Digital Health As A Solution?
Innovations for Wellness, Patient Engagement & the Management of Chronic Illness

Third Health Policy Decision Makers Forum
Singapore - June 5, 2015

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Overview

- What is Digital Health and what is driving its growth?
- How is Digital Health Having an Impact on Pharmaceutical Business Practices?
- New Players in the Space: What are Apple and Google Doing?
- Potential Challenges in realizing Full Promise of Digital Health
- Summary thoughts
Impetus for Digital Innovation in Health

- Inefficient healthcare systems with many opportunities for improvement
- Current burden of chronic disease is enormous and projected to rise over time – huge opportunity
  - Large populations
  - High cost areas – immediate and downstream
  - Quality of life issues
- Increasing cost sharing – have their attention
- Willingness to utilize technology and better access to data

![Projected Rise in Cases of Seven of the Most Common Chronic Diseases, 2003–2023](chart_image)
Consumer Willingness to Manage Life via Technology

- Mobile phones and tablets are everyday part of life in US and globally
- Willing to use them to do many things, previously done face to face or over the phone
  - Banking functions/transfer money
  - Shop for consumer goods, services
  - Communicate, connect, share personal updates/status
  - Job search
Powerful Story for Entrepreneurs and Investors

- Surge of patients with chronic conditions – In IMS study, members < 65 with these conditions filled >75% of all prescriptions (9,237/11,776)
- Growth in utilization and cost trends globally – predicted $1.2T by 2016
- 17% of children and adolescents are obese – tripled from one generation ago; Over 68% adults are obese per CDC in 2012
- High level of potentially avoidable costs $475B
New Firms Are Rapidly Creating Innovative Solutions

- Enhancing connection to health and health care through reminders, education, motivational support
- Improved and documented communication between patient and provider (and sometimes payer) across range of modalities
  - Telephonic
  - Email
  - Web
  - SMS/Text
- Medication tracking - location, frequency, dosage, etc
- Remote sensors
Claim Digital Health Will Help Us.....

- Reduce medication errors and promote compliance and increase patient satisfaction
- Reduce activity in high cost areas: emergency department and admissions/readmissions
- Allow case managers/medical personnel to focus more time on the complex, multi-chronic patients as others learn to self-manage
- Contribute more information to patient records and databases/registries for analysis and predictive modeling
- Enhance access to rural and low income consumers, traditionally hard to reach with traditional forms of medical care and communication
- Potential for cost decrease with need for fewer expensive machines – adapt existing consumer technology to help support monitoring
Digital Health Firms are Following Opportunity and Incentives in Few Key Categories

**FOLLOWING THE INCENTIVES**
*Top six trends of digital health (Q1-Q3 2014)*

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics and Big Data</td>
<td>$381M</td>
<td>Data aggregation and analysis to support a wide range of healthcare use cases</td>
</tr>
<tr>
<td>Digital Medical Devices</td>
<td>$280M</td>
<td>Software/hardware designed to treat a specific disease or condition</td>
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<tr>
<td>Healthcare Consumer Engagement</td>
<td>$238M</td>
<td>Consumer tools for the purchasing of healthcare services or health insurance (B2B and B2C)</td>
</tr>
<tr>
<td>Payer Administration</td>
<td>$223M</td>
<td>Management and administration tools for payers</td>
</tr>
<tr>
<td>Population Health Management</td>
<td>$195M</td>
<td>Comprehensive platforms for managing the health of populations under the shift to risk-based payment models</td>
</tr>
<tr>
<td>Telemedicine</td>
<td>$172M</td>
<td>Delivery of healthcare services through non-physical means (e.g. telephone, digital imaging, videoconferencing)</td>
</tr>
</tbody>
</table>

Note: Healthcain Health was recategorized from Personalized Medicine to Analytics and Big Data.
Common Business Models Include

- Wearables and basic tracker/fitness applications are targeted at consumers; also simple chronic disease/smoking cessation, etc.
- More sophisticated solutions are typically pitched at businesses who are perceived to have rationale to pay for the consumer/end user: health system, accountable care organization, health plan, employer.
- Rationales include saving downstream cost in more expensive areas, generating better data, enhance productivity-preventing/reducing absenteeism/
Enthusiasm and Promise High But Signs of Some Challenges Ahead

- Proving difficult to get funding after the early stages (Seed, Series A)
- Looking for results – are you achieving promised results/outcomes? Do you even know how to measure own impact?
- Often business models have been poorly defined – chasing solutions
- Many follow-on or “me-too” offerings = some areas saturated (e.g. diabetes)
- Firms may have been over-valued at early stages
Pharma is Stepping Up to “Own the Disease” and Go “Beyond the Pill”

Arthur D Little’s 2013 global pharma survey showed that 84% of those asked, felt it was crucial to have digital health strategy by 2020, 73% felt it would have crucial impact on competitive advantage.
What Else Drives Pharmaceutical Companies to Engage with Connected Health?

Digital Health drivers

Source: Joint Arthur D. Little, KIT survey
Innovative Ways to Solve This & Other Challenges Facing Industry
How is Pharma Changing? *Partnering to Create Data and Community Platforms*

- PatientsLikeMe creates networks that support a range of diagnoses
- Patients in different conditions can connect with others experiencing the same symptoms and condition and track and share their own experiences. Over 325K members
- Members generate data about the real-world nature of the disease that can help researchers, pharmaceutical companies, regulators, providers, and nonprofits develop more effective products, services and care
- Starting with Genentech, PatientsLikeMe data/platform is now used (AstraZeneca just signed 5 year deal) in the R&D process –
  - They can use the information to better understand what patients value
  - Clinically effective isn’t enough if doesn’t fit patients’ wants/needs
Partnership on projects such as recent wearables trial with Biogen where they collaborated on a project to track the activity of people with MS.

- Gave ~250 PatientsLikeMe members Fitbit One devices.
- Had 87% adherence.
- Has implications for how the health of MS patients is assessed in clinical trials and healthcare with more mobility data.
How is Pharma Changing? **Partnering to Facilitate Clinical Trials and Enhance Investment Opportunities**

- Qualcomm
  - Novartis for mobile enabled clinical trials program: “Trials for the Future”
  - Roche has program around capturing data from connected devices (anti-coagulation units 1\textsuperscript{st})
  - Walgreens customers can use 2Net to synch certain mobile devices and send biometrics to their MDs
- Also around investment arms – Roche Ventures, Novartis & Qualcomm, Biogen & Google X
How is Pharma Changing? **Working with Start-ups to Revolutionize How Medications Are Tracked**

- **Proteus Digital Health** - FDA cleared (also has CE mark in EY) ingestible sensor and patch that provides digital feedback with 99.1% accuracy vs observation/self-report - $172M round of funding in summer 2014 (WSJ reported its latest valuation as $1.1B)

- Sensor also tracks other statistics including sleep and activity levels

- Customers have mainly been pharmaceutical companies who use the technology in trials to assess medication adherence as well as the effects of medication

Patch transmits data from the ingestible sensor pill to the mobile device – no side effects reported to date
### Other Established Medical Device, Fitness and Telecom Players Also Moving into Digital Health

<table>
<thead>
<tr>
<th>New entrant</th>
<th>Entry date</th>
<th>What it offers</th>
<th>What it does</th>
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<tbody>
<tr>
<td>Samsung</td>
<td>2013</td>
<td>NeuroLogica&lt;sup&gt;15&lt;/sup&gt;</td>
<td>Expands Samsung’s medical imaging business via portable CT scanners</td>
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<tr>
<td></td>
<td>2012</td>
<td>S Health&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Software integrated with mobile devices that allows users to track nutrition, exercise, and weight</td>
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<tr>
<td>Verizon&lt;sup&gt;17&lt;/sup&gt;</td>
<td>2013</td>
<td>Converged Health Management</td>
<td>FDA 510(k) cleared remote health monitoring solution that connects data from patient devices to Verizon’s secure cloud on a real-time basis, allowing both patients and clinicians to easily access information</td>
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<tr>
<td>AT&amp;T&lt;sup&gt;18&lt;/sup&gt;</td>
<td>2012</td>
<td>Remote Patient Monitoring (RPM)</td>
<td>Blue-tooth enabled devices that collect biometric data and transfer patient information to designated clinician or caregiver</td>
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<tr>
<td>Canon&lt;sup&gt;19&lt;/sup&gt;</td>
<td>2013</td>
<td>“Healthcare Optics”</td>
<td>R&amp;D operation in Massachusetts with a focus on robotic-assisted surgery, cardiovascular disease detection, brain imaging, and miniature endoscopy tools</td>
</tr>
<tr>
<td>Qualcomm Life&lt;sup&gt;20&lt;/sup&gt;</td>
<td>2011</td>
<td>Connectivity Platform</td>
<td>Wireless health solution that aggregates and integrates patient data from disparate devices, applications and services. The platform provides a scalable infrastructure to manage interactions across a patient’s continuum of care.</td>
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<tr>
<td>Reebok, MC10&lt;sup&gt;21&lt;/sup&gt;</td>
<td>2013</td>
<td>Checklight</td>
<td>Wearable device with attachable sensors that detects the severity of head trauma in contact sports</td>
</tr>
<tr>
<td>Verizon and Motorola&lt;sup&gt;22&lt;/sup&gt;</td>
<td>2013</td>
<td>VML 700 LTE Vehicle Modem R1.1</td>
<td>Motorola Solutions modem utilizing Verizon’s 4G LTE network that is able to securely access the system storing patient data and relay vital statistics/video to hospital while ambulance is en route</td>
</tr>
<tr>
<td>Sony and Olympus&lt;sup&gt;23&lt;/sup&gt;</td>
<td>2013</td>
<td>Sony Olympus Medical Solutions</td>
<td>Joint venture combines Sony’s experience in digital imaging and Olympus’s optical manufacturing savvy to produce medical devices</td>
</tr>
<tr>
<td>Sony&lt;sup&gt;24&lt;/sup&gt;</td>
<td>2013</td>
<td>Venture capital</td>
<td>$10 million investment in Rainbow Medical, an Israeli medical device incubator</td>
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</table>
Plus - What Will Apple & Google Do Next?

Google™
HEALTH

Apple Watch

TIME
CAN
Google
SOLVE
DEATH?

The search giant is launching a venture to extend the human life span. That would be crazy—if it weren’t Google.
By Harry McCracken and Lev Grossman

HealthKit
Ways Google is Moving into Digital Health

- Store your genome in the cloud for $25/year (Google Genomics)
- Google Glass applications for health care
- Partner with Novartis on contact lens that can detect glucose levels
- Trying to reverse aging (Calico)
- Developing nanoparticle capabilities that may
  - Create a pill that will allow detection of cancer, heart disease very early on
  - Facilitate creation of synthetic skin
What Is Missing? How To Make Digital Health “Sticky” and Have a Lasting Impact

- **Clinical Evidence base** – is the solution based on credible research base? Does firm have clinical trials data?
- **Support Network** – moving past wearables and simple reminders - live Coaching – may be critical
- **Personalization & Gamification** - is it a “fit” for individual’s needs/motivations at that time? How maintain momentum?
- **Integration** – how challenging will it be to work with the solution? Will it connect to existing systems and can important data be captured, used? Is it administratively complex?
- **GOAL: scale/adoption/persistency** – will sufficient numbers of providers and patients use it and will it be used long enough and consistently enough to make a difference?
Digital Health holds great promise but has to refocus on key areas:

- Better **business models** that target and solve real problems for those being asked to pay
- Better **evidence of clinical efficacy** and linkage to actionable data
- Better **motivational underpinnings** to truly engage patients for the longer term

**Questions?**