal health information. A previous study that systematically assessed availability of privacy statements for the most commonly used apps found that only 30% had privacy statements that addressed whether entered information could be shared with third parties.⁸

In conclusion, as the number of apps made available continues to increase and agencies such as the FDA become involved in their regulation, the mHealth landscape will continue to change. Although apps have great potential to improve care for asthma, most are currently limited by their inability to demonstrate quality, effectiveness, and protection of user data.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Clinical Implication

- Many mobile health apps are available for asthma and have great potential to improve care for asthma. Nevertheless, measurements of quality and effectiveness and explanations of privacy risks are needed to help individuals choose the most appropriate apps.

TABLE I.

Categories of asthma-related apps, grouped according to specific functions (N = 209)

Categories	No. of apps	Percent of total
Teaching/training	109	52%
Alternative treatments	42	
General information	24	
Treatment information	18	
Child-directed	9	
Food additives	9	
Parent-directed	7	
Tracking and visualization of health information	47	22%
Symptom tracking	22	
Medication use	18	
Tools/calculators	7	
Medical provider-directed apps	37	18%
Reference	18	
Trainee-directed	10	
Tools/calculators	6	
Journals	3	
Air quality information	12	6%
General	8	
Location-specific	4	
Social forums	4	2%
Emergency	3	
Community support	1	

TABLE II.

Examples of apps in each category. A full list is provided in the Online Repository at www.jaci-inpractice.org

Name	Cost	Device (iPhone/ Android)	Description
Apps for teaching and training			
Asthma Control Tips	\$10.10	Android	Provides information about yoga and breathing exercises for controlling asthma.
Homeopathy for Asthma	Free	Android	Provides information about homeopathic asthma treatments.
iAsthma in Control	\$0.99	iPhone	Designed to teach children to take their medication and learn the symptoms that may precede an asthma attack. Option to create a personalized asthma "rescue plan" and enter emergency contacts. Allows parents to record peak flow and email forms for school or sports to the child's doctor.
Apps for tracking and visualizing health information			
AsthmaMD	Free	iPhone	Allows users to log asthma symptoms, visualize asthma in graphical format, track medications, map peak flow to severity zones, and track asthma triggers. Can share asthma diary and graph with health care professionals.
Inhaler Tracker	\$0.99	iPhone	Tracks and records inhaler use. Patients enter data. Displays remaining medication in each inhaler to notify patients of when the inhaler needs replacing.
Asthma Tracker & Log Multiuser	\$1.49	Android	Tracks peak flow, and asthma attack frequency, length, location, trigger, and treatment for multiple users.
Medical provider-directed apps			
MiniAtlas Asthma	\$1.99 (iPhone)/ \$2.99 (Android)	Both	Assists health practitioners in communicating with patients to help them understand their asthma. Provides images and explanations of the disease.
iGuidelines	Free	iPhone	Provides medical professionals with point-of-care access to interactive guidance for select pediatric conditions, including asthma.
ERes	\$3.99	Android	Contains calculators, medication lists, algorithms, decision rules, clinical polices, and core content for emergency care providers. Includes information about asthma treatment and predicted peak flow rates.
Apps providing air quality information			
Air Quality Pro	\$0.99	iPhone	Provides Air Quality Index for U.S. locations.
State of the Air	Free	Android	Provides air quality information for users' location. Includes ozone and particulate pollution counts as well as air quality alerts.
iSmog	Free	iPhone	Displays air quality information for the San Francisco Bay area. Optional push notification alerts indicating when the air contains unhealthy levels of certain contaminants.
Social forums			
OneHealth	Free	Android	Allows users with asthma and other chronic diseases to join health communities and connect with peers.
HelpAround	Free	Android	Allows users to locate nearby users with similar symptoms. Designed for use during emergencies, or to receive help or advice.