mHealth Overview in Precision Medicine

Peter Tippett, MD, PhD
Chief Medical Officer
VP, Verizon Innovation Incubator
Smartphone Penetration by Generation

US Gen X Smartphone Users and Penetration, 2012-2018
millions and % of Gen X mobile phone users

US Millennial Smartphone Users and Penetration, 2012-2018
millions and % of millennial mobile phone users

US Baby Boomer Smartphone Users and Penetration, 2012-2018
millions and % of baby boomer mobile phone users

Note: Individuals born between 1971 and 1980 who own at least one smartphone and use the smartphone(s) at least once per month
Source: eMarketer, March 2014

95.1% → 97.1%
87.4% → 87.7%

94.3% → 94.4%

Percent of US generation with any mobile phone 2015 → 2018
Industry Snapshot: Mobile Apps

Big Market in Early Stages of Development

“Similar to the internet revolution, mHealth is revolutionizing the way of patients receiving their care.”

Mary Annecharico
CIO at Henry Ford Health Systems

<table>
<thead>
<tr>
<th>Common Applications</th>
<th>Major Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>EHR Access in and out of care site</td>
<td>• Apple HealthKit</td>
</tr>
<tr>
<td>Biometric data collection and transmission</td>
<td>• Microsoft HealthVault</td>
</tr>
<tr>
<td>Fitness/activity tracking</td>
<td>• Google Fit</td>
</tr>
<tr>
<td>Remote communication with providers</td>
<td>• Samsung S Health</td>
</tr>
</tbody>
</table>

Mobile Health Market Rapidly Expanding

<table>
<thead>
<tr>
<th>$49.1B</th>
<th>95M</th>
<th>&gt;22,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated global mHealth market size by 2020</td>
<td>Americans using mHealth technologies in 2013. **19% of Smartphone Users have at least one Health app</td>
<td>Number of Healthcare Smartphone Apps **1,128 iOS apps related to diabetes alone</td>
</tr>
</tbody>
</table>

Mobile Patient Monitoring: Staying Connected Regardless of Location

“Patient monitoring is becoming a necessary measure for hospitals and doctors to measure their business. The focus is shifting whether they like it or not.”

Jack Young
Head of Qualcomm Life Fund

Clinical Benefits

- Reduced readmissions
- Reduced ED visits
- Improved chronic disease-related mortality
- Improved care coordination

Major Vendors

- Noninvasive Medical Technologies
- Corventis
- Pharos Innovations
- Honeywell HomMed
- McKesson

Remote Monitoring has Wide Reach

19M
Estimated patients connected to remote monitoring devices by 2018

$5.85B
Total remote patient monitoring market in 2013

76.7%
Market share of connected medical device manufacturers

Devices by the thousands

mHealth, fitness, monitoring, diagnostic, vitals …
More mobile data sources…

Telemedicine Buses, Kiosk & Retail Locations

Sensors

Remote Health Monitoring

Video Virtual Care
The Precision Phenotype

Mobile

Medications – (Rx & OTC)

Problem /Symptom List --

Nutrition --

Geography --

Family History --

Passive Activity --

-- Diagnostics

-- Physical Activity

-- Lifestyle / Work

-- Patient History

Genomic Profile

Point-in-Time Status:
Emotional Physical
Clinical Social
Personal Socioeconomic