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iPad Apps for Orthopedic Surgeons

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Abstract: The development and distribution of mobile applications, or apps, designed for medical professionals and patients is quickly expanding, and within this group are apps designed specifically for orthopedic use. Currently, the most popular mobile apps are sponsored by private companies and focus on delivering device-specific information. If this trend toward the use of privately funded educational materials continues, regulations may need to be established to ensure that the information provided is accurate, honest, and supported by peer-reviewed literature. It will likely be the responsibility of the orthopedic community to ensure that the development and use of these apps has appropriate oversight and validation as they are incorporated into clinical practice and training.

Interactive mobile media devices, such as smartphones and tablet computers, are quickly becoming popular clinical tools within the field of medicine.^{1,2} The combined benefits of mobility, storage capacity, accessible interface, and wireless access make these devices ideal for ortho-

pedic surgeons, residents, and patients who expect reference information to be immediately available. In response to the recognition that orthopedic surgeons are increasingly using mobile devices, a previous study demonstrated that 53% of orthopedic surgeons and trainees currently use smart-

phone apps in their clinical practice.³ In addition to smartphones, however, mobile tablet computers, such as the Apple iPad (Cupertino, California), are becoming increasingly popular.

Mobile tablet computing is currently dominated by sales of the Apple iPad and iPad 2, which have been reported to constitute approximately 82% of all US-owned tablet computers and 95% of business tablets.^{4,5} The iPad is quickly becoming the ideal tool for many functions because of its versatile array of tools, which includes a large, multi-touch screen, lightweight form factor, 2 digital cameras, wireless Internet capability, large storage capacities, and exceptional battery life. As a mobile reference library, the iPad is capable of organizing thousands of documents and reference files that can be loaded quickly and read on the go. The iPad also has the unique ability to present images, videos, and audio files—functionality not available with traditional educational and clinical tools.

One of the most unique and innovative ways of using the iPad and other tablet computers is by downloading applications, or apps, self-contained computer programs that run directly from the device home-screen interface and can perform a multitude of functions, including the incorporation of multimedia presentations, reference material, calculator tools, device demonstrations, and technique guides. Because of the iPad's large 9.7-in diagonal screen dimension, apps designed for an iPad have much greater potential to be used as regular educational resources or teaching tools compared with those developed for smaller smartphone screens.

In recognition of its popularity, application developers have also gravitated toward creating novel apps with specific functions designed to target both providers and patients. Medical schools across the United States are increasingly encouraging and, in some cases, providing students with mobile tablet computers that are considered a required

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educational tool.⁶ As a result, the next generation of orthopedic surgeons is being trained to incorporate these new technologies into their education, training, and practice.

The development and distribution of iPad apps designed for medical professionals and patients are quickly expanding, and within this group are apps designed specifically for orthopedic use. Although other specialties have explored and embraced the use of iPads in the hospital,^{2,7-9} no study has examined the iPad apps that are available to orthopedic medical providers and patients.

The purpose of this study was to collect, analyze, and summarize orthopedic-related iPad apps for students, patients, and medical providers.

MATERIALS AND METHODS

From July 12 to 24, 2011, the Apple iTunes store was queried for iPad apps related to orthopedic surgery. This was performed using search terms including orthopaedic, orthopedic, ortho, surgery, musculoskeletal, bone, and fracture. Each app summary page was reviewed, and data were collected regarding the app's name, publisher, publication date, cost, average rating, and number of ratings. After reviewing the summary and screenshots, a determination was also made regarding a primary and secondary categorization for the app (eg, educational, clinical, reference), the orthopedic specialty for which it was designed, and the intended audience (eg, orthope-

dic surgeon, trainee, student, patient).

Once data collection was complete, data were summarized, tabulated, and presented using Excel 2007 (Microsoft, Redmond, Washington). A complete analysis was performed comparing the relationship among app characteristics, intended audience, and cost. Descriptive statistics were used to report the data in the form of median and standard deviation, and chi-squared analyses were performed when comparing qualitative data between groups; $P=.05$ was considered statistically significant.

RESULTS

A total of 80 orthopedic applications were identified using the search algorithm. Of them, 23 (28%) had been updated in the prior 2 months and 52 (64%) had been updated in the prior 6 months. Thirty apps (38%) had 0 reviews, and only 22 apps (27%) had >20 reviews from consumers. Of those with >20 reviews, 7 (32%) were designed for students as skeletal anatomy-based teaching, reference, and testing applications.

From the 80 apps identified, 30 were primarily designed for the general public or students (38%), 14 were designed for nonorthopedic medical professionals (18%), and 34 were designed for orthopedic surgeons and trainees (43%). Nearly all of the apps (98%) for the general public, students, and nonorthopedic practitioners were limited to educational information and

patient-related information. In contrast, of the apps designed for orthopedic practitioners, 32% had a clinical focus, 26% were focused on patient teaching, 26% were sponsored by industry, and only 2 (6%) had a primary focus on education/training.

The average price for apps ranged from \$0 to \$399.99. A single app that sold for \$399.99 was based on a variable-duration subscription service and, once excluded from the analysis, all apps had a mean and median cost of \$11.90 and \$2.99, respectively. Interestingly, there was a clear delineation between app type and cost. Of the 17 free apps, 88% were designed for orthopedic providers, and 10 of them (59%) were industry sponsored. In contrast, for the apps ranging in price from \$0.99 to \$9.99, only 15% were designed for orthopedic providers, with the majority focused toward the general population (57%) and nonorthopedic providers (28%). Most apps in that price range (87%) were created for educational and patient information purposes. The third tier of apps, ranging in cost from \$14.99 to \$399.99, were designed primarily for medical professionals (82%) and included both educational and clinical subject material. When cost was analyzed based on intended audience, it was found that 44% of the apps designed for orthopedic surgeons were free in contrast to only 5% of the apps designed for the general public, students, or other medical providers ($P<.05$).

The 34 apps designed specifically for orthopedic providers were further examined. Only 10 apps had >10 reviews (Table); 5 of those were industry-sponsored applications, of which 4 incorporated implant and technique information specifically designed to educate providers and patients about devices. Only 1 app was created by a professional orthopedic organization (AAOS Orthopaedic Code X-Lite). Among the apps designed for orthopedic providers (Figure), 16 (47%) contained content covering a variety of orthopedic specialties. Eleven apps were designed for spine providers, whereas the number of apps focused on other specialties included 4 for arthroplasty, 1 for hand, 1 for foot and ankle, and 1 for trauma.

DISCUSSION

Since its release in 2010, the iPad has proven its usefulness and popularity to the general public, as well as to medical practitioners, resulting in the rapid development of apps designed for medical use. This is the first study to specifically examine iPad apps focused on orthopedic surgery.

Reviewing all medical apps was beyond the scope of this study; however, valuable information was gained from the currently available orthopedic-focused applications. First, the development of orthopedic applications is an active and developing niche supported by the fact that 64% of available apps have been updated or released within the past 6 months. These orthopedic

Table

Apps Designed for Orthopedic Providers With >10 Ratings From the Apple iTunes App Store

App Name	Developer	Category	Cost	Date of Update/Release	Rating ^a	No. of Ratings
Synthes	Synthes	Industry (technique)	\$0	6/6/2011	4	84
Mobile Coder Orthopedics	Psygo LLC	Clinical (coding)	\$79.99	3/14/2011	3	72
CORE–Clinical ORthopedic Exam	Clinically Relevant Technologies	Clinical (examination)	\$39.99	12/16/2010	4.5	53
Stryker IVS for iPad	Stryker	Industry (technique)	\$0	9/27/2010	2.5	39
OpTech Live	Stryker	Industry (technique)	\$0	2/11/2011	4	29
iSpineCare	Anatomate-apps	Educational (patient)	\$59.99	12/21/2010	4	24
FlipChart	Stryker	Industry (clinical)	\$0	2/11/2011	3.5	24
Mobile Coder Foot & Ankle	Psygo LLC	Clinical (coding)	\$49.99	3/10/2011	3	21
iOrtho Lite	K.M. Medical Software Limited	Clinical (examination)	\$1.99	6/18/2010	1.5	19
inMotion 3D	Stryker	Industry (patient)	\$0	6/8/2011	4.5	11

^aRatings are based on a 1-5 scale (1=low, 5=high).

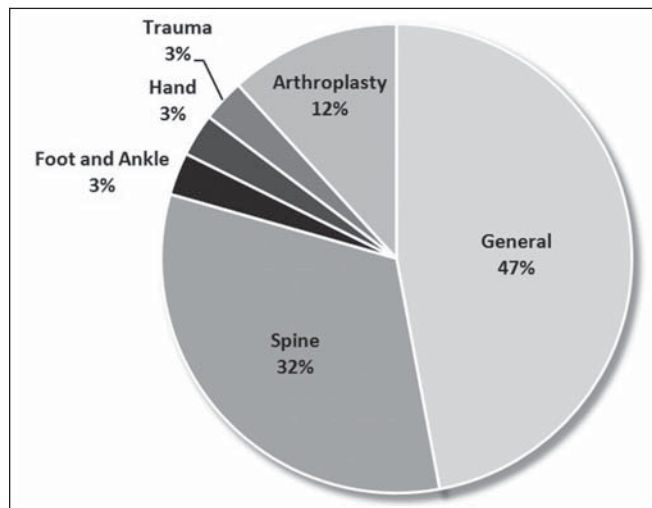


Figure: The distribution of apps designed for orthopedic providers by intended specialty.

apps target patients, students, and providers to varying degrees, and differences exist in the content and pricing of the apps for each population segment. Apps designed for the general population and students were more likely to be for profit and ranged in price from \$0.99 to \$14.99. Seven


of the most popular 20 apps were designed as musculoskeletal anatomy teaching and testing tools, and all ranged in price from \$0.99 to \$39.99. In contrast, apps designed for orthopedic providers were more likely to be free and developed by orthopedic device companies to provide informa-

tion about their implants. This service appears to be valuable to surgeons based on the fact that industry-sponsored device apps constituted half of the apps meant for orthopedic providers with >10 reviews.

Conspicuously absent from the group of apps were those designed for the education of orthopedic providers. A previous study suggested that the types of smartphone apps most desired by orthopedic attendings, fellows, and residents include textbooks, references, and board review material, none of which were found in our study.³ This suggests a persistent discrepancy between the types of mobile reference apps available to orthopedic providers and those desired by them.

The results of this study suggest that orthopedic providers currently use a variety of apps in clinical practice. In addition, because medical schools

and training programs are quickly incorporating these new technologies into educational curricula, it is likely that the prevalence of mobile devices as a clinical tool will only increase. However, currently the most popular mobile apps are sponsored by private companies and focus on delivering device-specific information. If this trend toward the use of privately funded educational materials continues, regulations may need to be established to ensure that the information provided is accurate, honest, and supported by peer-reviewed literature. Although the US Food and Drug Administration has considered regulating apps, no governing body or organization currently regulates or validates app content.¹⁰ Thus, it will likely be the responsibility of the orthopedic community to ensure that the development and use of these apps has appropriate oversight and validation as

they are incorporated into clinical practice and training. By analyzing the 80 orthopedic applications currently available for the iPad, this analysis can help surgeons identify apps to use in their clinical practice, as well as guide the development and integration of future mobile applications. 

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