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Understanding the difference between mHealth apps and mobile integrated therapies

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Today's mobile technologies need to address the whole patient in order to really play a role in improving patient care.

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The incidence of heart disease, obesity, and diabetes continue to rise in the US, with devastating impact on the cost of healthcare and its delivery. According to the Centers for Medicare and Medicaid Services (CMS), national healthcare expenditures in the US reached $2.6 trillion in 2010, doubling from 1999.[1] Diabetes alone is projected to account for 15% of US health expenditures by 2031.[2] The aging of 75 million baby boomers as they reach 65 years old, coupled with increasingly sedentary lifestyles and poor diet, contribute to the increasing prevalence of this chronic disease and its many complications.

There is broad agreement that meaningful solutions are needed to improve the quality of chronic disease care while reducing ever rising healthcare costs in the US and indeed around the world. Improving care while reducing costs may seem like an oxymoron, but it is possible to do both.

Personalized medicine versus patient-centric care

The advent of personalized medicine has been touted as the next great breakthrough in managing a variety of diseases. Through the use of biomarkers, scientists believe they can match the right pharmacologic therapy to the right patient—based on their genetic predisposition for a given drug.

For example, to manage chronic moderate-to-severe pain, long-acting opioids (LAOs) are the pharmacologic gold standard. However, managing this kind of pain in patients can be very complex. LAOs vary significantly due to their different receptor binding affinities, potencies, and routes of metabolism, etc.3 Adding to the complexity is the fact that each person has a unique physiologic profile, including a distinct clustering of mu receptor subtypes and differential rates of metabolism (slow versus

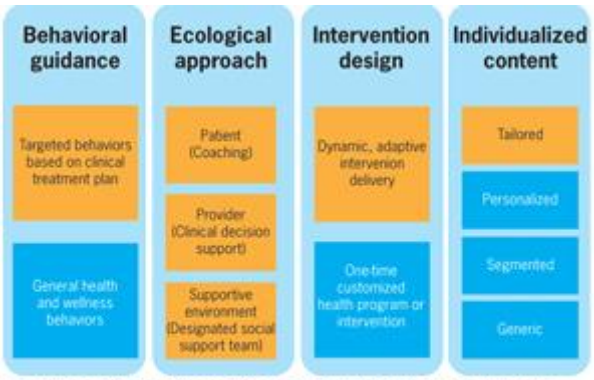
rapid metabolizers).[4] Correctly matching the right opioid to the right patient can dramatically reduce the costs associated with managing chronic moderate-to-severe pain by reducing adverse events, the need for breakthrough pain medications, and superfluous drug trials and failures. Most importantly, on a human dimension, with the right opioid, a patient's pain will be well controlled, improving his or her quality of care.

Regardless of how well a pharmaceutical may work for a specific patient, it is still up to that patient to comply with his or her drug regimen and other care plan requirements. Unfortunately, ensuring patient compliance with any care plan is an ongoing challenge in chronic disease care.

The use of drugs that have been genetically mapped to a patient profile represents a huge advance for chronically ill patients, but personalized medicine is not the complete solution. The complex challenge of helping any chronically ill person is not limited to his or her physiology, just as patient care is not defined by the type of drugs a physician prescribes. Good chronic disease management depends on how patients collaborate with their caregivers to manage their own care.

Patient-centric care takes the concept of personalized medicine to its logical conclusion. To optimize their care, patients need to not only comply with their medication regimen, they also need to adopt lifestyle behaviors that optimize their care, including diagnostic, diet, and exercise requirements. In the current healthcare climate, however, healthcare providers are hard-pressed to provide the kind of individualized attention that supports patients in changing their behaviors.

Patient-centric support from mobile integrated therapies



Four dimensions of behavioral support can be used to help determine the value of one support system versus another.

Mobile integrated therapy (MIT) holistically engages patients in the self-management of their disease. It decentralizes the delivery of healthcare and empowers patients and providers through the use of wireless mobile devices and the Internet. MIT represents the convergence of mobile technology, clinical and behavioral science, and validated clinical outcomes to create a new-to-the-world healthcare solution that supports the patient in all aspects of care. This new class of therapy can interact with patients on a 24/7 basis, providing them individualized coaching for their medication management, diet choices, lab reminders, and more, while providing clinicians with meaningful longitudinal data to make more informed decisions for their patients.

Founded by an endocrinologist, WellDoc has been at the forefront of creating MIT solutions and has demonstrated, via clinical trials, how potent virtual patient coaching can be when delivered with the right combination of clinical and behavioral science. In September 2011, the American Diabetes Association's scientific journal, Diabetes Care, published the results of a cluster-randomized study of a mobile phone-based diabetes coaching intervention using WellDoc's flagship product DiabetesManager. Mean declines in A1c (the gold-standard measure for diabetes control) over the one-year treatment period were 1.9 percentage-points in the primary intervention group (usual care plus WellDoc) and 0.7 percentage-points in the control group (usual care alone), a difference of 1.2 percentage-points ($P<0.001$). By comparison, many currently available pharmacologic agents can only claim A1c reductions of between 0.6 and 1.5 percentage-points.[5]

There are several distinguishing features of WellDoc's chronic disease platform. First is a virtual patient coach, which can be used on any data enabled device (e.g., smart phones, tablets, or PCs) and provides real-time coaching to patients on all aspects of their individual treatment plan. Second is an Automated Expert Analytic System that longitudinally analyzes patient data and provides trended feedback to patients and clinical decision support to clinicians. These features are integrated to deliver comprehensive behavioral support through familiar, personal technology that most patients already own and use every day.

The importance of strategic behavior design and support

The value of incorporating behavioral science into the treatment plan of any patient may not be obvious at first, but consider the paradox of clinical trials versus practice. In clinical trials, a drug's effectiveness is tested in an environment where compliant patients take their medications as directed—often incentivized by nominal cash payments or free study drugs to engage in activities such as periodic check-ups and the use of treatment diaries. Clinicians participate in the care of trial subjects with heightened attention, too, as these clinicians are incentivized for their participation.

By contrast, in clinical practice, patient outcomes may not always mimic the reported outcomes of clinical trials. If the drugs offered to patients in clinical trials and clinical practice are the same, then the difference between the two in outcomes most likely stems from the quality and consistency of patient and physician engagement. MIT uses behavioral design and support to individualize a patient's therapy in a meaningful way so that positive self-management habits become indelible behaviors that lead to sustainable patient outcomes.

The evolution of behavioral science, electronic health (eHealth), and mobile health (mHealth) research underscores several key characteristics of effective and strategic behavioral support, including:

• Identification and promotion of essential behaviors are known to have a significant impact on clinical and health outcomes and are feasible for patients to implement.[6]
• Incorporation of an ecological approach that uses multiple strategies to impact an individual's behavior. This approach includes strategies that directly affect an individual's health-related knowledge, attitudes, or perceptions that may serve as barriers to self-care (e.g., patient coaching messages and reminders), as well as effective behavioral support strategies for those who influence the patient in making healthy choices (e.g., caregivers or physicians).[7–9]
• Capacity to deliver complex interventions that adapt in response to an individual's changing needs over a lifetime.[10]
• Tailored message content based on a diverse range of demographic, behavioral, and psychosocial factors, such as readiness to adopt behaviors, confidence in ability to do the behavior, daily living patterns, coping style, and cultural norms.[11–14]

Integration of strategic behavior design into MIT

Integration of behavioral support into mobile technology is not new. However, not all behavioral support is equal. Four dimensions of behavioral support can be used to help determine the value of one support system versus another (see Figure 1). Evaluation questions to consider include the following:

• Behavioral guidance. Are all individuals using the application guided to the same self-care behaviors or is each individual guided to focus on targeted behaviors related to their specific clinical treatment plan?
• Ecological approach. Does the application provide behavioral support via patient coaching only, or does it have multiple mechanisms to support patients in their daily self-care actions?
• Intervention design. Is the behavioral support provided to an individual based solely on initial

understanding of their situation-based assessments at the time of registration, or does the system have the capacity to identify new self-care barriers and adjust behavioral support to emergent needs?
• Individualized content. Does the user receive the same generic message content as everyone else, or does the user receive tailored messages based on clinical, behavioral and psychosocial factors that influence health?

Many health and wellness applications offer rudimentary behavioral support that incorporates a subset of these four dimensions. Only an MIT addresses complex human behavior with a dynamic, adaptive approach and tailored patient coaching to meet the needs of a diverse range of individuals in multiple healthcare settings.

Comprehensive behavioral support for diabetes self-management

WellDoc applies this framework as the basis for its MIT behavioral design. Specifically, the system integrates clinical and behavioral algorithms that guide patients' self-management and providers' clinical decision support. It provides advice about a patient's medication, diet, and physical activity regimen, all based on the individual patient's patterns.

The system also coordinates behavioral support at multiple levels of the healthcare ecosystem, including the patient and his or her social support and healthcare teams. Not only does a patient receive coaching messages, his or her physician receives actionable clinical decision support recommendations on how to address the patient's self-reported perceptions of health or barriers to self-care practices (e.g., adherence to a new medication). A patient's designated caregiver or family member can also receive information that enables him or her to assist the patient with daily self-care.

Additionally, the system has the capacity to use patien-provided data to deliver behavioral support that adapts as the patient's life changes. For instance, the system is designed to support patients while in the workforce and then adapt to address new self-care issues that typically occur upon retirement.

Most importantly, such a system provides individualized patient messages to deliver the right information at the right time to support the development of healthy, long-term self-care habits. Immediate and contextually relevant feedback motivates patients to integrate new behaviors into their daily routines.

Messages are especially powerful when they come in the form of recommendations based on the analysis of a patient's longitudinal data (e.g., multiple high blood glucose levels on a given day of the week) and follow-up questions related to personal circumstances associated with the data trends (e.g., eating out, family or cultural traditions related to eating, etc).

Conclusion: Addressing the whole patient

Mobile technologies in healthcare need to address the whole patient. Too many health and wellness applications available today merely offer superficial features that have limited impact and have not demonstrated health outcomes. The efficacy of MIT has been proven in clinical trials and serves as a beacon of what is possible when the appropriate clinical and behavioral algorithms are combined to create a true patient-centric solution.

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