Mobile Applications for Medical Practice and Hospital Management

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Table of Contents

Introduction ................................................................. 3
Mobile Applications for Hospital Management ....................... 6
Mobile Applications for Medical Practice Management .............. 8
Discussion ...................................................................... 15
References .................................................................... 16
Mobile applications are taking the medical world by storm. Tom Kaneshige (2011), a senior writer at CIO.com, says, “Doctors have fallen in love with the Apple iPad, becoming one of the biggest early adopters among professionals.” But, he adds, this has caused some problems. “They want iPads for personal use and to get their work done. It’s the latter that has healthcare IT staff scrambling to secure the devices. The problem is that the iPad’s consumer-driven origins come into direct conflict with the nature of healthcare—namely, patient confidentiality and reliance on a few critical client-server apps.”

This may be why Jenny Gold (2011), staff writer for Kaiser Health News, titled her recent article on the use of mobile computing in hospitals, “For hospitals, there’s no app for that.” For example, she says that in the U.S., “iPads have been available since April 2010, but less than 1% of hospitals have fully functional tablet systems.” This compares with studies that indicate that about 80% of doctors in the United States have adopted either smartphones or tablets in their work (Merrill, 2011).

Nevertheless, this imbalance is likely to change because, as Andy Barbash (quoted in Michael, 2011), a neurologist at Holy Cross Hospital in Silver Spring, Md., notes, “Healthcare is fundamentally a mobile process.” That is, doctors, nurses and other healthcare professionals often move from room to room and from one hospital to another. Mobile devices actually fit with their needs. In contrast, the use of laptops and desktop computers within hospital settings often requires healthcare personnel to sit down and pay attention to a screen and keyboard in a location that is usually removed from their patients.

The adoption of mobile computing within hospitals and in medical practices becomes more attractive as the technology improves. The new iPad 2 has a processor that makes it run much faster than the previous version, and graphics are processed up to nine times faster than the original iPad. This means that medical images such as CT scans, X-rays, and ultrasound scans are going to be processed and displayed much faster on the newer devices. Healthcare personnel have also found good uses for the two cameras in the newest versions of tablet computers, especially for remote telemedicine (Merrill, 2011b).
At the same time, resistance to the use of mobile devices within hospital and medical settings is definitely there. In an interview with Earls (2011), Dr. Mark McEntee, senior lecturer at the University of Sydney in Australia, explains some of the reasons why the iPad is not up to scratch as a medical device, at least not in the radiology department as a “primary display device.”

There are two types of resolution, spatial and brightness, and both are significantly higher on current primary display devices than on iPads:

- spatial resolution on primary devices: 508 ppi (750 ppi for mammography)
- spatial resolution on an iPad: 132 ppi
- brightness resolution on primary devices: 1,000 cd/m² at least
- brightness resolution on an iPad: 333 cd/m²

A primary display device has to be calibrated to the gray scale standard display function (GSDF), which is a DICOM standard. A current generation iPad is unable to achieve this.

The iPad is a class II device, as defined by ISO, which means the number of pixel defects is two per million or more. A class I device, such as a primary display device, must have no defects per million. This is very expensive to achieve and, as the iPad is sold at a completely different price point to a diagnostic work station, it is unlikely that the tablet will ever become a class I device.

That's not to say that the iPad will not improve, and at a rapid pace; indeed, the iPad 3 is set to have a retina display with a spatial resolution of 326 ppi, but this still does not take the device into the primary display category, to say nothing of its projected status as a class II device. (Adapted from Earls, 2011)

In this interview, Dr. McEntee agrees that iPads and other tablet computers have a use for doctors visiting patients on the wards, but he worries about such a portable device going missing, thereby compromising patient privacy. These concerns can be countered with policies and provisioning, such as using MDM or MAM solutions, but needless to say, it’s easier to walk out of a healthcare installation with an iPad than a PC cart.
It is clear that we are at the early stages of development for the use of mobile devices as management tools in medicine. But, much will quickly change over the next three to five years. This brief research report examines the current platforms, applications, and uses of mobile computing for the management of hospitals and for individual medical practices. Our search through the available literature indicates that there are more applications for doctors to manage the practices, compared with apps for the management of hospitals. We have divided the applications we have found for management of medical settings into two categories: mobile applications for hospital management, and mobile applications for medical practice management.
Much work needs to be done to develop comprehensive hospital management information systems (HIS) for American hospitals. While there are a few HIS systems developed offshore such as SA-HIS, and one from NIIT, both with headquarters in India (NIIT, 2011; Sahadevan, 2010), American systems are still at the prototype or pilot program stages. This is important to note because hospital systems differ from one country to another in terms of standards, legislation, and practices. The small amount of literature that is available on hospital information systems right now simply is an indication of the potential of this field in the future. With that caveat in mind, here is a list of some possible functions for mobile applications in hospital management that may be developed in the near future:

- **Hospital information** – Mobile devices can be used by the public and by healthcare personnel to find information about any given hospital. Addresses and phone numbers, department names, visiting hours, services, parking information, floor plans, and other such information could easily be made available through mobile devices (NIIT, 2011; Sahadevan, 2010).

- **Hospital financial transactions** – Hospitals do billings, and take payment for many services. New mobile billing apps can be used for these transactions (Ingenious Med, 2011; NIIT, 2011; Sahadevan, 2010).

- **Electronic medical/health records (EMR/EHR)** – Electronic medical records and electronic health records have been in development for a long time. Their adoption has been slow, with only a small subset of hospitals reaching advanced implementation of EMR (Zeiger, 2009). Only now are they being adopted as mobile devices such as tablets and smartphones are integrated with EHRs and EMRs. But, “implementation has been slow, and experts say that’s because the technology hasn’t fit the practitioner’s needs... physicians’ inclination to implement EHRs was impacted by their ability (or lack thereof) to interact with the system through a mobile platform” (Michael, 2011). Some of these concerns may be due to legal regulations about document retrieval rights for consumers, as well as stewardship requirements for document owners.

- **Patient information management** – There are many information functions that could be made more efficient through the use of mobile devices for patient information. These include patient contact management, appoint-
Mobile Applications for Medical Practice and Hospital Management

- **Administrative functions** – Mobile devices, especially iPads, have been used for a whole variety of administrative functions including inventory management (using RFID tags) (M2 Communications, 2005), scheduling, tracking of wait times, tracking of service levels, bed occupancy, lab results, and overall statistics (NIIT, 2011; Sahadevan, 2010).

- **Coordination and collaboration** – New systems such as VivoLink (IWN, 2011) facilitate coordination and integration among physicians, hospitals, and implant distributors. Sermo Mobile allows physicians from across 68 specialties and all 50 states to collaborate, discuss, and consult with each other using mobile devices (HLR, 2011).

- **Access to medical information** – Mobile devices are able to provide image display for X-rays, MRI scans, and ultrasound images (Carr, 2010; Earls, 2011). Mobile apps can also provide access to medical literature for healthcare personnel as needed (Carr, 2010). There are still concerns over the iPad’s display quality as a visualization platform, as previously mentioned in this paper.

To date, there is no single mobile hospital management system that will carry out all of the above functions at a level that is acceptable to American hospitals. The pilot programs are underway, and it is just a matter of time before someone develops a program for the American health system that will include all of the above functions and more. For example, mRemedy Inc., a mobile tech development firm in Minneapolis, has developed, in collaboration with the Mayo Clinic, an app called myTality. MyTality is a platform for developing custom hospital mobile apps. Hospitals are able to use it to give directions, make email connections with clinicians, and give patients access to health information (Mueller, 2011). Another new healthcare app provides important information to patients before they come to the hospital. “The NWH Wait Time iPhone Application by MedTouch features near real-time reporting of emergency room wait times, integrated directions to the ER and pre-registration, and mobile-optimized physician profiles with contact information. This app was designed for Newton-Wellesley Hospital in Massachusetts” (Mueller, 2011).
Mobile Applications for Medical Practice and Hospital Management

As noted above, there are few applications that can be used in hospital management, but there are a number that are useful in the management of individual medical practices. At the same time, there are also barriers to adoption of mobile devices in medical offices. In November 2010, the *Healthcare Leadership Review* surveyed physicians both about resistance to the use of mobile devices as well as the usefulness of personal mobile devices in their work. The results were as follows:

Two thirds of physicians say they are using personal mobile devices for health solutions that aren’t connected to their practice or hospital IT systems, according to a report by PricewaterhouseCoopers’ (PWC) Health Research Institute. Nearly a third said their hospital or practice leaders will not support the use of mobile health devices. The findings of the survey, published in a report titled *Healthcare Unwired*, also found that 88% of physicians would like their patients to track and/or monitor their health at home, particularly their weight, blood sugar levels, and vital signs. In addition, 56% of physicians using mobile devices said they expedite decision-making, nearly 40% said the use of mobile devices decreases time spent on administration, and 40% said that they could reduce the number of office visits by using mobile health technologies. (HLR, 2010)

Another national survey of orthopedic surgeons revealed that 84% of respondents (n = 476) have a smartphone, the majority (55%) have an iPhone, and that 53% of the doctors with smartphones already use apps in clinical practice. Ninety-six percent of respondents who use apps reported they would like more orthopedic apps and would pay an average of nearly $30 for useful apps. The four most requested categories of apps were textbook/reference, techniques/guides, OITE/board review, and billing/coding (Franko, 2011). This kind of demand bodes well for the future of the mobile health industry. As McNickle (2011) notes,

Apps for coding, billing, prescription refills and more are streamlining workflows and making it easier for physicians and other medical specialists alike. For example, the popular app Hospital Rounds was designed to help professionals make rounds, finish dictations, log billing information, transmit billing information back to the office, and more. E/M Code Check, a physician-created medical documentation and coding app, helps increase practice revenue by presenting medical documentation requirements to support a specific level of coding in a clear way.
An app called Nimble, from St. Louis-based ClearPractice, is the first cloud-based EMR solution developed in iOS to run natively on the iPad. “The product connects either through Wi-Fi or 3G to the ClearPractice cloud so no data is stored on the device, making it secure and HIPAA compliant. The application contains all the features of the company’s existing SaaS-based EMR solution including scheduling, charting, prescribing, inpatient rounds, lab review/ordering, messaging and more. The product also seamlessly integrates with the company’s practice management and billing system so all charges are automatically captured, scrubbed, and electronically submitted for payment” (ClearPractice, 2010). This helps with the stewardship of records issue, discussed previously.

Here are 10 other apps that may be useful in managing a medical practice (app descriptions are adapted from their respective listings in app stores). Their inclusion here is not an endorsement, but to show examples of what kind of mobile materials are available to support the management of hospitals and doctors’ practices.

31 ½ Essentials for Running Your Medical Practice – iBook, by Guiliana, J. and Ornstein, H. (2011), $69.95 – While many books address medical practice management, this new book goes beyond textbook theory. Drawing on nearly 50 years of experience consulting with and running highly successful private practices, the authors map practical solutions to the harsh realities facing medical, dental, and all healthcare practices, including: tough competition,
patient expectations, shrinking reimbursement, litigation, malpractice insurance costs, complex regulations, high rents, utilities, and other challenges.

Medical Practice Trends Podcast 23 – “Advances in Mobile Health Technology” – talk by Dr. Joseph Kim, president of Medical Communications Media Inc., Free – This podcast can be downloaded from iTunes.

Dragon Medical Mobile – The program is a version of the Dragon Naturally Speaking product line, specifically designed for use by medical professionals. Dragon Medical is 99% accurate “out of the box” and includes medical vocabularies covering nearly 80 medical specialties and subspecialties. It allows physicians to dictate in their own words, generating “once and done” documentation, which they can then dictate, edit, and review in succession. Physicians further accelerate dictation by using customized macros to reuse frequently dictated text. Additionally, the Dragon Medical Template Library—a library of more than two dozen macros for standard notes and an extensive list of “medical normals” by body system—facilitates rapid note creation. This approach dramatically reduces the time physicians spend documenting care.
DrChrono EHR – DrChrono.com Inc., Free – DrChrono is certified as a complete EHR (Electronic Health Record) in accordance with ONC-ATCB stage 1 meaningful use criteria. The iPad EHR will qualify you for meaningful use EHR incentives. Use the certified iPad EHR and the regular EHR platform to qualify for $44,000+ under the economic stimulus plan incentives under the HITECH Act – for free.

iRVU – e-Med Tools, Free – This app allows doctors to track their productivity in terms of “relative value units,” or RVUs. With more than 70% of physicians getting paid on the basis of work RVUs, tracking your own productivity is essential to know what your productivity pay will be. iRVU lets you track work RVUs for inpatient medical services such as new patient H&Ps, critical care, consults, and follow-up visits at the point of care. Just type in the number of new patient encounters for each coding level, and iRVU will automatically calculate your total RVUs, RVUs per encounter, Medicare charges, and Medicare charges per encounter.
Mobile Applications for Medical Practice and Hospital Management

**iScheduler** – Rolling Hills Enterprises, Free – iScheduler, in conjunction with the InTouch Practice Management system, allows doctors to access their schedule remotely on their mobile device. Users can conveniently check practitioners’ schedules and view a day at a time, a week at a time for one practitioner or all in a single location. The application is double password-protected for maximum security.

![iScheduler screenshot]

**Practice Tips by Doctor's Digest** – Brandofino Communications, Free – Practice Tips by Doctor’s Digest provides four practice management tools, as well as breaking news, about medication safety (including instant alerts and hazards alerts of national importance). It also contains medication safety material and in-depth information on practice management topics. Bookmarking and tracking of what a doctor has read are also useful features.

![Practice Tips by Doctor's Digest screenshot]
Mobile Applications for Medical Practice and Hospital Management

PracticeWire – Healthy Advice Networks, Free – Stay current with the latest medical and practice management news, anytime, anywhere with PracticeWire Mobile. This app features PhysicianWire (the latest medical research from today’s leading publications), StaffWire (expert advice on everything from correct coding patient email), Breaking News (the latest health news patients and staff are talking about), and Health Alert (product safety recalls and FDA-issued boxed warnings for drug labels).

MGMA Member Community – DubMeNow, Free – The Medical Group Management Association (MGMA) Member Community app is designed for collaboration among other members, sharing knowledge and expertise and discussing topics that interest you and your medical peers. MGMA and its standard-setting and certification body, the American College of Medical Practice Executives (ACMPE) is an association for professional leaders of medical group practices.
Success Rx by Gary Kadi – Antal Media, Free – This app is by Gary Kadi, a leading consultant and speaker on managing a successful dental practice. The Success Rx Calculator allows you to enter data on case acceptance, patient retention, frequency rate, and number of adult patients in order to calculate the income potential of a dental practice.
Discussion

Mobile applications can be used as management tools for both hospitals and medical practices. However, development for hospital management has lagged behind the production of individual apps for doctors to use in their individual practices. The reasons for this may be manifold, from enterprise technology issues to government regulations and everything in between. That discussion is outside of the scope of this paper, but should factor into the research and consideration by any institution or practitioner considering employing mobile in their business management processes. In this brief report, we have outlined the potential for the use of mobile computing in hospital management by aggregating some of the features found in earlier versions of HIS programs. There is a major opportunity for vendors in the United States to develop and deploy a comprehensive mobile hospital management system that fits with the standards, laws, and practices of the American health system.

On the other hand, doctors have eagerly bought tablet computers, especially the iPad, for their personal use. Based on early success in a number of areas of medical practice, we should expect to see widespread deployment of tablet computers for the management of medical practices.
References


Kaneshige, Tom (2011). iPad Security Scramble: Take an inside look at how one hospital group is testing and perfecting its prescription for security as its doctors demand to do more work on iPads. One decision: Not all apps are ready yet. CIO, 24(9), April 1.


