

The Purpose and Value of mHealth for the University of North Carolina at Chapel Hill

A White Paper on mHealth



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Introduction

This paper provides an overview of the state of mobile health (mHealth) and its value for the University of North Carolina at Chapel Hill. mHealth is a growing field that is already beginning to impact health research and practice. The UNC Health Sciences Library (HSL) recognizes the importance of technology, including mHealth, to complement the healthcare workforce, improve quality of care, and increase positive health outcomes. To that end, Kellie Walters, mHealth Research Assistant, conducted extensive research to assess the state of mHealth. This included conducting environmental scans of peer institutions, attending local and national mHealth events, interviewing mHealth experts, and reviewing grey and peer-reviewed literature. This white paper provides a summary of that research as it applies to UNC-Chapel Hill and makes a case for prioritizing mHealth. The information reflects the field of mHealth at the time of publication, spring 2014.

What is mHealth?

mHealth Overview

mHealth, also known as mobile health, encompasses the many ways mobile technology is used to improve health. mHealth tools are used both globally and domestically by consumers, patients, students, clinicians, and researchers. mHealth can be used to enhance medical care, healthcare and public health systems, and public health and prevention efforts. An ever-expanding array of technologies is being used for mHealth from the basic (text messages) to the complex (mobile apps and wearable devices) to the futuristic (implantable and ingestible devices). Indeed, mHealth is becoming engrained in the world of health. Dr. Jay Bernhardt, Professor in the Department of Health Education and Behavior and Founding Director of the Center for Digital Health and Wellness at the University of Florida stated: “We will soon be saying ‘mHealth is dead’ when all healthcare and public health functions use mobile technologies” (SurroundHealth, 2013).

mHealth Across Health

The impact of mHealth can be seen across three overlapping areas of health: medical care, healthcare and public health systems, and public health and prevention (Free et al., 2010).

mHealth in Medical Care

With mHealth, medical providers can improve the diagnosis, treatment, monitoring, and education of patients leading to increased patient engagement, improved health outcomes, and reduced costs. Point-of-care tools, such as UpToDate, provide clinicians with the latest medical information when working with patients. Providers can even use mobile devices as medical devices and to monitor patients remotely.

Globally, mHealth is a powerful tool for community health workers in medically underserved parts of the world. Medic Mobile, a San Francisco-based mobile health company, has created multiple tools to aid community health workers in documentation, communication, disease surveillance, and care coordination. FHI360 involved community health workers in the implementation of m4RH, a mobile tool for providing family planning information in Kenya and Tanzania.

mHealth in Systems

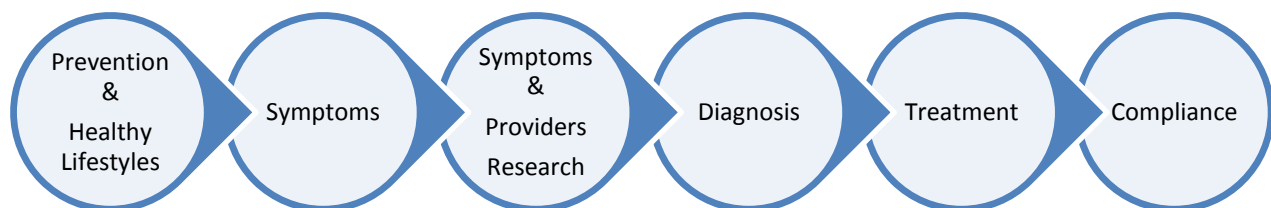
In addition to improving patient care, mHealth can enhance the efficiency of both healthcare and public health systems by streamlining workflow processes, increasing attendance rates, and improving provider-to-provider and provider-to-patient communication. Examples include mobile apps that allow access to electronic health records (EHR), text message reminders for appointments, and video consultations with patients (PwC, 2012). mHealth can transform the public health system by improving surveillance of infectious diseases, expediting data collection, and widening reach of messages in emergencies (Royal Tropical Institute, n.d.). Finally, mobile can be used to help health clinics ensure they have an adequate supply of medicine and other resources. The Malawi Ministry of Health and the public health consulting firm, John Snow, Inc. have created cStock. cStock is a text message-based program that allows health surveillance assistances to track the amount of medication at local clinics, reducing the chances of medication shortages (Cheers, 2013).

mHealth in Prevention

mHealth can strengthen prevention efforts, healthy lifestyle promotion, and chronic disease management. Examples include fitness and diet tracking tools, diabetes managers, and medication reminders. Mobile can also be used to promote smoking cessation, facilitate healthy pregnancies and births, control infectious disease, and educate consumers. mHealth can also be used to improve medication adherence, specifically antiretroviral therapy for persons living with HIV (Chi & Stringer, 2010). One of the most recognized mHealth organizations internationally is the Mobile Alliance for Maternal Action (MAMA), which provides mobile messages to help pregnant women and new mothers.

mHealth Across the Patient Journey

Figure 1: The Patient Journey Adapted from IMS, 2013; Kane, 2012.



An individual's needs change as he or she moves through the patient journey from healthy to sick to healthy again (Figure 1). mHealth can impact people throughout this journey, as depicted in the following fictional scenario (IMS, 2013; Kane, 2012):

John is an overweight, 50-year-old smoker living in Durham, NC. On New Year's Day, John resolves to lose weight and he downloads MyFitnessPal on his phone to track his diet. After two months of success, John decides his smoking is holding him back so he signs up for Text2Quit to get support. John succeeds at quitting smoking but after several months, his diet has gotten poor again. John starts noticing some unusual symptoms and, after a quick search on the mobile web, he realizes could have Type 2 diabetes. John logs onto his doctor's EHR app and reviews the patient information about diabetes. He then uses the app to schedule an appointment. A week later, John receives a text reminding him about his appointment for the following day. At the doctor's office, his physician uses UpToDate to review the latest research about diabetes and uses his iPad to explain treatment options to John. John decides to try Well Doc's Diabetes Manager, which his insurer covers, to control his diabetes. Mobile has provided John with the tools he needs to control his diabetes and remain healthy.

mHealth & Research

Mobile devices can also be used to improve health-related research. The convenience and accessibility of mobile phones makes them ideal for data collection in the field. This is especially useful in low-resource settings, where equipment is limited and internet access may not be available. The survey software Qualtrics now offers an offline survey app for this exact purpose. From 2012-2013, the World Wide Web Foundation led a project to understand how mobile data collection could be used in Sub-Saharan Africa (World Wide Web Foundation, n.d.). In other settings, mobile phones – specifically text messages – can be used to collect patient-reported outcomes from a distance (Christie, Dagfinrud, Dale, Schulz, & Hagen, 2014).

mHealth Technologies

mHealth spans across a number of technologies including SMS/text messaging, mobile apps, wearable devices, and sensors.

SMS/Text Messaging

SMS (short message service)-based mHealth programs utilize the text messaging features of mobile phones to facilitate information sharing and communication. Heavily researched, SMS shows promise in both global and domestic settings because of its inherent simplicity, low costs, and potential for effective scale up. A meta-analysis of text messaging-based interventions for health promotion revealed that these interventions were generally efficacious and comparable to related interventions,

including print- and computer-based programs. However, more research is needed to identify the most effective components of these interventions (Head, Noar, Iannarino, & Harrington, 2013).

SMS may be used to support medical care, systems, and public health. Examples include appointment and medication reminders, lab results notifications, tailored messages for weight loss, Medicaid enrollment, smoking cessation support, emergency notifications, mental health support, pregnancy and maternal health interventions, and diabetes management (Dolan, 2012b). Prominent SMS programs include Text4Baby and Text2Quit in the US and MAMA in developing countries.

Mobile Apps

The mHealth app market is exploding and is expected to reach \$26 billion globally by 2017. In early 2013, there were 97,000 mHealth apps in the major app stores (Jahns, 2013). Apps provide a variety of functions including to inform, instruct, record, remind, communicate, and engage (IMS, 2013). However, accurate, functional, and effective mobile apps are hard to find. In a revealing October 2013 report entitled “Patient Apps for Improved Health Care: From Novelty to Mainstream,” the IMS Institute for Healthcare Informatics presented the results of an analysis of “health and fitness” and “medical” apps in the US iTunes store. Out of more than 40,000 health apps, about 23,000 were considered genuine health apps. Of these about 7,000 were intended for healthcare professionals and about 16,000 were intended for consumers and patients. A deeper analysis of consumer and patient apps revealed most apps had poor functionality and many were rarely downloaded. In fact, just five apps accounted for 15% of all health app downloads (IMS, 2013). Additionally, a recent study examined iPhone apps to determine if they adhered to smoking cessation guidelines and found this was rarely the case (Abroms, Padmanabhan, Thaweethai, & Phillips, 2011).

While many app developers may have the best of intentions, their expertise is often in technology development rather than scientific research, health promotion, or medicine. They design apps as products, not health interventions. Generally, commercial developers want to release their new app as quickly as possible and refine it later. In contrast, the world of research and academia emphasizes the importance of iterative testing before release and is subject to funding and publication delays. The result is app stores full of sleek yet unproven and possibly harmful apps while less flashy but effective, research-based apps remain underutilized.

Despite these challenges, mobile apps still hold promise. To date, the US Food and Drug Administration (FDA) has approved about 100 apps that act as medical devices, including WellDoc Diabetes Manager. These proven tools are generally designed for specific needs and are not widely available (FDA, 2013a; IMS, 2013). To help patients and providers select mobile apps, companies, such as Haptique and the Mobile Health Marketplace, have developed marketplaces with reviewed, vetted mobile apps. However, Haptique attempt to “certify” mobile apps was unsuccessful, indicating it may be more important to educate consumers on app literacy rather than vet apps for them (Misra, 2014).

Wearables & Sensors

In an October 2013 Tedx Talk, Niamh O'Mahony, Applications Engineering Team Leader at a Dublin-based startup, stated “wearable technology is growing faster than the 10 year cycle that we have traditionally seen for technological innovations” (O'Mahony, 2013). Wearable devices help individuals monitor their own behaviors and body and also allow providers to remotely monitor their patients. Nike Fuel and Fitbit provide examples of today's generation of wearables that can be worn on clothing, shoes, or wrists to track physical activity and sleep. These devices sync with mobile apps so users can see their progress over time. Smartwatches, Google Glass, and even implantable or ingestible sensors offer great potential for health. As these devices become more economical, functional, and accepted, they are likely to become a mainstream part of health and healthcare (Defeo, 2013).

A specific subset of these wearables and sensors are more advanced and may be considered medical devices. Mobile phones are being transformed into hearing aids, heart monitors, vital scanners, and stethoscopes. Mobile medical devices will enhance remote patient monitoring which will allow doctors to care for their patients in more convenient ways. Notably, the FDA intends to regulate mobile medical applications that “are intended to be used as an accessory to a regulated medical device” or “transform a mobile platform into a regulated medical device” (FDA, 2013b).

Telehealth

Telemedicine, or telehealth, is “the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status” (American Telemedicine Association, n.d.). Although slightly outside of the scope of this document, telemedicine bears mentioning. The concept of telemedicine has been around for quite some time, but with modern technologies, including video, email, and mobile phones, telemedicine can do more than ever before. Use of telemedicine is growing: the VA had strong telehealth program (Mazmanian, 2014), and The Centers for Medicare and Medicaid Services are taking incremental steps to expand telemedicine coverage (American Telemedicine Association, 2013). Some private insurers are beginning to cover these services and several private companies, including AT&T and Verizon, are developing services for virtual health or telehealth.

Why mHealth?

mHealth Value

Revenue & Investments

In 2011, the global mHealth market was valued at \$1.2 billion. Software and services make up the lion's share of the current market (80%), while hardware (12%) and network/connectivity (8%) account for the remainder (Dolan, 2012a). Venture capital (VC) investors have taken an interest in mobile health. In the first 8 months of 2013, 50 mHealth companies received \$310 million in VC investments compared to \$229 million across 42 companies in all of 2012 (Jha, 2013).

Predictions for the growth of the global mHealth market vary widely. Global Data forecasts a 39% compound annual growth rate (CAGR), resulting in a market valued at \$11.8 billion by 2018 (Dolan, 2012a). In 2013, Research2Guidance predicts an even more optimistic outcome of \$26 billion in revenues for the global market by 2017 (Dolan, 2013).

Wearables and sensors appear to be the most financially promising area of mHealth. VC investors are highly attracted to companies developing health sensors, with a smart pill maker and two fitness tracking companies receiving the most capital in 2013 (Jha, 2013). In 2012, revenue for health sensors was \$407 million. According to Research2Guidance, mobile health sensors revenue will have a CAGR of 69% and reach \$5.6 billion by 2017 with 61 million sensors shipped (Dolan, 2013).

Healthcare Costs Savings

With healthcare spending accounting for 17.9% of the US gross domestic product, high healthcare costs and overspending are significant burdens to the country (Centers for Disease Control & Prevention, 2014). mHealth is anticipated to drastically reduce the cost of care through more efficient processes, enhanced care, and remote monitoring. Scripps Translational Sciences Institute is currently conducting a study to evaluate whether mHealth will reduce healthcare costs (Scripps, 2013).

Until the Scripps study is complete, market research calculations offer promise. A GSMA report predicts mHealth overall could save almost €100 billion in Europe and reduce the per capita healthcare spending for EU patients using mHealth by 18% (GSMA, 2013). Over the next 10 years, Deloitte forecasts \$305 billion in savings as a result of reduced travel time, improved logistics, and better communication (Deloitte, 2012).

Remote patient monitoring will likely account for much of the healthcare costs savings because it will reduce the time patients need to spend at a healthcare facility and increase providers' time to engage with patients. Under the most optimistic scenario, Juniper Research forecasts that remote patient monitoring will save up to \$36 billion cumulatively from 2013 to 2018 (Juniper Research, 2013).

Research Funding

Despite the commercial investment and potential cost savings, there is limited widespread funding for mHealth research. There are a small, but growing, number of federal grants for research in this area. In April 2014, the National Institutes of Health announced that it would award funding for mobile health tools that would aid underserved populations with chronic disease (Sarkar, 2014). With the priorities of the Patient Protection and Affordable Care Act (PPACA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act, it is likely that greater attention will be given to this area in the future.

Lives Saved

mHealth has the potential to heighten quality of life and save lives throughout the world. GSMA and PwC expect mHealth to save more than 1 million lives in Sub-Saharan Africa in the next five years alone. HIV/AIDS, tuberculosis, malaria, and pregnancy-related deaths can be prevented by utilizing mobile phones to keep track of medical stock, report and monitor disease outbreaks, increase treatment compliance, and ensure healthcare workers' adherence to treatment guidelines. For pregnancy-related deaths, mHealth interventions could reduce perinatal and maternal mortality by 30%. Most amazingly, many of these interventions can be done using simple text messages (PwC, 2013). In Europe, mHealth could help 184 million people become healthier and gain a combined 158,000 years of life (GSMA, 2013).

mHealth Users

The adoption of mobile phones has been vast and swift. Mobile phones have become engrained in our lives. Furthermore, acceptance of using mobile phones for health purposes is growing, making now the right time to invest time and resources in mHealth.

Patients & Consumers

The number of mobile phone subscriptions globally is expected to surpass the world's population in 2014 and over 90% of people across the globe are covered by a mobile phone signal (Worldwatch Institute, 2013). As of January 2014, 90% of U.S. adults own a cell phone and 58% of US adults have a smartphones (Pew Research, 2014). In the developing world, there are 89 mobile phone subscriptions for every 100 people and that is expected to grow (Worldwatch Institute, 2013).

One in three cell phone owners have used their phone to access health information. The following groups of people are more likely to use mHealth than the average person: smartphone owners, Latinos, African Americans, those between the ages of 18 and 49, those with a college degree, caregivers, and those who recently faced a medical crisis or change in health (Fox & Duggan, 2012). Patients with cystic fibrosis, growth hormone deficiency, acne, ADD/ADHD, and Hepatitis C are among the top five patient groups using mHealth (Tyler, 2013).

Patients believe mHealth applications and services will increase the convenience of health care (52%), will improve healthcare quality (48%), and will reduce overall health care costs (46%) (PwC, 2012). A survey by Royal Philips Electronics revealed that 1 in 10 participants believed they could be dead or severely incapacitated if it had not been for online health information. Twenty-five percent trust symptom checker websites as much as their doctors and nearly 50% are comfortable using these tools. Thirty-five percent believe using technology to monitor their health is essential for a long life (Royal Phillips Electronics, 2012). Despite these positive feelings surrounding mHealth, 53% of consumers have never used any type of mHealth tool (Pennic, 2013). Potential reasons for this include concerns about privacy, security, accuracy, and a lack of products consumers want on the market (Deloitte, 2013).

Providers

An August 2013 report showed 86% of clinicians use smartphones and 53% use tablets in their work, up from 78% and 34% in 2012, respectively (Terry, 2013). Doctors are using mobile devices for various services including telephone-based consultations (38% of doctors), administrative communication (38%), receiving data to monitor patients (21%), drug adherence and other health-related communications (17%), and text-based consultations (16%). Even larger proportions want to offer these services. For example, 51% of doctors want to employ mobile devices for remote patient monitoring and for drug adherence and other health-related communications (PwC, 2012).

The 2nd Annual HIMSS Mobile Technology Survey asked IT professionals working in hospitals how they saw mobile being used. Half of those surveyed “indicated the use of mobile technology would substantially impact patient care delivery.” The biggest impacts would be on pharmacy management, including pill reminders, and care facilitation across healthcare, including remote patient monitoring. The IT professionals cited funding and security as the largest barriers to health IT (mHIMSS, 2012).

Payers

Payers also support mHealth services. More than a third of payers have already begun to cover mobile services, including telephone-based and text-based consultations, administrative communications, and drug adherence and other health-related communication. Another third intend to pay for these types of services within the next three years (PwC, 2012).

Students

In 2013, Harris Interactive surveyed college students to assess mobile technology ownership and found the following: 91% owned laptops, 72% owned smartphones, 40% owned tablets, and 20% owned basic e-readers. Furthermore, eight in ten believed tablets could transform the way they learn and two in three believe tablets will replace textbooks in the next five years (Pearson, 2013). Mobile use is growing in medical education with over a dozen medical schools incorporating tablets or smartphones into their curricula through device requirements or school-provided devices. Cornell University, The Ohio State University, Stanford University, University of Minnesota, and Yale University are among the growing number of schools utilizing these devices in their curricula. According to a recent systematic review, although college students are using the internet to access health information, their eHealth literacy is low and many, especially those in health and medical professions, could benefit from college-level instruction on eHealth literacy (Stellefson, 2011).

mHealth at UNC & in the Triangle

Interest in mobile health and other health-related technology is growing at The University of North Carolina at Chapel Hill and throughout the Research Triangle. IntraHealth International and FHI 360 are pioneering mobile health solutions for developing countries. Cutting Edge, a consulting firm, has been in the mHealth news for recent reports on the subject area and major research groups, including RTI, are also focusing on mHealth. The Triangle is home to a growing number of health tech startups: Validic, an API to integrate mobile health data, Family Health Network, a tool to connect patients, providers, and caregivers, and Thrive 4-7, an eTherapy program to promote health.

Duke University, North Carolina State University, and UNC are all entering the field of mHealth research. In 2012, the mHealth@Duke Consortium was started. Starting in 2013, they began hosting an annual mHealth conference and received funding from Duke's Schools of Medicine and Nursing (mHealth@Duke, n.d.). The Gains Through Gaming Lab at NC State conducts research on the benefits of video games on psychological functioning and the Mobile Gaming Research Lab studies the mixing of physical and digital spaces through mobile games (Gains Through Gaming, n.d.; The Mobile Gaming Research Lab, n.d.). UNC researchers have focused their attention on mHealth and eHealth. Their research focuses on a variety of health issues, including HIV, healthy eating, exercise, and chronic disease management, using a variety of technologies, including social media, texting, mobile apps, and tablets.

Until recently, this work has been siloed. The UNC Center for AIDS Research (CFAR), UNC Communications Applications and Interventions (CHAI) Core, and UNC School of Journalism and Mass Communication joined together to host the Inaugural Symposium on Using New Technologies to Enhance Healthy Behaviors. During the event, UNC and Triangle researchers had the opportunity to talk about their work and lessons learned. In

response to the event's success and the desire to deepen and expand the communication between those interested in this field, a New Health Technologies listserv was created.

Both mHealth@Duke and the New Technologies group at UNC have strived to involve groups and individuals from across the Triangle. To increase collaboration among those in the Triangle, two related special interest groups have formed: Health 2.0 NC Triangle and the Triangle mHealth Consortium.

What are the challenges?

Regulation

On September 23, 2013, the U.S. Food and Drug Administration issued final guidance for developers of mobile medical applications. The FDA recognizes mHealth's potential and the need to encourage innovation while still protecting patients from medical apps that may pose significant harm if not working properly. Thus, the FDA plans to regulate medical apps that are intended to be used as an accessory to a regulated medical device (e.g. app that allows a medical image to be viewed on a tablet) or transform a mobile device into a regulated medical device (e.g. an app that turns a smartphone into an ECG). While many other types of apps may be considered medical devices according to the FDA's definition, the FDA intends to use "enforcement discretions" and developers will not need to submit review applications for devices or apps that pose minimal risk. Examples include self-management apps that do not provide treatment recommendations, tracking apps, information access apps, and patient-provider communication apps, among others. In short, the FDA will regulate high-risk apps that act as medical devices but will not regulate many of the low-risk apps, meaning consumers and practitioners still need help selecting the most effective apps (FDA, 2013a).

There have been several Congressional bills regarding mHealth proposed; however, no new laws have been passed. Some of the key issues are the need for privacy and a concern that regulation would stifle innovation. Recently, a bipartisan group of senators drafted a letter to the FDA asking for clarity about its intentions for mobile device regulation (Michael F Bennet, 2014).

Research & Evaluation

The evidence base for using mobile devices to achieve better health is growing but incomplete. Recent systematic reviews have shown promise for mobile interventions for health promotion and in healthcare but much of this promise has not been fully realized (Head et al, 2013, Free et al., 2013a, Free et al, 2013b).

Publication delays may result in an underestimation of the mHealth research being done. In all three of these reviews, the most recent studies included were published in 2011 (Free et al., 2013a, Free et al., 2013b, Head et al., 2013). It is also no surprise one of the topics most heavily researched in mHealth – smoking cessation – also had the most

evidence supporting its use. Despite the currently limited evidence, mHealth research is active and several clinical trials are being conducted (Labrique, Vasudevan, Chang, & Mehl, 2012).

Health behavior theory, a cornerstone of health behavior change interventions, is often missing from mHealth (Head et al., 2013, Riley, 2013). To enhance efficacy, interventions are often based on heavily researched and validated theories that describe and predict behavior. Efficacy of these apps may be improved by adapting current theories to this new medium (Riley, 2013).

Evaluating mHealth interventions can be a significant challenge for researchers because the rapid pace of technology does not pair well with the slow pace of grants, research, and publication. The time from grant application until publication for randomized control trial is often around 7 years and the time from grant application until an intervention becomes part of practice can span 17 years (Noar, 2013; Riley, 2013). Clearly, this model will not work for tech-related health. Researchers and funders must learn to build and fund interventions that utilize the function of the device rather than the device itself (Tate, 2013). Finally, mHealth interventions are often data-rich, increasing the expertise and labor required to evaluate. However, properly harnessed, this data can be used to the benefit of researchers. Leaders in the field are calling for and proposing new methods of evaluating interventions (Kumar et al., 2013).

Conclusion

mHealth encompasses the many ways new, mobile technology is used to improve health and health systems. Patients, provider, researchers, developers, and investors all have a stake in mHealth. The evidence base for mHealth is growing, but is still in the early stages of development. The fields of research and healthcare will need to adapt to leverage this new technology. mHealth will continue to expand and reinvent itself. Regardless of what it is called or what technologies are used, the concept of using technology to improve people's health where they are is here to stay.

Possible upcoming directions for mHealth:

- Some of the questions surrounding mHealth regulation will be answered, but more will be raised. While the FDA and Congress may solve their current debate, new technology will inevitably lead to new questions about regulation.
- Telemedicine will become commonplace as new laws are passed and insurance companies expand coverage for these types of services.
- mHealth researchers and developers will pay more attention to the aging population. With the Baby Boomers entering retirement, the field will shift away from focusing solely on the young and healthy to helping older adults live healthfully and at home.
- Wearables use will continue to grow and wearables themselves will improve and become less intrusive.
- The amount of data generated by mHealth will continue to increase. This will bring both opportunities and challenges. Used well, big data can help researchers understand human behavior better and improve health. However, it may be a challenge to harness the power of that data.
- Security and privacy will be central issues. With the increased incidence and reporting of data breaches, leaders in the mHealth field will need to be cautious and very protective of users' data.

Where can I find more?

mHealth Tools

mHealth Guides

- [ADOPT mHealth Toolkit](#) – Toolkit on mHealth for chronic disease and older adults
- [Designing Health Literate Mobile Apps](#) by Broderick et al. 2014
- [The mHealth Planning Guide: Key Considerations for Integrating Mobile Technology into Health Programs](#) by K4Health
- [mHIMSS Roadmap](#) – Guide for adoption of mobile and mHealth devices
- [Wellocracy](#) – Fitness tracking resources

mHealth Evidence

- [Journal of Medical Internet Research](#)
- [Journal of Mobile Technology in Medicine](#)
- [mHealth Evidence](#) by K4Health

mHealth Conferences

- [mHealth Summit](#)
- [Wireless Health](#)

Local & National mHealth Groups

- [Health 2.0 Triangle](#)
- [mHealth@Duke Consortium](#)
- [Triangle mHealth Consortium](#)
- [mHealth Alliance](#)
- [mHealth Working Group](#)

Listsers

- New Health Technologies Listserv at UNC. Contact Catherine Grodensky <grodensk@med.unc.edu> to be added to the listserv.
- [mHealth Training Listserv from NIH Office of Behavioral and Social Sciences Research](#)

mHealth Videos & Webinar Series

- [mHealth Education: The Science and Practice of Using Mobile Technology for Health](#) with Jay Bernhardt, PhD from Surround Health
- [mHealth Summit 2012 Videos](#)
- [mHealth Videos](#) from Johns Hopkins Global mHealth Initiative
- [NIH mHealth Webinar Series](#)
- [UNC New Technologies to Enhance Healthy Behaviors Symposium 2013](#)

Online Courses

- [Health Information Systems to Improve Quality Care in Resource-Poor Settings](#) from MIT Open Courseware
- [mHealth Basics: Introduction to Mobile Technology for Health](#) from K4Health
- [Mobile Money](#) from Tech Change

mHealth News

Consumer-focused

***mHealth Daily Update** (<http://www.happtique.com/mhealth-daily-update/>) is a daily emailed newsletter by Happtique. News is gathered from a variety of sources and is directed at an educated, interested consumer.

***Mobihealthnews** (www.mobihealthnews.com) produces stories about various topics including new technologies, regulations, and research. Weekly email newsletter and RSS feed are available.

Health Works Collective – Mobile Health Page

(<http://healthworkscollective.com/all/88?ref=navbar>), sponsored by Siemens, is a site that touts itself as “the world’s best thinkers on healthcare” and these thinkers write blog posts about mHealth and other topics. Weekly emails and RSS feed are available but they are not mHealth exclusive.

Mobile Health Market News (<http://mobilehealthmarketnews.com/>) gathers information from multiple sources, filter it, and put it into perspective. The website puts weight on regulations and legal & financial issues. Weekly email newsletter and RSS feed are available.

Provider-focused

iMedical Apps (<http://www.imedicalapps.com/mhealth/>) is an mHealth resource directed at physicians that discusses and reviews predominately medical apps. Considered an evidence-based, trusted Web 2.0 website by the Cochrane Collaboration.

Editor-in-Chief and others have degrees from UNC-Chapel Hill. Monthly email newsletter and RSS feed are available.

Kevin MD (<http://www.kevinmd.com/blog/category/tech>) is a blog from MedPageToday and is considered physician-focused. The blog discusses many health tech related topics. In the Tech section of the blog, mHealth is a common topic, although the section more often talks about EHRs. Emails and RSS feed are available but are not mHealth or eHealth exclusive.

Fierce Mobile Healthcare (<http://www.fiercemobilehealthcare.com/>), one of many “Fierce” sites. Focuses on mHealth related to healthcare. Email newsletter & RSS feed are available.

Additional Reading

Commentary

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Market Research

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