MEDICAL GADGETS, KIOSKS AND APPS: CONSUMER AWARENESS OF HEALTH RISK FACTORS

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When did Apple’s App Store Launch?

Answer: July 10, **2008**

- There were initially **500** apps
- There are now over **900,000**
- **17,000** are health related apps
- Over **50 billion** apps have been downloaded
- And iPhone isn’t even the most popular phone!

Other facts:
- The original iPhone was released:  
  - June 29, **2007**
- The first-generation iPad was released:  
  - January 27, **2010**

IMAGE: FLICKR USER US MISSION GENEVA
The Speed of Technological Advance

Pope Benedict XVI

Pope Francis

2005

2013
“Mobile apps have the potential to transform health care by allowing doctors to diagnose patients with potentially life-threatening conditions outside of traditional health care settings, help consumers manage their own health and wellness, and also gain access to useful information whenever and wherever they need it,” said Dr. Jeffrey Shuren, director of the FDA’s medical device center.
Medical Devices in the News

• New handheld mobile device performs laboratory-quality HIV testing

New research shows that a handheld mobile device can check patients' HIV status with just a finger prick, and synchronize the results in real time with electronic health records.

• Do-It-Yourself Tests Enable Cancer Diagnosis in Bathroom

Mode Diagnostics Ltd. wants to bring the medical laboratory into your bathroom -- with a mobile phone-size device that can detect signs of cancer right before your eyes.

• New device can extract human DNA with full genetic data in minute

Take a swab of saliva from your mouth and within minutes your DNA could be ready for analysis and genome sequencing with the help of a new device.
The Dream of the Medical Tricorder
To Boldly Go Where No Man Has Gone Before:

“When aliens seize and torture Dr. McCoy … Captain Kirk and Mr. Spock rush to his aid. They are able to assess his condition in seconds with the help of a medical tricorder – a hand-held computer with a detachable sensor that is normally used by Dr. McCoy himself to diagnose others. A quick scan with the tricorder indicates that he suffers from ‘severe heart damage; signs of congestion in both lungs; evidence of massive circulatory collapse.’”

“Along with teleportation, speech-driven computers and hand-held wireless communicators that flip open, the medical tricorder was one of many imaginary future technologies featured in “Star Trek”. Ever since, researchers have dreamed of developing a hand-held medical scanner that can take readings from a patient and then diagnose various conditions. Now, nearly five decades after “Star Trek” made its debut in 1966, the dream is finally edging closer to reality.”

Inspired by Star Trek, the X-Prize will award $10M to the winner of a contest to diagnose as many as 15 common diseases without the assistance of a doctor or nurse.

"AS ENVISIONED FOR THIS COMPETITION, THE DEVICE WILL BE A TOOL CAPABLE OF CAPTURING KEY HEALTH METRICS AND DIAGNOSING A SET OF 15 DISEASES."

ULTIMATELY, THIS TOOL WILL COLLECT LARGE VOLUMES OF DATA FROM ONGOING MEASUREMENT OF HEALTH STATES THROUGH A COMBINATION OF: WIRELESS SENSORS, IMAGING TECHNOLOGIES, AND PORTABLE, NON-INVASIVE LABORATORY REPLACEMENTS."
THE CORE SET INCLUDES:
- ANEMIA
- URINARY TRACT INFECTION, LOWER
- DIABETES, TYPE 2
- ATRIAL FIBRILLATION
- STROKE
- SLEEP APNEA, OBSTRUCTIVE
- TUBERCULOSIS
- CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)
- PNEUMONIA
- OTITIS (“EAR INFECTION”)
- LEUKOCYTOSIS
- HEPATITIS A
- ABSENCE OF CONDITIONS

THE ELECTIVE SET INCLUDES:
- PERTUSSIS (WHOOPING COUGH)
- HYPERTENSION
- MONONUCLEOSIS
- ALLERGENS (AIRBORNE)
- HYPOTHYROIDISM/HYPERTHYROIDISM
- FOOD-BORNE ILLNESS
- SHINGLES
- MELANOMA
- STREP THROAT
- CHOLESTEROL SCREEN
- HIV SCREEN
- OSTEOPOROSIS

VITAL SIGNS SET:
- BLOOD PRESSURE
- ELECTROCARDIOGRAPHY
- BODY TEMPERATURE
- RESPIRATORY RATE
- OXYGEN SATURATION

HTTP://WWW.QUALCOMMTRICORDERXPRIZE.ORG/
IMAGE: PARAMOUNT PICTURES

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The Role of New Health Technology

- Education
- Quantification
- Expand Access
- Diagnosis

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Education
Patient Education

Websites and Smartphone Apps

- WebMD – Patients research illness, diseases and health
- MEDgle – Patients enter symptoms, diagnoses, drugs and procedures into probabilistic database
- HealthTap – Smartphone App to pose a question to a physician and research conditions.
Patient Social Networks

- PatientsLikeMe,
- CureTogether

- Enter/search for symptoms, treatment success, prognosis

- Create personal connection to treatment plan
Patient Social Networks

Gabapentin Treatment Report

Category: Prescription Drugs

Most Popular Types: Neurontin, Ratio-Gabapentin, APO-Gabapentin (Show all)

See also: Gabapentin-Baclofen-Elavil topical, Gabapentin Lidocaine

What is Gabapentin?

Gabapentin is an anticonvulsant medication used as an adjunct treatment for partial seizures and for the management of postherpetic neuralgia and neuropathic pain.

Reported Purpose & Perceived Effectiveness

<table>
<thead>
<tr>
<th>Purpose</th>
<th># of patients</th>
<th># of patients with evaluations</th>
<th>Perceived Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibromyalgia</td>
<td>1,348</td>
<td>410</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>1,284</td>
<td>321</td>
<td></td>
</tr>
<tr>
<td>Nerve pain (neuralgia)</td>
<td>1,073</td>
<td>285</td>
<td></td>
</tr>
<tr>
<td>Numbness and Tingling with Pains and Needles</td>
<td>350</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>Stiffness/Spasmodicity</td>
<td>222</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Peripheral Neuropathy</td>
<td>212</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

See all 408 reasons taken

See all 4,922 patients currently taking Gabapentin

Reported Side Effects

Commonly reported side effects, conditions, and hospitalizations associated with Gabapentin

- Weight gain: 141
- Fatigue: 89
- Sleepiness: 75
- Dizziness: 62
- Drowsiness: 61
- Increased appetite: 58

Reported Dosages

See all 391 reported side effects

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Image: www.patientslikeme.com
Quantification

“SELF-KNOWLEDGE THROUGH SELF-TRACKING”
Quantification

Fitness and Activity Monitors

- Activity Apps – Walking, Running, Cycling
  - MapMyRun, RunKeeper
- External devices to monitor physical activity
  - Pedometers
  - Bracelets – Fitbit Flex, Jawbone Up, Nike Fuelband
- Sleep Monitors
  - Zeo, Sleep Cycle
Quantification

Diet and Exercise Apps

- Nutritional information and calories of foods and restaurant meals
- Many weight-loss apps use social collaboration to achieve goals
- Often compatible with one another
Quantification

Personal Health Monitoring Apps

• Pulse/Blood Pressure - Withings
• Blood Glucose - iBGStar
• Heart Rate – AliveCor ECG
• Blood Saturation – iHealthSpO2 Pulse Oximeter
Quantification

Portable, inexpensive devices may improve patient outcomes by collecting more health data and influencing behavior

- LIFE WATCH PHONE MONITORS SEVERAL HEALTH INDICATORS AT ONCE.

- MORE ON THE HORIZON:
  - HEALTH MONITORING TATTOOS
  - DIGESTIBLE DEVICES
  - IMPLANTABLE DEVICES
Quantification

Individual DNA Analysis

- Companies, such as 23andme, provide genetic testing from a saliva sample
  - Identifies relative risk of the individual developing hundreds of diseases
  - Limited influence on how people follow-up with the information
- Smartphone apps help store and analyze results from DNA tests
  - Gene Genie
“Technology has become a new arm of the health care delivery system. You need to bring the exam room to where the patient is, not where the doctor is.”

-Jay Sanders, Adjunct Professor at Johns Hopkins University and CEO of The Global Telemedicine Group

Expand Access

Kiosks - Increasingly available in retail settings

- Kiosks offer health and wellness advice and test:
  - Vision
  - Blood Pressure
  - Obesity
  - Lifestyle behaviors
  - Family history
  - Video visit with doctor

Sources:
Expand Access

Kiosks - Increasingly available in retail settings cont..

- Walmart and Sam’s Club plan to install 2,500 health screening kiosks in stores in 2013.
- Cheek-swab kiosks in New Hampshire to find potential matches for bone marrow donors.
- Genomic vending machines at universities to reduce cost and improve accessibility of high-powered computing for gene sequencing.

Sources:
Expanding Access

Remote Medical Testing

Many medical tests can now be done using a smartphone.

Vision and hearing loss are two of the top causes of disability in adults over age 60, especially in low income countries.

- Vision – “myvisiontrack” app
- Ear Infections – “cellscape” app
- Hearing Aid – Low cost hearing-aid, Sound World Solutions

More than half of the disease burden in low income countries is due to communicable diseases.

- Images from cellphone cameras used to diagnose disease
  - Tuberculosis.
  - Malaria

Expanded Care

Physicians Tools for Remote Consultation

• Smartphone Physical
  • TedMed 2013 described 10 Smartphone apps that can be used to perform a Physical evaluation
  • www.smartphonephysical.org

GOOGLE GLASS

MANY “EXPLORERS” HAVE BEEN PHYSICIANS.
HANDS-FREE COMPUTER ACCESS
CONSULT WITH OTHER DOCTORS WHO CAN SEE WHAT THEY SEE
TRAINING AND REFERENCE
Diagnosis

Many tests can be done at home without visiting a lab.

Consumers can test for diseases at home

- HIV (blood and saliva tests available)
- Hepatitis
- Cholesterol
- Diabetes
- Colon Disease
Diagnosis

Cancer Detection

Individuals are now able to test for diseases as well. The convenience means it is likely more people will be diagnosed early, however there is also concern regarding the accuracy of some apps.

- Skin Cancer
- Prostate Cancer
- Colon Cancer
- Cancer detecting bra
Diagnosis

**Urinalysis**
- **Urinalysis Apps**
  - uChek
  - Piddle
  - Smart Diapers
- **Abnormalities may indicate:**
  - Diabetes
  - Dehydration
  - Kidney Disease
  - Certain Cancers
  - Urinary Tract Infections

"Want to quantify this experience? Try Piddle…"
Diagnosis

- Ophthalmoscopy
- Haematology
- Mood scanner

The possibilities are endless!!
Applications to Insurance
Personal health devices are becoming smaller, cheaper and more effective which creates risk and opportunities for the insurance industry.
Potential Risks to the Insurance Industry

- Applicant Anti-Selection
- Insurer Overreaching
- Regulatory Action
Potential Risks to the Insurance Industry

Applicant Anti-Selection

- Increased availability of information that is
  
  1. Low Cost
  
  2. Specific
  
  3. Private

- Anti-Selection: Demand for insurance is correlated with Risk

- REVEAL Study: Knowledge of genetic risk profile changes insurance purchase behaviors


"On the Internet, nobody knows you're a dog."
Potential Risks to the Insurance Industry

Insurer Overreaching

- “Technological progress could be compared to an axe in the hand of a pathological criminal.”

  - Albert Einstein

- Exciting opportunities to use technology and analytics to improve customer experience.

- Take care to uphold sacred trust with customers.

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Potential Risks to the Insurance Industry

Regulatory Action

• Regulatory response could lead to increased information asymmetry

• Continued regulatory trend toward promoting
  • Consumer privacy rights
  • Security of personal information
  • Non-discrimination
    • EU Gender directive
  • Patient safety
    • Cybersecurity (device hacking)
    • Device effectiveness
Potential Risks to the Insurance Industry

Information Overload

“Technological progress has merely provided us more efficient ways of going backwards” - Aldous Huxley

• Tremendous volume of data to integrate and interpret

• Difficult to isolate signal from the noise

• Matt Asay: “The first company to effectively bring together all this disparate data into one app is going to win…. we need someone to win the race to aggregating the data behind our quantified selves”

• Patients may misinterpret data and fail to seek necessary treatment

http://readwrite.com/2013/08/05/why-the-quantified-self-needs-a-monopoly
Opportunities for the Insurance Industry

• Point of Sale Underwriting

• Research and Analytics

• Improved Public Health

• Market Expansion
Opportunities for the Insurance Industry

Point of Sale Underwriting

• Mobile devices create potential for point of sale
  • Physical measurements
  • Disease screening
  • Integration of devices with
    • E-app
    • Electronic evidence
    • Health records
Opportunities for the Insurance Industry

Research and Analytics

• Track and measure progress to health goals
  • Dashboards
  • Benchmarks
  • Success of treatment plans
• Large population datasets for research
• Predictive modeling/risk scoring algorithms
Opportunities for the Insurance Industry

Improved Public Health

- Improved outcomes for consumers who:
  - Would not otherwise visit a doctor
  - Adopt healthier behaviors
  - **Monitor** health and **detect** disease earlier
- Improved population health
  - Mortality improvement
  - Lower cost of chronic care treatment
Opportunities for the Insurance Industry

Market Expansion

IBM Research:

- Most devices are focused on super healthy and chronically ill
- The Economist: “an eclectic mix of early adopters, fitness freaks, technology evangelists, personal-development junkies, hackers and patients suffering from a wide variety of health problems”

- Largest consumer segment lies in the middle

Opportunities for the Insurance Industry

Customer Engagement

- Innovate product, distribution and underwriting process
- Utilize wearable tech to encourage healthy lifestyles
- Many aligned goals:
  - Better health outcomes
  - Faster, less-invasive customer experience
  - Improved customer loyalty and persistency
  - More accurate risk assessment

IDEAS:
- Wellness discounts
- Combination products
- Life stage products
- Applicant signaling
- Continuous risk-based pricing

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Usage Based Insurance (UBI) / Telematics in Auto Insurance

• Progressive Snapshot
  • Provides the company individualized driving data in exchange for a premium discount.

• Aviva, State Farm and other competitors are using devices such as On-star as well as smartphone apps to gather driver data.

• This type of program has evolved into “Pay as you drive” insurance.
Girls……

Europe wants you to pay more. We want you to get a fair deal. If you ‘drive like a girl’ you will get a discount after 3 months.

Drive like a girl? Prove it!

A telematics box fitted out of sight at no extra charge lets you

Money back after 3 months

If you ‘drive like a girl’ you will get a discount after three months.

Lots of great benefits

Fully comprehensive car insurance, all the benefits of the
Conclusions

THE CONTINUED RAPID EVOLUTION OF HEALTH MONITORING AND DIAGNOSTIC TECHNOLOGY IS INEVITABLE.

- Self Quantification will evolve into a part of mainstream life
  - First adopters lay the groundwork— the masses soon follow
  - Integration of quantified health and financial data
  - Ubiquity comes quickly
    - Remember life before email, Google, Facebook, eBay, Amazon, etc.?
Conclusions

The continued rapid evolution of health monitoring and diagnostic technology is inevitable.

- Increased information asymmetry between insurers and applicants is a valid concern. Two response tracks:

1. Denial (or Defensive/Reactive)

2. Disruptive/Proactive
THANK YOU!