Medical Applications for Pharmacists Using Mobile Devices

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BACKGROUND: Mobile devices (eg, smartphones, tablet computers) have become ubiquitous and subsequently there has been a growth in mobile applications (apps). Concurrently, mobile devices have been integrated into health care practice due to the availability and quality of medical apps. These mobile medical apps offer increased access to clinical references and point-of-care tools. However, there has been little identification of mobile medical apps suitable for the practice of pharmacy.

OBJECTIVE: To address the shortage of recommendations of mobile medical apps for pharmacists in daily practice.

DATA SOURCES: Mobile medical apps were identified via the iTunes and Google Play Stores via the "Medical" app categories and key word searches (eg, drug information, medical calculators). In addition, reviews provided by professional mobile medical app review websites were used to identify apps.

STUDY SELECTION AND DATA EXTRACTION: Mobile medical apps were included if they had been updated in the previous 3 months, were available in the US, used evidence-based information or literature support, had dedicated app support, and demonstrated stability. Exclusion criteria included apps that were not available in English, had advertisement bias, used nonreferenced sources, were available only via an institution-only subscription, and were web-based portals.

DATA SYNTHESIS: Twenty-seven mobile apps were identified and reviewed that involved general pharmacy practice, including apps that involved drug references, clinical references, medical calculators, laboratory references, news and continuing medical education, and productivity.

CONCLUSIONS: Mobile medical apps have a variety of features that are beneficial to pharmacy practice. Individual clinicians should consider several characteristics of these apps to determine which are suitable to incorporate into their daily practice.

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Health information technology has evolved with the advent of mobile devices (eg, smartphones, tablet computers), allowing greater access to both the public and medical professionals. In a recent survey from the Pew Internet Research Center, 53% of US adults were found to own a smartphone, 31% of whom used their phone to search for health information and 19% of whom had downloaded and used an application (app) to manage and monitor their health.[1] Compared to public use of smartphones, it is estimated that 81% of US physicians own smartphones.[2] Indeed, surveys have demonstrated a high adoption of mobile devices by health care professionals for practice and education.[3-5]

With the rise in smartphone adoption, one large transformation in the use of mobile devices is the influx of more complex mobile apps. These apps have a large spectrum of functions, from gaming and media consumption to news and education. The benefits of apps lie in their ability to run independently of web-based browser access on a highly mobile platform. Apps can also be self-sufficient and not require internet access for use at all times, due to the ability to save information to the mobile device's memory. This is especially the case when comparing web-based versus in-phone apps. Recently, mobile medical apps have found a niche among mobile devices, effectively turning smartphones and tablet computers into medical tools for clinical references and decision-making devices.[6,7]

Pharmacists have demonstrated interest in the use of mobile devices in patient care.[8,9] Research has shown that pharmacists use mobile devices to help serve as clinical references and point-of-care tools.[10-12] Research has further demonstrated that the use of clinical references (eg, UpToDate) as point-of-care tools has helped streamline workflows and increase productivity of health care professionals.[13,14] Many of these references are now available as mo-

Author information provided at end of text.

bile apps. These advancements in apps and growth in utilization may help increase patient care and medication safety.[15] While there have been multiple reviews of apps for certain areas of medical practice, such as orthopedics, antimicrobial stewardship, and neurology, there has been little focus on apps that may be beneficial for pharmacists overall.[16-20] One issue, however, is that there are many mobile medical apps currently available, with few endorsed by medical societies. While some online stores have sought to make it easier to identify medical apps, their categories are often not specific to pharmacy practice. This review will guide pharmacists on selecting apps that will be helpful to their practice based on summarizing their functions and the information they provide. Pharmacists will then be able to select which app may best fit their practice. While most apps mentioned are related specifically to mobile medical applications, this review includes a section on productivity apps, which may help pharmacists increase efficiency of their daily activities.

Selection of Applications for Review

Medical apps are found across multiple devices; however, they work only on the operating system (OS) for which they are designed. The 2 operating systems currently used by the most consumers are Apple's iOS and Google's Android OS. Apple's apps are sold on the iTunes Store, while Android-based apps are sold on the Google Play Store. Due to the majority of apps being available for these 2 operating systems, this review concentrates on apps available for Apple iOS and Android OS devices. The iTunes and Google Play Stores each currently list over 700,000 apps.[21,22] Apple's mobile devices include the iPhone, iPod, and iPad. Android-based mobile devices include a variety of smartphones and tablet computers from multiple developers.

Medical apps were identified after reviewing the Medical apps categories on both the iTunes and Google Play Stores during December 2012. The Health and Fitness category was not included, as this category tends to contain apps targeted for patient use (eg, diet and physical activity, tracking vital signs). The top recommended paid and free apps available on both stores were evaluated; however, both stores limit the number of apps displayed, and a complete count of currently available apps on either store is presently unattainable due to the stores' designs. In-app store searches were then performed to identify apps that had not been listed. Search terms included medical, pharmacy, drug reference, medical calculator, lab reference, and clinical reference. This search generated 6831 apps on the iTunes Store (combining apps between those available for the iPad, iPod, and iPhone) and 6436 on the Google Play Store.[23,24] Many of these apps are available for both operating systems. One issue with this type of search is that apps are not necessarily classified by either Apple or Google, but rather by developers. As such, many apps found via those searches were not truly medical apps, as they ranged from insurance companies' portals to medical diaries to apps dealing with recreational drug use.

To help navigate the store and get in-depth reviews, 2 websites dedicated to medical app reviews were used to assess the medical apps identified. These included iMedicalApps and Medical App Journal.[25,26] Both sites are managed by health care providers who review apps based on their experience and the apps' functionalities. These reviews were beneficial in identifying apps not found on the iTunes Store and Google Play Store upon initial search and in ascertaining applicability to pharmacy practice. Productivity apps were identified based on their status on the app store and user rating scores. Inclusion and exclusion criteria of apps chosen for this review are identified and defined in Table 1. Mobile medical apps identified are then described in detail, when available, as to what features and information they posses. Information assessed included, but was not limited to, the update history when identifiable, scope of application utilization, information provided, purpose of the app, the pros and cons of use, and comparison to similar apps when appropriate.

Data Synthesis

In total, 27 apps were selected for review (Table 2). The apps in this review include drug references, clinical references, medical calculators, laboratory references, news and continuing medical education (CME), and productivity apps. A comparison of drug reference apps is detailed in Table 3.

DRUG REFERENCE

Micromedex

Developed by Truven Health Analytics, Micromedex mobile solutions have several stand-alone apps available. These include Drug Information, Drug Interactions, IV Compatibility, Pediatrics Essentials, and Neofax Essentials. The Drug Information app is free, while all other apps require a subscription of $9.99-29.99 per year; however, if an institution has a subscription to the web-based Micromedex 2.0, then the IV Compatibility and Drug Interaction apps are accessible to those institution users. Micromedex Drug Information has over 4500 drug names available to look up on the app. Data are provided by the DrugPoints database, differing from Micromedex 2.0 DrugDex. As such, it includes information on dosing, mechanism of action, available drug strengths/forms, pharmacokinetics, and clinical teaching points. The IV Compatibility app is based on the information available from Trissel's 2 Clinical Pharmaceutics Database, with the ability to check medications for possible drug interactions due

to Y-site tubing administration, solution compatibility, and admixture concerns. Micromedex is beneficial for pharmacists who would like to access only select areas (eg, intravenous drug compatibility, drug information) without requiring the purchase of a whole suite. However, the limited amount of information presented via the free Drug Information app may not be as desirable for some pharmacists who would prefer more in-depth clinical information.

Lexicomp

Lexicomp, owned by Wolters Kluwer Health, is available as several different suites on mobile devices. The most basic suite is Lexi-Drugs, which is a comprehensive drug database. In comparison to the Micromedex Drug Information app, the Lexicomp app has more detailed information. But, as stated above, the Micromedex Drug Information app has only the summarized information. The information available via the Lexi-Drugs mobile app is the same as that found on Lexi-Drugs' website accessed via a web browser on the computer. In addition, other suites include functions such as intravenous drug compatibility, drug identification, drug interactions, medical calculators, pediatric dosing, and geriatric dosing. Suite costs range from $75 per year for Lexi-Drugs to $285 per year for all of Lexicomp's features. Institutional purchases are available, so several users may have access to the mobile suite through their employer or institution. The suites are updated weekly through the app and allow the user to select what can be updated and when, so as to not lock down the app when needed. Lexicomp offers a suite through one app for pharmacists in a variety of practice areas based on the selections offered; however, some features that may be desirable (eg, laboratory test data, clinical reference, medical calculators) require more expensive suites that users may find less expensively through other apps.

PEPID Pharmacist Pro

This app builds a pharmacy suite using *AHFS DI Essentials*. As such, the app has over 40,000 medication monographs included for use. Additionally, there are a pill identifier, intravenous drug compatibility checker, allergy checker, drug interaction identifier, laboratory manual, medical calculators, and a differential diagnosis generator. It has several useful components combined in a single app; however, an annual subscription fee is required, and there are no free options. Pharmacists who want one straightforward app will find PEPID beneficial, as the app has no selective payment suites and has everything included with an annual subscription. The drawback is that for some pharmacists all of these functions may not be beneficial for practice, and they may overpay for unused features. Lastly, the app user interface can be slow at times when compared to other apps.

Medscape

Medscape is a free app that offers resources on various medical topics. The app's drug information has over 8000 monographs on prescription, over-the-counter, and herbal/supplemental medications, as well as information from the First DataBank drug library. An interaction checker is included that can analyze up to 30 medications at once. In addition, information is provided on diseases, conditions, and medical procedures, with multiple tables, images, and videos covering pathophysiology, epidemiology, differential diagnoses, and treatment options. A medical calculator is also available as part of the app, covering 129 medical equations. Lastly, Medscape provides medical news organized by sections, including pharmacy. CME credits specifically for pharmacists are offered that can be completed and collected via the app; however, not all credits are approved by the Accreditation Council for Pharmacy

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria
Recently updated: apps that were updated in the previous 3 months via the app store
Dedicated support: demonstrated a support web page for questions and technical support if required
Available in the US: app was available in the US iTunes store or Google Play Store
Evidence-based information or literature support: information provided by the app was from a reputable source or referenced clinical sources
Stability: app was downloaded and upon use all functions were usable and did not crash
Positive reviews: based upon reviews available from the app store and professional reviews conducted via medical application review websites
Exclusion criteria
Written in languages other than English: only apps that were English supported were included for review
Advertisement bias: apps that served as industrial advertisement or sale support for other resources
Nonreferenced sources: information provided that was not referenced or had questionable sources
Negatively reviewed by practitioners: apps that were professionally reviewed via medical app review websites and were not recommended
Institutional-only apps: apps that were not available individually to a user but required institutional subscriptions
Web-based apps: apps that only served as a portal to websites and were not available to fully function offline
Medical specialty apps: apps that were centered on a certain medical specialty or training (eg, medical simulators) outside of general pharmacy practice

Education (ACPE). One drawback is that Medscape requires lengthy (up to 10 minutes to download) monthly updates in-app. The app cannot be used until the updates are implemented, so it is important to continually check for possible updates. This app is beneficial for pharmacists who want a free and accessible app for drug and disease information that also has news features.

Epocrates

This app is one of the original drug referencing apps available for mobile devices utilizing information from the Multum (Cerner) drug library. Epocrates Rx is free and provides drug information, drug interactions, pill identification, and medical calculators. The medication information is sparse, providing only basic information. It does not supply detailed monographs on medications. Epocrates Essentials requires an annual subscription fee, but includes additional information on diseases, diagnostic and laboratory tests, and billing. While 2 suites are available, pharmacists may find Epocrates Rx preferential due to being a free app with features that can be used daily.

Table 2. Mobile Medical Applications for Pharmacists

Category and Name	Operating System	Cost	Wi-Fi Needed for Use[a]	Registration or Account Required	Cloud-Based Syncing Available
Drug references					
Micromedex	iOS and Android	Free for Drug Information, $9.99-29.99/year for other apps[b]	No	No	No
Lexicomp	iOS and Android	$75-285/year	No	No	No
PEPID Pharmacist Pro	iOS and Android	$254.95/year	No	No	No
Epocrates	iOS and Android	Free-$159.99/year	No	Yes	No
Medscape	iOS and Android	Free	No	Yes	No
LactMed	iOS and Android	Free	No	No	No
Clinical references					
Johns Hopkins Guide	iOS and Android	$39.95/year	No	No	No
Sanford Guide to Antimicrobial Therapy	iOS and Android	$29.99/year	No	No	No
Skyscape	iOS and Android	Free and subscription-based suites	No	Yes	Yes
Omnio	iOS	Free and subscription-based suites	No	Yes	Yes
Read by QxMD	iOS	Free (limited to institution journal subscriptions)	Yes	Yes	Yes
Dynamed	iOS and Android	$395/year or free if institution has a subscription	Yes	Yes	No
UpToDate	iOS and Android	$499/year	Yes	Yes	No
Medical calculators					
MedCalc Pro	iOS	$4.99	No	No	No
Mediquations	iOS and Android	$4.99	No	No	No
Calculate by QxMD	iOS and Android	Free	No	Yes	No
Laboratory references					
Pocket Lab Values	iOS and Android	$2.99	No	No	No
Lab Pro Values	iOs and Android	$2.99	No	No	No
News and continuing medical education					
Medpage	iOS and Android	Free	Yes	Yes	Yes
Pharmacist's Letter	iOS and Android	$115.00/year	Yes	Yes	No
Productivity					
iAnnotate PDF	iOS and Android	$9.99	No	No	Yes
GoodReader	iOS	$4.99	No	No	Yes
Clear	iOS	$1.99	Yes	No	Yes
Wunderlist	iOS and Android	Free	Yes	Yes	Yes
Dropbox	iOS and Android	Free	Yes	Yes	Yes
Evernote	iOS and Android	Free	Yes	Yes	Yes
Google Drive	iOS and Android	Free	Yes	Yes	Yes

iOS = Apple mobile operating system.

[a]Wi-Fi use is defined as requiring internet access to use app to full extent. It does not include internet connection required for some functions (eg, updates, device sync).

[b]IV Compatibility and Drug Interactions apps are available to users whose institution is subscribed to Micromedex 2.0 without further charge.

LactMed

This free app was created by the National Library of Medicine's (NLM) Toxicology Data Network to serve as a reference for drugs and dietary supplements that may affect breastfed infants. The app includes information on the concentrations of medications found in breast milk, adverse effects, and suggestions for therapeutic alternatives when appropriate. The app is updated and maintained by the NLM.

CLINICAL REFERENCES

Johns Hopkins Guide

Supported by Unbound Medicine, the Johns Hopkins Guide is an authoritative, comprehensive guide to diabetes, HIV, and infectious diseases from experts at the Johns Hopkins School of Medicine. Information includes medications and therapeutic options for treatment. Users have the option to purchase an annual subscription to 1 of the 3 guides or all 3 for a reduced price. Information is continually updated and supported by evidence-based information cited within the app. Users can select and save references to a favorites menu for quick access and can receive in-app news and notifications on the home screen. A disadvantage of the Johns Hopkins Guide is that it is presently limited to clinical advice on only diabetes, HIV, and infectious diseases, with no current developments in other areas of practice.

Sanford Guide to Antimicrobial Therapy

This mobile app provides digital access to one of the leading references on antimicrobial therapy. A benefit of the app over the traditional pocket book is that the app incorporates internal calculators for the dosing of antibiotics that may help practitioners reduce time in making therapeutic decisions. In addition, the app is regularly updated with new medical information, such as new medications and updates from evidence-based guidelines. For pharmacists working with infectious disease management or within the inpatient setting, this app may be very beneficial; otherwise, information presented could be accessed from other general apps for a lesser price or for free.

Skyscape and Omnio

These are not stand-alone apps, but instead function as a portal for multiple digital medical literature resources. Skyscape is the developer for both apps; however, Omnio was developed specifically for use on the iPad with essentially the same information provided as in Skyscape. The apps come preloaded with RxDrugs, Archimedes, Outlines in Clinical Medicine, and MedAlert. These resources cover medication information, pill identifiers, drug interaction checkers, medical calculators, clinical guidelines, and alerts on clinical news and drug information. Premium content is available for purchase, as Skyscape has partnered with over 50 publishers of medical content. These include *5-Minute Clinical Consult*, *The Merck Manual of Diagnosis and Therapy*, *AHFS Drug Information*, *Pharmacotherapy Handbook*, and more. Additionally, resources from medical societies are available through the app, such as the National Comprehensive Cancer Network and American College of Cardiology guidelines. The apps are regularly updated and have robust support. One great feature of Skyscape is that many standalone apps offered by medical societies are also incorporated into Skyscape, which help reduce the number of individual apps needed. Taking this into consideration, Skyscape helps users reduce the numbers of apps they need to purchase and use Skyscape as a personalized portal to other medical references without going through other app set-ups individually.

Read by QxMD

This free app functions in a manner similar to mobile device news apps in that it collates articles from different blogs and news agencies; however, this app arranges medical journal articles by different specialties and topics for easy access and reading. The app also allows users to browse journals to

Table 3. Comparison of Mobile Drug Referencing Apps

	App				
Feature	Micromedex	Lexicomp	PEPID Pharmacist Pro	Epocrates	Medscape
Drug information	Yes[a]	Yes	Yes	Yes	Yes
Intravenous drug compatibility	Yes	Yes	Yes	No	No
Drug interaction checker	Yes	Yes	Yes	Yes	Yes
Pill identification	No	Yes	Yes	Yes	No
Laboratory values	No	Yes	Yes	No	No
Medical calculators	No	Yes	Yes	Yes	No
Allergy checker	No	No	Yes	No	No

[a]Information provided on mobile app is not the same as Micromedex 2.0, but rather summarized information.

which their institutions subscribe without going through an institution library portal each time. The user can also browse and search for articles through the app, which pulls papers from PubMed. Articles can then be easily saved in-app and shared with colleagues. If users do not belong to an institution with a medical library, they will be limited to free articles.

Dynamed

This app is the mobile version of the evidence-based point-of-care resource currently available via an internet browser through an institutional or personal subscription. With over 3100 clinical-based summaries, this resource helps practitioners stay current with the latest evidence-behind medical practice. The information provided in the app is the same as that provided in the web-based resource, but it is streamlined for easier reading on mobile devices. Access for the app is through Skyscape (mentioned above) and requires the user to obtain a personal serial number from Dynamed for registration.

UpToDate

UpToDate is another point-of-care resource. Providing in-depth articles from medical experts, UpToDate serves as a comprehensive medical reference for the management of many disease states. The mobile version of UpToDate is similar to Dynamed in that it is adapted for easy viewing on mobile devices while supplying the same information as the internet browser version. One drawback of UpToDate is that the in-app version is not supported for institutional use and is available only via individual subscriptions; however, it is possible to access UpToDate through the app if the institution supports and allows onsite access. UpToDate will be releasing institutional access in 2013, but will require an upgraded subscription from the institution for use and implementation. It is possible to upgrade the app and download all article summaries to the device, without requiring internet access for later reference; however, space must be managed in order to avoid overloading the memory of the device.

MEDICAL CALCULATORS

MedCalc Pro

This app gives the user access to over 300 medical formulas, scores, scales, and classifications. These formulas and calculations can be printed or emailed to other health care providers. Users can also save patient profiles to the app and include patient data, such as weight, height, and laboratory test values to perform patient-specific calculations. Data can also be switched from conventional to SI units as needed.

Mediquations

This app has 232 medical formulas and scores included for use. Similar to MedCalc, it is possible to email or print results of calculations and share with colleagues. Notes can also be included in calculations for later reference. The one advantage of this app over MedCalc is that it is available on both Apple and Android devices.

Calculate by QxMD

This app supports over 150 medical formulas and scores organized by medical classifications (eg, cardiology, hematology). The app preloads to the user's self-described clinical practice (ie, pharmacist) and selects calculators that may be handy for quicker access. One large advantage of Calculate, despite its smaller number of medical formulas, is its in-app citation of the medical literature from which the formulas were created or validated. This is a useful resource for those who wish to know the background behind the medical equations they use.

LABORATORY REFERENCES

Pocket Lab Values

Many medical app suites, such as the drug references, do not come equipped with laboratory test value references. This app has over 320 laboratory test values split into different medical categories. A bonus feature of the app is that it gives the ranges of appropriate values, along with information on what may cause values to be high or low. Lastly, the app allows users to record notes for future reference. The benefit of this app is that it has a large and diverse amount of laboratory test references; however, if the user has another app that has laboratory values, this and similar apps would serve no purpose.

Lab Pro Values

This app includes 250 laboratory test values and is organized similarly to Pocket Lab Values. The app also includes definitions of thousands of medical abbreviations and definitions of over 400 medical prefixes/suffixes. This app is a useful tool for those encountering unfamiliar terms who would like further definitions and laboratory test values to reference.

NEWS AND CONTINUING MEDICAL EDUCATION

MedPage Today

This app offers breaking medical news on over 30 medical specialties and annual coverage of over 60 meetings and symposia; however, there is no section specifically for pharmacists, as seen in Medscape. In addition to medical news, the app offers free CME through the app that can be completed by pharmacists; however, not all continuing education modules are ACPE approved. There is also information on drugs, diseases, and medical procedures provided in-app like Medscape. The drug information provided is based on the

same system as the Micromedex Drug Information app. The app is updated daily with recent news and videos.

Pharmacist's Letter

This app is essentially the same as the currently available *Pharmacist's Letter* delivered via postal service and email every month; however, if subscribers would like a digital format, this app serves that purpose. The benefit of the app is that it connects users back to the *Pharmacist's Letter* online resources in-app or to past issues through the archive. This allows users to then access the beneficial monographs and tables provided by the *Pharmacist's Letter* while reading the monthly newsletter. The app also allows CME units to be earned in-app by users through multiple-choice examinations and documented in each user's continuing education portfolio. The app allows the newsletters to be downloaded and then read offline as well. This app is beneficial for pharmacists who use *Pharmacist's Letter* daily and would like to have an easily accessible electronic format and in-app access to their online resources.

PRODUCTIVITY

Dropbox, Evernote, and Google Drive

Cloud-based storage provides users with a tool in which to store, update, and share files without relying on a physical device (ie, flash drive). Most cloud-based storage systems offer several gigabytes of memory to users free of charge, although more space requires an annual subscription fee. Dropbox and Evernote are both popular cloud-based storage options that can be used on multiple devices as well as an internet browser. Dropbox uses a file tree management system and is very similar to managing a folder on a desktop computer. Evernote offers the option for direct uploading of pictures and audio recording. Google Drive supports the sharing of files as well as real-time uploading and management of files through Google Docs. These apps may be useful for individuals wishing to collaborate on projects and share documents quickly. In addition, these apps can be linked with other apps on mobile devices, allowing easy sharing between apps. These apps do require an internet connection, but files can be saved to the drive of most mobile devices for future offline reference. Lastly, these applications are not compliant with the Health Insurance Portability and Accountability Act (HIPAA) at this time.

iAnnotate PDF and GoodReader

Since the advent of mobile tablets, the ability to edit documents and PDF (portable document format) files from mobile devices has steadily evolved and improved. These apps allow users to highlight, select, insert notes, and then share with others either through email or cloud-based storage. Changes can then be saved on the device for later reference and adjustment. If a user likes to write on the tablet, a stylus may be recommended to make writing easier.

Clear and Wunderlist

Clear is a simple list-making app available for the Apple iOS. It has the ability to accentuate what activities need to be performed and allows the users to move the tasks into different lists of their choosing. The app is heavily touch based and allows the user to easily organize activities and actions that need to be performed as well as allowing the user to move them to different lists if needed. Lists can also be shared via iCloud to multiple devices on the same account. Wunderlist is another popular free list-making app available on multiple mobile devices and personal computers. This app allows users to create and share with collaborators lists of activities and actions that need to be completed. Activities can be scheduled and set to remind the user to complete objectives. The app also has the ability to sync across multiple platforms.

Limitations

This review sought to identify mobile medical apps that may be beneficial for pharmacists in daily practice; however, there were several limitations in the identification of mobile medical apps. A substantial limitation is the constant flux of apps available through the iTunes and Google Play Stores. Medical apps presented through the stores change monthly based on either Apple's identification of apps for health care professionals or the top paid or free apps available. In addition, with the recent upgrade to iOS 6 on mobile devices, the ability to identify the number of apps available or search easily through the iTunes Store has been diminished. The Google Play Store has similar issues in its search function. Additionally, medical societies and organizations have not yet reviewed individual medical apps for their members or professions, leaving much of the market in developers' hands. Taking these factors into consideration, the apps presented here may fluctuate based on user download and developer preferences. Also, based on the inclusion and exclusion criteria used, some users' preferred apps may not be found in this review. The criteria were meant to provide information on the most up-to-date apps relevant to pharmacy, but may have precluded several apps. Lastly, evaluation of the accuracy of content, comprehensiveness, or efficiency of information location/extraction was not assessed via an objective evaluation tool.

CONSIDERATIONS ON USE OF MOBILE MEDICAL APPLICATIONS

There will be several challenges in the integration of mobile medical apps in the future. Foremost is the current uncertainty of what apps will fall under Food and Drug Adminis-

tration scrutiny, as they are currently constructing guidelines for oversight.[27] While many of the apps in this review will most likely not fall under scrutiny, several, such as the medical calculators, may in the future. Another issue is that most apps are not HIPAA compliant, and users must be cognizant of what information they may choose to record on their devices. Lastly, the ethical considerations of using mobile medical apps must be considered, as there is little oversight and it is dependent on the user to confirm that the information on which they are basing clinical decisions is well founded. This is especially a concern for apps that pharmacists may self-discover on the app stores.

Summary

Mobile devices may serve as medical tools depending on what apps are used. Medical app use on mobile devices allows pharmacists to have mobile access to multiple medical references and drug information from trusted sources. This allows quicker and increased access to information for point-of-care treatment. In addition, apps allow for increased management of users' personal files and help with productivity and time management; however, finding and discovering medical apps for use may be difficult due to the current set-up of most app stores being driven not by health care providers but, rather, mobile app developers.

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Conflict of interest: Dr. Aungst is a writer and editor for iMedicalApps.com, a website dedicated to providing news on the integration of mobile technology into medical care and the reviewing of medical apps for mobile devices. He is paid for his contributions as a writer and editor. He neither consults nor receives reimbursement from app developers or creators.

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