

white paper

# MOBILE APPLICATIONS IN HEALTHCARE

## Reaching Out to Patients to Improve Care

*Includes Case Study*

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## Introduction to mHealth

One in five mobile phone owners today owns a smartphone,<sup>1</sup> a trend that is on the rise as consumers increasingly use these devices as handheld computers. Not surprisingly the number of consumer smartphone applications (apps) that were downloaded went from 300 million in 2009 to five billion in 2010.<sup>2</sup> With mobile devices outnumbering personal computers,<sup>3</sup> we are approaching the point where they will be the most common way to access data.

For healthcare, the explosion of the smartphone market is an unprecedented opportunity. More than 200 million mobile health (mHealth) applications are in use today, and that number is expected to increase threefold by 2012.<sup>4</sup> Seventy percent of people worldwide are interested in having access to at least one mHealth application.<sup>5</sup> According to the Global Mobile Health Market Report 2010-2015, Smartphone applications will enable the healthcare industry to reach out to 500 million users in 2015.<sup>6</sup>

This paper discusses what is driving the mHealth industry, strategies that health care organizations are employing to reach consumers, and developing best practices for apps that can be used across various devices and that appeal to consumers.

## Top Drivers for mHealth Apps

Most health consumers regularly seek health information online, so it makes sense that they are turning to their smartphones for their health questions and needs. Health care organizations have an advantage here, because they are already a trusted source of information. While patients may not be doing in-depth research on their mobile devices, they are looking for action-oriented information, according to Scott Eising Director of Product Management for Mayo Clinic Internet Services.<sup>7</sup> Many healthcare organizations already have personal health records and/or patient portals that can easily be adapted to smartphone technology.

Health care organizations increasingly want to connect more directly with patients as a means of providing efficient, high quality care. With features such as mobile scheduling, the ability to check wait times in offices and emergency rooms, and mobile prescription refills, mHealth apps make it easy for patients to interact with healthcare organizations.

Beyond the ability to connect, mHealth apps make it easy for patients to do business with health care providers. "In today's world, people will pay money to buy back their own time," said Bert Reese, Senior Vice President and CIO of Sentara Healthcare. Just as innovations such as EZ Pass let customers save time and get where they're going faster, mHealth apps have the potential to provide faster, more efficient health care.

Mobile health apps offer the opportunity to:

- Build brand equity through frequent contact
- Increase consumer loyalty by providing a broader range of services
- Improve customer service through the range of options available to patients
- Drive differentiation by providing a competitive advantage
- Improve customer service through a wide array of options to serve patients
- Increase the availability and access to healthcare so patients can take ownership of their data and have increased responsibility for their own health<sup>8</sup>

Smartphones have advantages over other information and communication technologies, including portability, continuous uninterrupted data stream, and the capability to support multimedia software applications.<sup>9</sup> With the potential to provide cost-efficient care delivery to patients and improve health outcomes, the value proposition for mHealth is strong.<sup>10</sup>

“Health care providers have to get into the mobile app market,” said Reese. “Consumers will demand it. Providers that have mobile apps, giving patients back their own time, become providers of choice. If they maintain clinical integrity, accuracy and convenience, they’ve hit a home run.”

## **mHealth Strategies for Improving Care**

There are a number of strategies being employed by health care organizations to involve patients in their care through mHealth apps. They are aimed at providing patients with the tools to manage their health with the goal of improving it.

**Chronic Disease Management:** For patients with chronic health conditions such as asthma, diabetes, or heart disease, sound health management involves making good health “micro decisions” every day.<sup>11</sup> Smartphone apps facilitate this process when and where decisions are made. This can prevent situations from escalating to the point where more costly and time-consuming interventions are required. Apps that track asthma flare ups or blood glucose, for example let patients know their health status without an office or hospital visit. Or, if a patient with COPD experiences a sudden weight gain, for example, an app that tracks that information and communicates it to the physician can raise a red flag that allows measures to be taken before the patient’s health deteriorates to the point that he or she has to be hospitalized.

Some apps connect patients with caregivers on a continuous basis. Examples of sensor technologies that can be combined with smartphones to track health measurements and monitor patients with chronic conditions include:

- Peak flow meters and pulse oximeters for respiratory conditions
- Digital blood pressure monitors for hypertensive patients
- Glucometers to measure blood glucose for those with diabetes

**PHR Apps:** The majority of the public believes that using an online Personal Health Record (PHR) would provide major benefits to managing health care services. In fact, two out of three members of the public and doctors agree that patients should have the option to view and download their personal health information online.<sup>12</sup> Use of personal health records has been slow to take off but is on the rise. Coupled with the proliferation of smartphones, this means that patients increasingly expect this option to be available and are more likely to utilize it. The ability to schedule appointments, communicate with providers, view test results, and request prescription refills meshes perfectly with the trend toward using a smartphone to manage many aspects of one’s life. Furthermore, many hospitals already have online PHRs and patient portals that can easily be converted to smartphone platforms.

**Behavioral Change:** Consumers are already using apps to track and manage their behavior and there’s no reason why health care providers should not benefit from this trend. Apps that help patients adhere to treatment regimens, offer diet assistance, or track exercise have the potential to help keep patients healthy and prevent disease.

**Health Information:** This is another strategy that echoes the online presence maintained by many hospitals. Apps that provide health news and information coupled with other functionality have the potential to attract consumers and increase their loyalty. For example, Mayo Clinic's Symptom Checker lets users search MayoClinic.com for more information about thousands of health topics and provides access to information about care at Mayo Clinic.

**Remote Monitoring:** One of the key factors that is expected to contribute to the growth of mHealth apps is the increase in remote patient monitoring devices. The market for wearable devices will exceed 100 million units annually by 2016, driven by devices for both consumer and clinical settings.<sup>13</sup> In 2009, nearly 50,000 blood pressure monitors were used in telehealth applications, but this is expected to hit 500,000 by 2013. In addition, global shipments of home digital blood glucose meters, blood pressure monitors, weight scales, pulse oximeters and peak flow meters used in mHealth applications will grow to more than 1.6 million, according to a 2010 InMedical Report.<sup>14</sup> Providers that offer remote monitoring linked to a smartphone app will offer a valuable service to their patients that will also give them a competitive edge.



*Apps that help patients manage their disease may contain specific queries that help them monitor their health*

## Hospitals Using Apps to Connect with Patients

- Southcoast Hospitals Group has an iPhone app that helps patients keep track of their medications, find a physician and stay connected with news and events.
- Akron Children's Hospital's Care4Kids app offers general health and hospital information, as well as allow parents to store their family's medical history.
- DMC Children's Hospital of Michigan developed an app that answers common pediatric health-related questions and provides a child safety checklist.
- Mayo Clinic's Meditation, based on the research of Amit Sood M.D., helps patients use the mind-body connection to stay healthy, while its Symptom Checker helps patients manage acute problems and provides guidance on practicing self-care at home.

## Best Practices for mHealth Apps

Consumer apps are designed for ease of use by the consumer, a concept that providers should keep in mind when entering the mHealth app market. Many of these applications are built by tech-savvy professionals, so providers should make sure that they are conceived and executed with the patient at the forefront. If properly designed, mHealth apps will be targeted to those who want to engage in their health. For example, apps for chronically ill patients need to be designed so that they will be easily accepted into the already complicated lives of these individuals and their caregivers.<sup>15</sup> "A badly designed app is like a badly designed website," said Sai Chanderraju, General Manager for Products at iSpace. "It won't generate user stickiness." Optimizing the user experience is paramount to launching an app that people will come back to again and again.

Designing an mHealth app can be a complex undertaking, but there are a few characteristics that providers should always keep in mind:

**Make it broad.** mHealth apps can range from low complexity to high and can be used in SMS/Text, browser-based. Mobile websites, or on devices. SMS/Text has simple functionality and ubiquitous access, while Mobile web presents standardization issues. On device apps are more complicated to develop but offer a sharper interface and better graphics. Providers should consider developing solutions in all three areas.

**Make it simple.** In terms of optimizing the user experience, the fewer clicks the better. Users should be able to get where they want to go quickly and easily. Consider the features patients most want to use and include those. Once patients are using the app, they can always go to the website for more in-depth information and features. The key is to attract them with an easy-to-use interface.



**Make it useful.** Consider the features that patients will be most interested in while they're on the go. For example, the ability to schedule or change appointments and locate provider facilities is a useful feature for patients while they're out and about. Additional options, such as a GPS feature that provides directions from the user's current location, can be a bonus. According to Sentara's Bert Reese, the best way to determine what features will be appealing is to crowdsource - bring patients and employees together and ask them what features to include or change to add value. If an idea fits in with the value proposition, then it's worth pursuing.

**Make it unique.** Smartphone apps are an opportunity to differentiate from other providers. Providers should consider functionality that no one else is providing to make it more appealing for patients to do business with them.



**Make it easy.** Developing mHealth apps can be challenging because they need to be usable on different platforms, such as Android, IOS, or Windows. Solutions should be able to be simultaneously delivered via SMS/Text, Mobile Web and On Device. Furthermore, new smartphones are coming on to the market quickly and it is difficult to keep pace. The fact that an app works on one device does not mean it will work on all of them. Providers that cater to one platform will be leaving potential consumers behind. Vendors must devise methods of overcoming this obstacle without compromising value or ease of use.

## Putting it into Action: Integrating with a Web Presence

For a medical and affiliated physicians group serving over half a million patients, iSpace created an app that is tightly integrated with the group's patient portal. The idea was to broaden the patient's experience while keeping it uniform with the website that they had already been using.



An easy-to-use Welcome screen contains icons that direct patients to various tasks, including:

- An appointment scheduler that allows them to schedule appointments, request referrals and view upcoming or past appointments. It also provides the location and contact information for the provider and the reason for the visit.
- A lab appointment scheduler that lets them manage their laboratory tests.
- A prescription interface that allows them to request refills at a specified pharmacy.
- A Health Record feature that provides access to the patient's Personal Health Record, where they can store an abundance of information such as vital signs, allergies, immunizations, and medical history.
- A Message Center that allows them to communicate with their providers.

The app also contains a patient education feature with access to content on diseases and conditions. Future functionality will include access to statements and payments, a patient support center that provides advice for patients with questions, and informed consent and other forms.

In order to overcome the problem of usability across platforms, iSpace, developed a "Code Once, Deploy Everywhere" solution that uses one code-base for all devices and platforms. This framework allows iSpace to manage one set of codes, making the development of mHealth apps that work across devices faster and easier. For providers, it means they can quickly get the app up and running for all smartphone users, without neglecting a portion of their patient base.

# Cancer Care Ontario

## Mobile Application Development for Cancer

Cancer Care Ontario – Toronto, Canada

Cancer Care Ontario (CCO) is the agency of the Provincial Government of Ontario responsible for managing cancer and other chronic diseases for the Province of Ontario. Ontario is about the size of the US state of Texas, with a population of 13 million, over 150 hospitals, and over 14,000 active physicians. Managing a chronic disease like cancer, across such a population and geography, and across the continuum of care, from prevention to screening, diagnosis, treatment, recovery and/or end of life is a daunting challenge. To be at all successful requires accurate, timely, and tailored information, distributed to patients and providers in a useful and actionable manner.

CCO has relied heavily on traditional means of communicating best practices, guidelines and clinical evidence, through a large and representative network of clinicians that meet regularly and communicate amongst each other even more frequently. In recent years, the CCO web site has served as an additional means of communications, hosting almost all guidelines, evidence and provider and patient relevant information available from CCO. However, a meeting, an email or even access to a web site is not the most efficient means of equipping a patient or provider with information they need at the moment, wherever they happen to be. So, beginning in 2010, CCO began to think about the use of mobile applications to improve our communications with patients and providers.

As in any new endeavour, it took a while for CCO to determine an appropriate first use of mobile technology, and to develop the internal capability to create, publish and distribute a mobile application. We undertook both tasks simultaneously, believing that once the clinicians decided on an appropriate use for a first mobile application, they wouldn't want to wait to see it. After shopping around many ideas, and soliciting even more from our customers, we decided to take a set of guidelines for assessing the clinical status of palliative care patients (previously developed by CCO and widely agreed to in the clinical community) and make it into a mobile application. These guidelines use a patient's self-assessed symptoms (using a score based on the Edmonton Symptom Assessment System) and provide clinicians with pharmacological and non-pharmacological symptom management information required to support clinical decision-making, leading to the best possible symptom control for patients.

By starting with content we already had, without involving patient information, and making it available much more conveniently than from our web site, we thought these guidelines would be a quick win for CCO's first foray into application development. While deciding on our first "app" we also set about building the capability to produce it. As

we thought there would be many opportunities in the future, we chose to create an internal development capability and did so by first finding a manager with mobile application experience, assisting him in building a team, cross training some development staff we already had, and supplementing the team with contracted resources when necessary.

Once our mobile development team was in place, developers and clinicians joined forces to create workflows of each guideline and test the user experience to ensure that this application would be intuitive for health care providers and easy-to-use while interacting with the patient at the time of care.

Our first “app” was created for the iPhone initially then ported to Windows Phone 7. We had intended to also make it available on Blackberry, but could not find the expertise nor the methodology to do so. The short timeline to develop the “app”, and its rapid adoption amazed all of us. After only two months of development and signing up with the various apps stores, we had the “Symptom Management Guidelines Application” published and within a month had hundreds of downloads, and within 4 months, over a thousand, from countries all over the globe. The adoption rate has so encouraged us that we now have a number of additional app’s; a drug formulary application available for both patients and providers to act as an information resource on systemic cancer treatment and symptom management, and an internally focused news application for CCO staff to keep informed of organizational wide technology developments.

CCO also recognized that “download rate” was not an in-depth enough metric to determine if our applications were truly being utilized by our target audiences so the development team worked hard to embed analytics into the applications so we can now measure true usage data, for example length of time spent in the application. These analytics will help to inform future app development at CCO.

These numbers show us that health care providers are demanding the same as information consumers across all industries; multiple channels of delivery, instantaneous access to information and without the constraints of a wired piece of equipment. “We are now convinced (and have the evidence to prove it) that mobile applications are an effective, secure, and responsive method of delivering information to patients and providers in health care,” Rick Skinner, CIO of Cancer Care Ontario.

## Conclusion

An increasing number of patients are using mHealth apps on their smartphones to manage their health. As a trusted source of information, health care providers can take advantage of this opportunity to connect with patients. Apps that help patients manage chronic diseases, update their health records, institute behavioral change, find health information and connect to remote monitoring devices have the potential to improve health outcomes, reduce costs and help differentiate providers from the competition. Providers should aim to develop easy-to-use apps that can be extended across a variety of devices and platforms and offer functionality that patients can use on a regular basis. In many cases, mHealth apps can become an extension of the web presence already established by providers. "EMRs, data initiatives being driven from those and companion mobile apps – health care providers don't want to be technologically isolated from that conversation," said Reese. "If you're a hospital that doesn't have those three things, you're out of the game. It's like being a bank without an ATM. What becomes the market differentiator today will become the standard of doing business tomorrow."

### Where We're Headed

While providers are just dipping their toes in the water of mHealth apps, developing platforms that connect patients with providers in basic ways, Sentara's direction is much broader. CIO Bert Reese envisions integrated solutions that combine mobile apps with the EMR, the only source of clinical information that physicians are inclined to rely on.

Consider a scenario in which a child becomes ill on a Sunday afternoon. Her mother opens a Sentara app on her phone that displays all of the Sentara locations that are currently open, along with their wait times and the travel time from the family's current location. The mother selects a location and clicks on it. The app prompts her for the name of the family member who is ill and the reason for the visit. When the family arrives at the chosen location, the child's EMR has been positioned for the caregiver, who is already aware of the problem. Sentara is moving in the direction of constructing unique apps such as this one, which combines a mobile platform with GPS and the EMR. Going a step further, Reese has plans to develop apps with a social network-like experience that are linked with the patient's EMR.

## ABOUT THE AUTHORS

**Colin Korschak, MBA, FHIMSS** is a Managing Partner with DIVURGENT and leads the Advisory Services Practice. He is a highly accomplished executive with over 17 years of experience and recognized achievement in quality service delivery and project management. Mr. Korschak has extensive experience in healthcare operations, P&L management, account management, strategic planning and alliance management. His broad healthcare experience encompasses pharmaceutical, provider, payer, information technology and consulting. Mr. Korschak is a registered Pharmacist, possesses an MBA in health services administration, is board certified in healthcare management and is a Six Sigma Black Belt. He is an Adjunct Professor with Old Dominion University leading classes in their MBA program on Performance Improvement, Negotiation and Business Ethics.

**Ram Davaloor, MS, MBA**, has over 20 years of entrepreneurial experience in building companies in the Healthcare and Information Technology space. Ram has cofounded several successful Healthcare focused Technology and Services companies in the past. Ram currently serves as the Chief Operating Officer of iSpace Global, an IT, Products and Business Services Company he cofounded in 2007. iSpace specializes in Healthcare Technology solutions including Mobile solutions to Health Plans and Providers. Prior to iSpace, Ram cofounded Symphony Data specializing in Healthcare Technology and Business Services that was acquired by Zavata, Inc. in 2005.

## COMPANY OVERVIEW

**DIVURGENT** was founded by a team of consulting veterans who are well versed in the healthcare industry. As a premier healthcare consulting firm, DIVURGENT is focused on the business of hospitals, health systems and affiliated providers. We provide advisory, activation management, clinical transformation, and revenue cycle management services to help you improve patients' lives. Recognizing every organization is unique, we leverage the depth of our experienced consulting team to create customized solutions, utilizing best practices and methodologies.

**iSpace** is a global services company focused on Information Technology and Business Process solutions. With a specialty in Healthcare, iSpace works with a variety of Fortune 1000 companies throughout the United States providing distinctive, lasting and superior technology and business services to their clients. With quality customer service and innovative problem solving solutions, iSpace has been awarded with industry standard certifications such as ISO 9001 and ISO 27001.

## References

1. One in five U.S. consumers now using mobile commerce. PRNewswire, May 19, 2011. <http://www.prnewswire.com/news-releases/one-in-five-us-adult-consumers-now-using-mobile-commerce-94244549.html> Accessed September 1, 2011.
2. Boulos MNK, Wheeler S, Tavares C, Jones R. How smartphones are changing the face of mobile and participatory healthcare: an overview, with an example from eCAALYX. Biomed Eng Online, 2011; 10:24 <http://www.biomedical-engineering-online.com/content/10/1/24> Accessed September 1, 2011.
3. Ingram M. Mary Meeker: Mobile internet will soon overtake fixed internet. Gigaom, April 12, 2010. <http://gigaom.com/2010/04/12/mary-meeker-mobile-internet-will-soon-overtake-fixed-internet/>. Accessed September 1, 2011.
4. Merrill M. mHealth apps forecast to increase threefold by 2012. Healthcare ITNews, December 30, 2010. <http://www.healthcareit-news.com/news/mhealth-apps-forecast-increase-threefold-2012>. Accessed September 1, 2011.
5. Merrill M. *ibid.*
6. Mikalajunaite E. 500m people will be using healthcare mobile applications in 2015. Research2guidance, November 10, 2010. <http://www.research2guidance.com/500m-people-will-be-using-healthcare-mobile-applications-in-2015/>. Accessed September 1, 2011.
7. Sarasohn-Kahn J. How smartphones are changing health care for consumers and providers. California HealthCare Foundation, April 2010.
8. Merrill M. *ibid.*
9. Boulos MNK, Wheeler S, Tavares C, Jones R. *ibid.*
10. Merrill M. *ibid.*
11. Sarasohn-Kahn J. *ibid.*
12. Americans overwhelmingly believe electronic personal health records. Markle Foundation; June 1, 2008. <http://www.markle.org/publications/401-americans-overwhelmingly-believe-electronic-personal-health-records-could-improve-t>. Accessed April 6, 2011.
13. Gullo C. Ten predictions for the mobile health market. MobileHealthNews, August 26, 2011. <http://mobihealthnews.com/12751/ten-predictions-for-the-mobile-health-market/>. Accessed September 2, 2011.
14. Gullo C. *ibid.*
15. Sarasohn-Kahn J. *ibid.*

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