

→ CONNECTED HEALTH TOOLS

Improve Patient Outcomes

The ability for real-time information exchange enables better relationships, monitoring, and behavior change.

The Center for Connected Health has been studying the effects of connected health on patient behavior, engagement, and outcomes and has determined that subjects who used wireless devices as opposed to those who used modem-based devices were more likely to be engaged in their healthcare and have better clinical outcomes.

The reasons for the positive impact range from physicians being able to access real-time patient data to make more targeted and better informed clinical decisions to the patient being able to more easily modify behavior and stick with a drug regimen easier with the help from digital tools.

“When companies rely just on data gathered during visits to gauge how patients are feeling, it’s like having just a few pieces of a puzzle, it’s not enough to tell the whole story,” says Sheila Rocchio, VP of marketing and product management, PHT Corp. “But if we collect data on a regular basis we’ll get all the pieces that show the complete picture.”

According to Marc Perlman, global VP, Oracle Healthcare and Life Sciences, mHealth technologies enable a broad ecosystem to facilitate data integration directly from device to the data center, and offer great promise in managing chronic disease as they can promote improved patient engagement through continuous remote monitoring regardless of where the patient lives, or works, and certainly well beyond the walls of the traditional healthcare institution. Since these tools can monitor a variety of indicators, such as key vital signs for chronic disease management or individual or group wellness metrics, they provide immediate information to healthcare providers, and through earlier patient and care team engagement, hold the potential to minimize, or actually prevent, costly acute incidents.

“mHealth technologies allow better insight into patients’ needs, development, and engagement,” Mr. Perlman says. “These technologies will help improve patient outcomes by further improving the way patients interact with their healthcare provider ecosystem and

enabling data that can improve clinical trial effectiveness, ultimately resulting in better outcomes for patients.”

Mobile apps increase communication with and between patients and providers. According to Ms. Rocchio, studies prove that using alarms and reminders increase compliance with the scheduled task. Engagement apps that remind patients about study schedules, highlight milestones, show recent symptom data, and communicate important study news and track progress toward completion can significantly reduce drop-out rates and help strengthen the relationship between patients and clinicians.

Marc Sirockman, executive VP and managing director of Artcraft Health, says mHealth can be adapted for patients and their caregivers to educate in a dynamic and interactive format that is accessible wherever needed.

“mHealth can be used, for example, to track medication adherence, monitor biometrics, or engage with any number of self-managed tools, such as journals, calendars, and games,” he says. “If the process is enjoyable and presents useful, carefully constructed content, design, and functionality, mHealth’s far-reaching prospects for behavior management and change

leading to better patient outcomes can be fulfilled.”

According to Matt Balogh, senior VP, director of technology, Ogilvy CommonHealth, part of Ogilvy CommonHealth Worldwide, the industry is moving toward a hyper-patient-centric point of care and the markets from wearable technologies to the data that support these next-generation monitors and the exchanges that support the ecosystems are growing massively right now.

“The iHealth systems — the scales, the glucose monitors, blood pressure cuffs, pulse oximeters, as well as Fitbit, Fuelbands, Google Glass, etc. — and the wearables and technologies that pair with a mobile phone provide an

MARC SIROCKMAN • Artcraft Health

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experience that is easy to set up and easy to use on a daily basis,” he says. “And unless people start using mHealth technologies, we’re not going to see the change we want to see. The demographics, especially with the baby boomers getting older, are going to need more chronic care, patient experiences are really where these battles are going to be won.”

“Mobile health has the potential to be a transformative technology in modeling preferred patient behaviors and health outcomes,” Mr. Sirockman says. “mHealth’s impact on consumer behavior for everything from tracking weight reduction to monitoring blood pressure, glucose levels, and medication adherence is already an established phenomenon that offers a quantitative ROI on health and wellness. As more and more clinicians are using smartphones rather than their desktop or laptop computers, we’re at an important crossroads in understanding just how well-designed mHealth strategies can integrate the patient experience across the medical and healthcare system.”

Improving Outcomes

Using tools such as apps, monitoring devices, and text messaging can greatly improve patient outcomes during clinical trials, and they have also been proven to work in real life.

It’s the whenever and wherever nature of mHealth that yields an incredible potential to effect patient outcomes, says Jonathan Javitt, CEO and vice chairman, Telcare.

“It’s a radical transformation of medicine as we know it,” he says. “The information derived from mobile health monitoring systems can also be shared with caregivers and family members to inform a greater support system. This is especially critical in pediatric or aging populations where other individuals are actively involved in a patient’s care and treatment.”

According to Michelle Marlborough, VP, product strategy, Medidata Solutions, mHealth solutions — when combined with patient engagement technology — provide unique opportunities to impact the behavior of patients.

“While compliance is always a major concern, patients are far more likely to be compliant when participating in a clinical trial than in the real world,” she says. “By bringing



mHealth solutions into early clinical development, techniques for patient engagement and compliance can be examined before the drug’s commercialization. This means that interventions and recommendations can be introduced that will allow patients to gain more optimal therapeutic value earlier in the life cycle of the therapy.”

Mr. Balogh says outcomes are going to be driven by mHealth support tools that go beyond the pill that indicate patients are taking their medication or if they miss a medication.

“Technology can proactively tell a patient what he or she has to do in that situation; technology can be that point of care and provide support in other ways,” he says. “Combined, these features are really going to start to drive outcomes, which again is what everything is going to be about.”

While there are many tools that are potentially helpful in promoting compliance and adherence, mHealth technology has much greater applications, for example, providing the foundation for a platforms addressing a fuller, much richer range of medication management opportunities for mobile patients.

“mHealth can make vital medical information immediately available not only to patients, but also to their medical professionals and caregivers,” says Napoleon Monroe, managing director, New Directions. “Algorithms in a communications device or elsewhere, in combination with sensed medication and patient information, could provide any stakeholder with decision tools. A central facility

Ways mHealth Improves Patient Engagement

mHealth can improve engagement using sensor-based, bi-directional, real-time, mobile dispensing devices. Systems using these dispensing devices can be made suitable for all dosage forms and regimens, and feature:

- » Combinations with other apps.
- » Sensor-gathered and self-reported data.
- » Real-time communication about therapeutic markers, symptoms, side effects, completed activities, missed tasks, adverse reactions, polypharmacy/drug interaction, patients’ emotional states, lifestyle occurrences (e.g., exercise, dietary habits), and condition of medication.
- » Multidirectional information exchanges between patients, providers, caregivers, and other stakeholders.
- » Use of automated identity and data capture plus advanced security features, including biometrics.
- » Treatment reinforced through customized messaging and customized response.
- » Dose response or gesture-based dispensing verification.
- » Confirmation of inference regarding doses actually taken.
- » Incentives, as appropriate.
- » Modifiable protocols and schedules that can be fixed, randomized or event triggered at point of care or remotely.
- » Geolocation for environmental data and treatment site selection.
- » Educational programs scheduled, shared with professional(s), family caregivers; tested within the system.
- » Surveys with conditional responses can provide patient benefits.

Having these types of tools can provide patients with benefits such as:

- » Reduced confusion about their meds.
- » Remaining active and mobile.
- » Enhanced potential for emergency response.
- » Fewer outpatient/inpatient visits, co-pays and other out-of-pocket expenses.
- » Less absenteeism; increased worker productivity.

Source: New Directions. For more information, visit newdirectionsconsulting.net.

could perform analyses, make remote diagnoses, and take actions as necessary. Inclusion of a central facility in a medication management system provides for informed professional engagement with the patient, and facilitates device approval and management.”

Effective data exchange between care teams enables more proactive disease management, says Jeff Baker, CEO and founder, Noble.

Noble is working in partnership with Asthma MD to commercialize the Asthma MD Lung Performance Peak Flow Meter, a digital and hardware solution for better disease management. Focused on features that drive repeat usage, the mobile medical app replaces paper journals and creates a comprehensive digital overview of asthma activity, while the Peak Flow Meter provides an accurate measurement of lung function. Combining these two functions into one patient solution provides a more comprehensive approach to chronic disease management.

mHealth technology improves both chronic care and acute care by giving patients a tool for accurately recording their data in real time, providing a more accurate assessment of their disease or health management regimen.

In chronic care, using digital devices for health review questions can improve the accuracy of the patient's responses and therefore improve patient health outcomes.

"Patients with chronic disease and the elderly will often say that they feel well even if they don't when questioned by a physician," says Susan Dallabrida, Ph.D., VP of clinical science and consulting, PHT. "Being able to answer questions on devices in advance of a clinical visit gives patients time to think about the correct response and eliminates the deer-in-the-headlights reaction that can occur from the pressure of having to recall data rapidly. That increased level of communication between patient and healthcare provider translates into improved healthcare."

Dr. Dallabrida adds that after being hospitalized and released, most patients don't know what to expect, but with the aid of mHealth technology, discharged patients can get a device that asks daily questions about their symptoms for a couple weeks. This is a great benefit to both physicians and doctors.

"Doctors can receive real-time tracking data plus data from email alerts that are triggered by changes in the patient's health status," she says. "mHealth apps take the burden off the patient to determine when their post operative symptoms are outside the norm and puts that determination in the hands of the physicians who know what are normal post operative symptomatology burdens."

Using mHealth technology, physicians can make decisions faster with real-time data. Studies show that 85% of email alert triggers are followed up by the physician in less than 24 hours, Dr. Dallabrida adds.

This type of healthcare system allows for true 24/7/365 healthcare.

"This type of immediate intervention is key to preventing complications and avoidable



KIM RAMKO • EY @KimRamkoEY



"Many new technologies serve as motivators for patients and that in turn improves outcomes."

hospitalizations," Mr. Javitt says. "In a recent U.S. endocrinology study we reported data from an employer that realized a \$3,300 per-employee annual savings in people with diabetes who used the mHealth program compared with those who did not."

mHealth Tools Crucial In Changing Patient Behavior

The premise is simple: if patients modify their behavior to adopt more healthy choices, their overall health outcomes will improve. The tricky part is learning how to motivate patients through applications and mobile devices. The ability to track health behaviors in real time will create opportunities for learning how to motivate patients, says Kim Ramko, global life science advisory services leader for EY. An important factor of these tools is the sense of "ownership of health" the consumer/patient has with having access to information and monitoring his or her own improvements.

"By modeling and monitoring health behaviors, we are learning how to incent behaviors based on profiles," Ms. Ramko says. "New technologies are expediting our learnings and in turn targeting patients better with those profiles to see faster uptake in desired out-

comes. And given the new applications being developed leveraging natural language we will see many more advances in defining behavioral patterns to support improved outcomes as it will be easier to gather information from the patient and for the patient to get answers."

Identifying patient behavior must include analysis of all factors within the modeling approaches of analysis, says Alyson Connor, president and partner, MicroMass Communications. Many current modeling algorithms are based on big data demographics and observable online behaviors. While these data may help identify patients who may be at risk and need more support, they don't at all provide a roadmap for how to change health behavior. For example, factors such as geographic location, refill transactions, and gender may help identify targets but they don't define what messaging and strategy will be effective in improving patient outcomes or changing their behavior over time.

"Modeling approaches that combine big data with real-time behavioral insights — at-

Five Ways EHR Technology Can Improve Diagnostics and Patient Outcomes

According to the National Learning Consortium, when healthcare providers have access to complete and accurate information, patients receive better medical care. Electronic health records (EHRs) can improve the ability to diagnose diseases and reduce — even prevent — medical errors, improving patient outcomes. EHR technology positively impacts patient diagnostics and outcomes in innumerable ways; however, the five most notable include:

1. More accurate diagnoses. A provider using an EHR can access a more comprehensive look at a patient's medical records, medication history, pre-existing conditions, and much more, helping the treating physician to consider the "bigger picture" before making a diagnosis and recommending treatment.

2. Reduced number of medication errors. EHR technology can be configured to automatically check for drug and allergy information and interactions including drug-drug, drug-allergy, drug-disease, and therapeutic duplication alerting.

3. Improving public health outcomes. EHRs help providers identify and manage patient populations. Providers can target management of specific high risk factors or combinations of risk factors to improve patient health and outcomes. For example, a provider might wish to examine how many patients with hypertension have their blood pressure under control. Or, a provider may wish to track adherence with an evidence-based guideline for a poorly controlled diabetic and conduct outreach for non-compliance.

4. Using EHR-based prompts and reminders to improve patients' prescription experience. In one study, 92% of patients reported being happy that their doctor used e-prescribing, and 76% of these patients believed eRx simplified the process of obtaining medications. An engaged patient is a satisfied patient, and high patient satisfaction leads to low patient attrition.

5. Using EHR-based prompts and reminders to improve overall health outcomes. The paradigm shift sought is long-term healing, prevention, and wellness as opposed to episodic care. One study revealed that EHR-based prompts and reminders led to improved rates of recommended preventive eye, foot, and renal examinations or screenings; increased mammography rates by 10%, and led to improved blood pressure control in older patients with hypertension.

Source: HealthIT. For more information, visit healthit.gov/providers-professionals/improved-diagnostics-patient-outcomes



MICHELLE MARLBOROUGH -
Medidata Solutions

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titudes and perceptions — allow marketers to build more actionable and effective solutions," she says. "This comprehensive approach not only identifies which patients are at risk and what they are doing, but also provides the important context of why they are doing it."

One of the most effective techniques to achieve behavior change and outcome is education, which also happens to be the most time-consuming for healthcare providers.

"New technologies can use innovative techniques to help educate consumers and achieve better outcomes," says Dr. Sam Pejham, co-founder of Asthma MD and assistant clinical professor at UCSF School of Medicine. "The same technologies could use gaming techniques to help better engage consumers in health related issues. Yet other technologies help patients with their adherence to their prescription through an easy-to-use reminder system."

According to Ms. Rocchio, there's great promise in integrating mobile technologies with physiologic measures. Since regular, real-time monitoring and tracking through mobile apps produces a better picture of the patient's health status, it therefore, improves the physician's awareness to changes in a patient's health status so they can better manage the clinical course.

"mHealth tools allow us to ask a patient with a respiratory problem questions about their activity level and evaluate their meter readings," she says. "Mobile phones, video chats, and real-time access to data and blue-button capabilities also make research more accessible, convenient, and beneficial to patients and easier for providers."

The blue button is a symbol for patients to view online and download their own personal health records. Several Federal agencies, including the Departments of Defense, Health and Human Services, and Veterans Affairs, implemented this capability for their beneficiaries.

David Ormesher, CEO, closerlook, says the

future of mHealth tools and connected health lies in three primary drivers: the quantified self movement, aging in place trends, and power of patient data collected from social media sites.

The fitness/wellness trend, sometimes called the quantified self-movement, is growing based on the ability for consumers to track multiple activities and health markers, including movement, sleep, weight, blood sugar, and blood pressure, to name a few.

"Wellness geeks will drive the device manufacturers to provide integration and the ability to correlate the inputs with fitness outcomes," he says. "A tight outcomes feedback loop creates internal motivation and adherence, and soon physicians will recognize this value and begin prescribing the leading mHealth solutions."

The aging-in-place trend will be another driver that will spur the changes needed to make connected health a reality. Caregivers are looking for technology to help them care for their loved ones, while they age at home rather than in a nursing home. Environmental and vital sign sensors will enable patient self-management and give caregivers and healthcare professionals timely data on the well-being of the patient. The third driver of connected health will be the growth in patient social media communities. Early leaders such as PatientsLikeMe demonstrate that large sets of self-reported patient data can provide valuable drug efficacy information.

"By democratizing data and giving both consumers and physicians better information about disease, care, and efficacy on a personalized level, there will be a decisive shift in value away from the large, bureaucratic, and centralized medical mainframe sources of care to a distributed peer-to-peer model," Mr. Ormesher concludes. "A combination of crowd-sourced health algorithms and a lightweight sensor-based infrastructure will put the means of diagnosis and care in the hands of patients and their caregivers." **PV**