Mcommerce in Healthcare

“The maturation of mobile commerce in the Healthcare Industry”

(Cerner Corporation, 2012)

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Summary

Mobile devices and wireless technologies are a catalyst for change in Ecommerce. As an IT Director at Penn State Hershey Medical Center, I am most interested in the effect that mobile devices have on the business of healthcare. There are many applications in healthcare from administration, patient scheduling, telemedicine and diagnostic monitoring which are transforming the way we provide healthcare. I’d like to explore new applications, outline benefits, challenges and speculate based on available research how mcommerce in healthcare will change the delivery of healthcare services globally over the next five to ten years.

In the past several years, smart phones have become an essential device that we always have with us. Many consider their mobile phone their most important possession and The Economist put it simply: “mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous technology.” We will have six billion mobile phones in the world by 2013, with over 85 percent of the world’s population having access to a wireless signal. The prevalence of this technology provides the possibility to address a healthcare delivery crisis and transform the world.” (Topol, 2011)

There are applications that allow healthcare consumers the ability to connect with their healthcare providers to communicate, schedule appointments and pay their bills. Even more exciting projects are putting the clinical laboratory on a chip. Using the SIM card as a biosensor, clinicians are able to detect malaria, sexually transmitted diseases, and other infectious diseases remotely. The SIM card chip could also be used to analyze blood, heart rhythms, saliva, sweat, breath, and urine. (Savitz, 2012)
This is especially beneficial in countries where healthcare providers and infrastructure are not readily available. The idea of mobile telemedicine and addressing healthcare issues in countries where they have cellular phones can have a major impact toward improving healthcare services worldwide.

Conversely, one of the major challenges with the healthcare industry is that it is highly regulated and requires stringent security practices. Mobile device security is still evolving to the level of security that can be achieved with centrally managed client server systems protected by an organizational firewall. The federal government continues to introduce new regulations to improve healthcare and advance security practices in order to protect consumers and protected health information. These requirements often put healthcare providers at odds with providing services at higher risk based on the convenience of using a mobile device.

I believe regardless of the regulatory and security requirements, the cellular mobile applications for healthcare benefits outweigh any vulnerability they introduce. It’s only a matter of time before the mobile device and mcommerce in healthcare totally transforms the way we do business.
Healthcare spending is 16 to 18% of the United States gross domestic product (Tulenko, 2012) and minimally 10% of most countries as shown in the table to the lower right. This multi-billion dollar industry continues to increase in cost and is a primary concern for the world economy. Healthcare Organizations, Governments and Insurance Payers are struggling to create quality healthcare delivery systems that are affordable and accessible to all people across the globe. With the growing population and limited access to health care services, the mobile health phenomenon, sometimes referred to as mHealth, is considered a key solution to address the world’s needs today and in the future. Mcommerce in Healthcare is in early development stages, but has many applications with the potential to resolve global care deficiencies. While proven to be immensely valuable, mobile telemedicine has significant challenges to overcome to become a mature and established service delivery method for the healthcare industry. (Handler, 2012)

Many economic factors and advancements in technology are at the nexus of change for Healthcare. Michael Hedges, VP and CIO of Medtronic, a healthcare solution provider, was interviewed at the World Economic Forum in 2010. He predicts that mobile health initiatives will transform how we manage our health in the next 5 to 10 years while reducing healthcare costs for a growing world population of more than seven billion. Healthcare “anywhere” is the concept that clinical providers, insurers and other payers will develop mobile applications for the treatment and payment of health care operations. Applications are being created to improve

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<th>Country</th>
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<td>United States</td>
<td>18</td>
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<tr>
<td>Canada</td>
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<td>Cuba</td>
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(Rogers, 2012)
patient-provider communications, address adherence to drug therapies, collect biological data and analyze lab specimens all from a consumer smart phone. (Hedges, 2010)

Mobile, social and cloud experiences have the potential to change the healthcare industry as they have changed news, entertainment and media management. The smart device (smart phone, tablet, e-reader) adoption by the mainstream population and its processing power provide the industry a way to reach people more effectively. (Willis, 2012) Many consider their mobile phone their most important possession and The Economist put it simply: “mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous technology.” We will have six billion mobile phones in the world by 2013, with over 85 percent of the world’s population having access to a wireless signal. (Topol, 2011) According to David Willis, a Gartner Inc. research analyst, “The disruptive force of mobility is reworking every industry.” (Willis, 2012) and Dr. Eric Topol states that “the prevalence of this technology provides the possibility to address a healthcare delivery crisis and transform the world.” (Topol, 2011)

Nielsen Wire, predicted that 50% of US mobile subscribers would have a smart phone as shown in the charts above and the global penetration of smart phones across in global markets
isn’t far behind. Surprisingly, adoption outside the US is increasing year over year at a faster pace. (Quick, 2009)

Applications

The telemedicine field has experienced tremendous growth in recent years in countries like the United Kingdom, United States, Greece, Japan, Canada, Germany and in developing countries like Bangladesh where 70% people live in rural areas. (Watfa, 2011) Many different types of applications are available or under development to enable providers to improve the delivery of care to their patients remotely. Within in the next 5 to 10 years, mobile healthcare applications we can only imagine today, we will be able to say, “There’s an app for that!”™ (Gross, 2010)

One vendor, Indisys, has deployed a virtual medical assistant service in the Spanish province of Andalusian for a population of 8 million people. The application service provides a range of medical, nutrition and child-care advice; helps healthcare consumers arrange, modify or cancel doctors’ appointments; and allows individuals to communicate with clinical providers. Virtual medical assistant applications available on smartphones have the potential to help support healthy diets and exercise routines. Using an avatar, healthcare consumers may ask questions in a typed or spoken natural-language dialogue. (Handler, 2012)

Wellness programs and weight management apps are being offered by many insurance companies to encourage consumers to manage their health and lower their costs. As shown in the chart at the top of page 7, personal health assessments are conducted by 59% of insurers and partners polled in the 2012 Towers Watson survey of global medical trends. (Towers Watson, 2012)
Another prime area for improvement using mobile applications is in the management of chronic diseases and medication compliance. Applications like Pill Jogger are designed to remind patients to take their medications, to monitor that they have done so, and to send alerts to patients, clinicians or family members in the event of noncompliance. Using reminders, games and incentives to encourage consumers to adhere to their medication therapy plans can reduce costs and improve outcomes. Most individuals do not take their medication consistently which impacts their efficacy. Studies have shown that when patients use their medications correctly they can reduce their healthcare costs. Consider someone with asthma that doesn’t regularly use their medication. The result may be more trips to the Emergency Department for chronic episodes. Additionally, a diabetic that inconsistently administers their medications and glucose monitoring is at higher risk for adverse events which increase costs when health care professionals need to intervene. (Pill Jogger, 2012)
Dr. Eric Topol describes a “reboot” of the health care system using powerful digital tools including mobile sensors and advanced processors in his book, “The Creative Destruction of Medicine, how the digital revolution will create better health care”. Digital cameras, microphones and global positioning can be considered the most widely available sensors since they are incorporated in most mobile phones. Using these technologies and wireless accelerometer sensors similar to those used in video games like the Nintendo Wii and Microsoft’s Kinect, which recognize faces, gestures and motion, applications under development are able to perform diagnostic testing, quality image capture and audio data capture from a mobile device. (Topol, 2011)

In the future, patients may be able to capture and send their own diagnostic image from a pocket-sized mobile echocardiogram unit like the GE Vscan shown to the right. The Vscan is similar to a smart phone and it’s only a matter of time before this proprietary technology performing ultrasound image capture like the images below. (GE Healthcare, 2012) The application will eventually be
available using consumer mobile platform technology and matching the diagnostic quality of high end equipment being used today. (Topol, 2011)

While advanced applications are on the horizon, consider some very useful applications that are changing outcomes and saving lives today. Dr. Nadim Mahmud co-founded Medic Mobile in the hopes of building new models of health care support networks from simple, SMS-based platforms. Back in 2007, he was responding to a healthcare crisis in Bangladesh during monsoon season. There was a spike in cholera cases and he was working at a hospital in the capital, Dhaka, treating over 1,000 patients per day for diarrheal disease. One of his first patients was a 53 year old man who was severely dehydrated and his family traveled 3 days to reach the treatment facility only for him to pass away within 10 minutes of seeing Dr. Mahmud. This tragedy may have been avoided if the family only knew that a satellite clinic site had been deployed just 20 minutes from their home. Needlessly, people die when they lack communication and information regarding the availability of healthcare. Using their application, FrontlineSMS, they are able to alert rural health volunteers about available care, notify communities of services in their area and track patient immunizations and health events. (Mahmud, 2012)

Telemedicine and distance monitoring have special efficacy for patients with chronic disease such as diabetes, congestive heart failure, chronic obstructive pulmonary disease, and chronic skin ulcers for which changes in vital signs can signal a need for medical intervention. These are just a few examples of applications that will transform the healthcare industry forever. (Watfa, 2011)
Mobile application infrastructure is necessary to support and deliver these health services. Below is a simple system architecture diagram for an Android-based telemedicine system that provides patient monitoring. This effective integrated management system collects data, facilitates communication and monitors transactions for patients, general practitioners and pharmacists. The secured central patient database and electronic medical records reside either in the cloud or on a server in a data center. Patient’s access their information securely from the mobile client application or Internet browser using a cellular or wireless communication network. Interaction with the backend systems can be either online real-time mode (synchronous) or offline store and forward mode (asynchronous). (Watfa, 2011)

There are various programming languages and mobile platforms available to develop mobile application software. In this specific example, the application running on the Android mobile operating system; its developers used Java to code the mobile client and PHP server scripting language for the telemedicine web application. PHP is an open-source server-side scripting language which was originally designed for web development to produce dynamic web pages. The mobile client collects vital signs using a sensor connected to the mobile device.
shown in the two screen shots to the left. Screen “A” shows the application when the sensor is not connected and screen “B” indicates that the sensor is found. The picture below shows the user holding the medical device/sensor in his left hand and the mobile gateway and processor in his right hand. Using Bluetooth, the data from the sensor is transmitted to the mobile device and via the cellular connection the mobile device transmits data to the patient record on the server database. The physician is then able to receive an alert that data has been uploaded by the patient, so he or she is notified to examine the data to make diagnostic care management decisions and contact the patient if adjustments to their medication are required. This encounter is executed remotely without an office visit and can be across town or the globe. (Watfa, 2011)

Challenges

Despite technology developments, widespread smartphone adoption and medical advancements, the reality is that few healthcare payers have a thoughtful and mature mobile technology strategy in place. While mobile technology has the ability to attract and retain individual consumers as they tailor their own health plan experience, a single unproductive or erroneous interaction can damage the payer’s brand and customer loyalty. That’s why it is
essential that providers develop a coordinated strategy for their mobile position. This is a complex and difficult task for most organizations, as there are many stakeholders and contributors involved in setting strategy as well as organizational and technology challenges. (Booz, 2012)

First, there are unprecedented challenges managing the data security of health care information. Health information management is highly regulated under HIPAA, the Health Information Portability Accountability Act of 1996 and the HITECH Act enacted as part of the American Recovery and Reinvestment Act of 2009. Less than 30% of CIOs believe their current policies for consumer mobile device use will pass an information audit. Data loss is a serious problem, and security exposures are inevitable if policies lack the necessary guidelines and administrative, technical and physical controls to manage data securely moving outside the boundaries of the organizations secure centralized systems. Mobile device management tools are available and address some critical security gaps needed to protect data privacy, meet regulatory and contractual requirements, and comply with audits when data resides on a mobile device, however many organizations have not made the software investments. (Willis, 2012)

A second challenge facing health care organizations and telecommunication carriers is the demand and expectation that consumers must have immediate wireless Internet data access. The combination of mobile, social networking, and cloud computing is consuming wireless connections so fast that they will surpass wired connections by 2015. High-growth countries, such as India, will reach this point even sooner. As tablets and more advanced applications are deployed, the need for bandwidth is increasing at an exponential rate. On average, a tablet consumes 20% more bandwidth than a personal computer, and being wirelessly connected means that these devices can swamp Wi-Fi networks. (Willis, 2012)
Finally, there are major challenges developing mobile applications as mobile platforms present a complex and ever changing computing environment. There are many mobile operating systems which have unique presentation layer, interaction style and software stack. Various screen sizes, input modes and hardware capabilities are available require application intelligence to automatically detect hardware capabilities to adjust image resolution and quality. Network connectivity is erratic and fluctuates widely in typical usage, so considerations for operation while offline may be necessary. (Willis, 2012)

There are many challenges facing healthcare organizations and mobile devices have the potential to solve key issues with access and affordability. Over the next 3-5 years, as reimbursement models, infrastructure, security and regulatory governance mature, mobile health applications will be an extension of the electronic medical record in most health systems.

Conclusions

Gartner Inc. is known for publishing information technology industry benchmarks and market forecasts. In Handler’s 2012 hype cycle report for telemedicine, they changed their prediction that mHealth will plateau over the next five to 10 years to being "obsolete before plateau" because it is a broad and nebulous concept that emphasizes the means (mobile technologies), not the end (actual use of mobile technologies in healthcare delivery). Mobile technologies are now routinely incorporated into healthcare delivery, and as a result, the term has become obsolete. (Handler, 2012) Semantics aside, mobile devices have changed our entire approach to business and healthcare with mobile applications, the cloud and smart devices will improve health around the world as adoption continues and services mature.

Clearly, the healthcare industry has many applications and use cases for mobile access of patient information. As investments to secure data and organizational strategy align to support
the use of telemedicine services, we will begin to realize improved health access, mature applications and reduced costs.

Within the next 5 to 10 years, healthcare will be mature and undoubtedly available anywhere using mobile devices. I expect in 2022, we will have forgotten how society functioned without mobile devices as it’s hard to remember today a world before the Internet.
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Works Cited


Runyon, B. (2012). As the Mobility Movement Gains Momentum, Healthcare Delivery Organizations Must Prepare to Adapt. Stamford, CT: Gartner.

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