Innovation in the Changing Health Care Landscape

The Apple – J&J Collaboration

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Head, Integrated Evidence CVM
Janssen Pharmaceuticals
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### The problem in industry

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>Of eligible patients participate in trials</td>
</tr>
<tr>
<td>30%</td>
<td>Average participant dropout rate</td>
</tr>
<tr>
<td>20%</td>
<td>Of trials shut down because of lack of enrolment</td>
</tr>
<tr>
<td>$2 Bn</td>
<td>To develop a medicine (factoring failures)</td>
</tr>
</tbody>
</table>

**Sources:**

- [https://www.forbes.com/sites/matthewherper/2017/10/16/the-cost-of-developing-drugs-is-insane-a-paper-that-argued-otherwise-was-insanely-bad/#3b80d9d72d45](https://www.forbes.com/sites/matthewherper/2017/10/16/the-cost-of-developing-drugs-is-insane-a-paper-that-argued-otherwise-was-insanely-bad/#3b80d9d72d45)
# A first step: The mSToPs Study

**SOURCE:** Healthcare Resource Utilization Associated With Electrocardiograph (ECG) Sensor Patch Screening For Atrial Fibrillation (AF): Results From The Mhealth Screening To Prevent Strokes (Mstops) Trial. *Journal of the American College of Cardiology*, Vol. 73, Issue 9, Supplement 1, March 2019. DOI: 10.1016/S0735-1097(19)30904-0

<table>
<thead>
<tr>
<th>Who</th>
<th>How</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>At risk of</td>
<td>ID via payer claims</td>
<td>Payer claims</td>
</tr>
<tr>
<td>✓ AF</td>
<td>Virtual recruitment</td>
<td>ECG tracing</td>
</tr>
<tr>
<td>✓ Stroke</td>
<td>Virtually instrument</td>
<td></td>
</tr>
</tbody>
</table>
More detection, fewer hospitalizations

<table>
<thead>
<tr>
<th>AF Diagnosis</th>
<th>Hospitalizations / mo./100 persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>w/ Patch</td>
<td>6.3%</td>
</tr>
<tr>
<td>vs.</td>
<td>4.3</td>
</tr>
<tr>
<td>w/o Patch</td>
<td>2.3%</td>
</tr>
<tr>
<td>vs.</td>
<td>16.9</td>
</tr>
</tbody>
</table>

…the mSToPS trial [is] especially noteworthy [because] the entire study was conducted remotely…

This direct-to-participant clinical study shows the great potential of these types of in-home studies to evaluate the coming wave of wearable health technologies

- Francis Collins, MD, PhD
  NIH Director
  07/17/2018 blog post

mSToPs to Heartline

**Old School**

- Number of patients / events often modest
- “Clean data” NOT available in real time for modeling
- Megabytes to Gigabytes of data

**New School**

- Hypotheses
- Data Structure
- ML
- Analytics
- Internal capabilities

Larger number of patients and events

“Clean data” available in real time to guide trial modifications

With wearables can be Terabytes to Petabytes of data
Data Insights -- Goldmine vs. Landmine?

• Valuable insights vs. Distractions
• Time well-spent vs. Lost time
• Helping vs. Hurting
• Value creation vs. Value destruction
The external market dynamic: High cost incumbents are trapped by their economics

![Bar chart showing total change in national health expenditures, by major spending category, 2017 to 2023.](chart)

**Total Change in National Health Expenditures, by Major Spending Category, 2017 to 2023**

- **Hospital Care**: +$416.8 billion
- **Professional services**: +$333.2 billion
- **Government administration / Net cost of health insurance**: +$119.6 billion
- **Outpatient prescription drugs**: +$118.9 billion

**Share of total change in NHE, 2017 to 2023**

- Hospital Care: 33%
- Professional services: 29%
- Government administration / Net cost of health insurance: 9%
- Outpatient prescription drugs: 9%

Source: Drug Channels Institute analysis of National Health Expenditure Accounts, Office of the Actuary in the Centers for Medicare & Medicaid Services, February 2019. Professional Care includes: Physician and Clinical Services, Dental Services, and Other Professional Services. Outpatient prescription drug figures exclude inpatient prescription drug spending within hospitals and nearly all provider administered outpatient drugs.

Published on Drug Channels (www.DrugChannels.net) on March 26, 2019.
Wearable devices are proliferating, and will play an increasingly central role in health care in the coming years.

The global wearable market is projected to more than quadruple between 2016 and 2022\(^1\)

**Wearables revenue (global)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2018P</th>
<th>2022P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue ($ billion)</td>
<td>16</td>
<td>26</td>
<td>73</td>
</tr>
<tr>
<td>CAGR</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Global wearable unit sales** will grow 60% through 2021, to 500 million units per year\(^2\)

Wearables will create tangible near-term value in healthcare while building a platform for future models.

Wearables are nearing a tipping point in terms of their utility in healthcare. They are becoming much smarter and more integrated into our lives, driven by passive monitoring of biometrics and machine learning. They will soon play a critical role in improving patient and economic outcomes.

Sources: 1) Tractica; 2) Gartner
Apple is an ideal partner in wearables given their leading position in the smartwatch space and ability to collect rich consumer and biometric data.

**U.S. smartwatch marketshare¹**

<table>
<thead>
<tr>
<th></th>
<th>Million units (Q3 2017)</th>
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</thead>
<tbody>
<tr>
<td>Apple</td>
<td>281</td>
</tr>
<tr>
<td>Garmin</td>
<td>151</td>
</tr>
<tr>
<td>Fossil</td>
<td>179</td>
</tr>
<tr>
<td>Samsung</td>
<td>263</td>
</tr>
<tr>
<td>Others</td>
<td>1,514</td>
</tr>
</tbody>
</table>

Apple Watch represents almost 2/3 of the U.S. market, and is expected to remain the smartwatch market leader through 2021²

It also accounts for over half of all smartwatches ever shipped worldwide³

**Apple’s strategic advantages**

- **90+ million iOS users in the US⁴**, including 6 million aged 65 and older⁵
- iOS provides a **seamless, integrated user experience** (vs. other fragmented mobile operating systems)
- Retail and **service/support infrastructure** through retail footprint
- Apple is a highly valued brand worldwide⁶
- Major investment in **sensor technologies** and **health-related algorithms**

Sources: 1) IDC; 2) Gartner; 3) Canalys; 4) Statista; 5) J&J analysis; 6) Forbes
New and combined data inputs provide better insights

- Sensor
- Claims
- Validated PROs
- Symptoms
- Privacy
- Regulatory – Law, FDA, AKS
- Compliance
- Security
- Data structure to run analytics
- Data rights
Apple and J&J will study the impact of the S4 Watch on atrial fibrillation detection and outcomes