

Mobile Software Applications for Hand Surgeons

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AS SMARTPHONES AND tablet computers gain increasing popularity among physicians and trainees, recent articles have focused on mobile applications (apps) for particular specialties.¹⁻⁸ Most recently, authors Barr and Yao discussed the uses, capabilities, and regulations of smartphones as they apply to hand surgeons.⁹ In their article, the authors elucidated many of the useful features of smartphones, including the utility of apps, software developed specifically for mobile devices. They noted that no study had specifically examined apps designed for the hand surgeon. This article describes many of the currently available apps that would be most useful to practicing hand surgeons. Many of the presented apps are available for both iPhone and Android devices, although most are available exclusively for the iPhone and iPad. Many are free, others require purchase, and all are available through the iTunes App Store or Android Market (Table 1). I encourage readers who are interested in these apps or others to seek additional reviews from app review websites such as www.TopOrthoApps.com, which reviews only orthopedic apps.

CLINICAL

A variety of useful apps are designed for the clinical setting. Using the iPhone's internal accelerometer, Forearm Goniometer allows for objective measurements of pronation and supination, and a similar app, Simple Goniometer, can be useful for wrist range of motion measurements. For surgeons who regularly measure clinical outcomes, OrthoScores, Scores-SF36, and Scores-ODI provide the ability to digitally complete the DASH, *QuickDASH*, SF-12 and SF-36 Health Surveys, and so on, and save or email the results. A number of coding apps have become available specifi-

TABLE 1. App Cost and Availability

App Name	iTunes App Store	Android Market
AAOS Orthopaedic Code X-Lite	Subscription	Subscription
AO Surgery Reference	Free	Free
ASSH 2011	Free	Free
BoneCast	Free	\$0.99
BoneFeed	Free	\$1.41
Campbell's Operative Orthopaedics	\$99.99	
Clinical Orthopedic Exam	\$39.99	\$39.99
DrawMD Orthopedics	Free	
Forearm Goniometer	\$4.99	
HandDecide	\$1.99	
HandFeed	Free	Free
Medical iRehab Golfer's Elbow	\$2.99	\$2.99
Mobile Coder Hand & Wrist	\$49.99	
Ortho Traumapedia	\$9.99	
OrthoClass	Free	
OrthoMeter	\$11.99	
OrthoScores	\$99.99	
Plastic and Reconstructive Surgery	Free	
Scores-ODI	\$9.99	
Scores-SF36	\$14.99	
ShoulderDecide	\$1.99	
ShoulderDoc	Free	
Simple Goniometer	\$0.99	
Tennis Elbow	\$2.99	\$2.99

cally for hand surgeons, such as Mobile Coder Hand & Wrist and AAOS Orthopaedic Code X-Lite (for subscribers to the Code X service).

EDUCATIONAL

In addition to clinical apps, developers have also focused on surgeon education. HandFeed is an RSS reader for hand-related publications, such as the *Journal of Hand Surgery* (American and European vol-

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umes), *Hand Clinics*, *Techniques in Hand & Upper Extremity Surgery*, *Journal of Bone and Joint Surgery* (British volume), *Hand*, and others. References and abstracts are provided, but full text is not available. For more general orthopedic publications, one might also consider downloading BoneFeed and BoneCast (for audio and video podcasts). Attendees at the 2011 American Society for Surgery of the Hand meeting undoubtedly heard about the ASSH 2011 app, which included the conference schedule, a personal calendar, a program, maps, speakers, presentations, e-posters, and other utilities for use during the conference. The journal *Plastic and Reconstructive Surgery* is one of the first scientific publications to release a free app that includes complete access and download of each issue as it becomes available online.¹⁰

PATIENTS

In addition to apps for surgeons, developers have focused on patient education. Many patient education apps would be a useful addition to a surgeon's clinical practice. For example, HandDecide and ShoulderDecide include a plethora of animations, images, videos, and descriptions designed for educating patients about orthopedic conditions. ShoulderDoc is another app focused on teaching patients about shoulder conditions, whereas apps such as Tennis Elbow and Medical iRehab Golfer's Elbow focus on the pathology and treatment of more specific conditions. DrawMD Orthopedics provides a sketchpad for demonstrating injuries and treatments to patients and includes a number of prepopulated anatomic illustrations, implants, and pathologies.

GENERAL ORTHOPEDICS

In addition to apps developed specifically for upper-extremity surgeons, many general orthopedic surgery apps can be useful to hand surgeons. For example, Campbell's Operative Orthopaedics has published an app focusing on 240 "core techniques," including 12 hand categories, amounting to a total of 41 hand surgical procedures. The AO Surgery Reference app assists with fracture classification and preoperative planning, and OrthoClass and Ortho Traumapedia help surgeons classify fractures and dislocations. OrthoMeter uses a combination of the iPhone's internal accelerometer and its camera function to measure preoperative or postoperative alignment of hardware and bones. Clinical Orthopedic Exam is a physical examination reference application that includes statistical properties and video demonstrations for more than 80 clinical tests for the elbow and hand alone, and over 250 clinical examina-

tion tests in total. Not surprisingly, most of the large orthopedic device companies have created apps for surgeons that include video guides, tutorials, product brochures, and techniques guides—all available free through their respective apps. Examples include Acumed, Braun, DePuy, Smith & Nephew, Stryker, and Synthes.

This article has attempted to share some of the most useful apps for hand surgeons that are currently available. However, before downloading and using apps to treat patients, surgeons should be aware of their limitations. Apps are not peer reviewed by the medical community, and no validation of an app's content is performed before publication in the app stores. Only a few clinical studies have attempted to validate specific apps in peer reviewed journals.^{11–13} In addition, apps that rely on a mobile device's internal hardware, such as the camera or internal accelerometer, are subject to mechanical failure, and only a minority of medical apps have pursued and received approval from the United States Food and Drug Administration.¹⁴

If current trends continue, medical providers will increasingly use smartphones, mobile tablets, and apps.¹⁵ At the time of writing, the Apple App Store proclaims over 500,000 apps, with nearly 10,000 of those in the "medical" category.^{16–17} Thus, keeping up to date with the most useful apps available requires continuous browsing of the app store, frequenting app review sites, and validating the content of apps before using them for clinical decision making.

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