



The Office of the National Coordinator for
Health Information Technology

Patient-Centered Care

Activated Patients

Lecture b: The Quantified Self & mHealth

This material (Comp 25 Unit 2) was developed by the University of Alabama at Birmingham, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number 90WT0007.

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org>.

Activated Patients

Learning Objectives

- Bring a global perspective to Do-It-Yourself (DIY) medicine and describe the factors influencing its expansion
- Discuss the impact of DIY medicine on both clinical practice and clinical research
- Discuss the potential promise and peril of the changes that DIY will bring to healthcare
- Discuss the role of the Quantified Self and mobile health applications in patient-centered care

Quantified Self

- A movement to incorporate technology into data acquisition on aspects of a person's life in terms of inputs, states, and performance.
 - Self monitoring
 - Gamification

Wearable Sensors and Computing

- The combination of wearable sensors and wearable computing has been known by many names over time
 - Life logging
 - Self-tracking
 - Auto-analytics
 - Body hacking
 - Self-quantifying
 - Self-surveillance
 - Personal informatics

Patient Uses

- Self-quantification may be used for DIY medicine for personal purposes
 - Monitoring chronic illness
 - Understanding what affects daily function and quality of life
- Self-quantification may also be used in partnership with a clinician
 - Challenges remain here including evolving standardized/best practices

Research Applications

- Data analyzed via traditional techniques to establish correlations among the variables
- Quantitative methods from business and science applied to health data
- Data Visualization to generate hypotheses

M-Health

- 60% of US adults track at least one health metric
- Mobile health app usage growing
- Patients willing to share data to aid in diagnosing and treating themselves or to aid others
- Empowered by availability of devices and change in attitudes toward tracking and sharing data

Available Tools and Biosensors

- Mood
- Activity
- Sleep
- Biological
- Diet
- Other

Quantified Self - Mood

- Multiple apps to track mood
- Spectrum of users
- “Journaling” functions
- Social media linkages
- Collect aggregate data across users
- Examples
 - Track Your Happiness, MoodPanda, Moodscope, Moodjam, Optimism

Quantified Self - Activity

- Types of Activity trackers:
 - pedometers
 - accelerometers
 - altimeters
 - GPS
- Companion apps
- Examples
 - FitBit, Amiigo, Jawbone, Strava, RunKeeper, Pebble, Apple Watch.

Quantified Self - Sleep

- Monitor sleep patterns
- Optimize sleep/wake cycle
- Examples of sleep-specific tracking apps
 - SleepBot, Sleep Cycle
- Sleep tracking also incorporated into activity trackers

Quantified Self - Biological

- Heart rate
 - Cardiio, Emwave2, iThlete
- Blood pressure
- Weight
 - MyFitnessPal, The Quantified Body
- Electrocardiograms (ECG)
- Combinations
 - Withings
- Remote monitoring for chronic illness

Quantified Self - Other

- Microbiome analysis—uBiome
- Prompts to adjust posture—LumoLift
- Eating speed—HapiFork
- Prompts for activity--Belty

Using Data for Patient-Centered Care

- Self-quantification opens doors
 - Individualized home monitoring
 - Closer follow-up
- Potential issues
 - How do we incentivize uptake
 - Alert fatigue
 - How do clinicians bill for such monitoring
 - Insurance repercussions?

Quantified Self – Challenges

- Accuracy of devices
 - Self-quantification experiment lack rigor and controls
 - Very few formal research studies exist
 - Smartphones close to observations
 - Wearable devices more variable
- Standards
- More rigorous research

Quantified Self – Challenges (2)

- Devices are not part of EHR
- Need for visualization tools
- Lack of device integration into Health IT ecosystem
 - No good mechanism for health information exchange
 - No bidirectional patient-provider exchange

Quantified Self – Challenges (3)

- Digital divide—disadvantaged populations
- Engaging the elderly
- Long-term utilization
 - Gamification one potential strategy to maximize engagement long-term

Activated Patients

Summary – lecture b

- Combination of wearable devices and wearable computing
- Many devices and apps available
- Data used to optimize care and health management
- Challenges still to be overcome
 - Validation of technologies
 - Bi-directional exchange of data with EHRs
 - Addressing the barriers to adoption

Activated Patients

References – Lecture b

References

- Accelerometer. Wikipedia. Wikipedia Foundation. Retrieved January 2016 from <https://en.wikipedia.org/wiki/Accelerometer>
- Activity Tracker. Wikipedia. Wikipedia Foundation. Retrieved January 2016 from https://en.wikipedia.org/wiki/Activity_tracker
- Altimeter. Wikipedia. Wikipedia Foundation. Retrieved January 2016 from <https://en.wikipedia.org/wiki/Altimeter>
- Case, M. A., Burwick, H. A., Volpp, K. G., & Patel, M. S. (2015). Accuracy of Smartphone Applications and Wearable Devices for Tracking Physical Activity Data. JAMA: Journal of The American Medical Association, 313(6), 625-626.
- Castelao, L. (2012, March 3). The Quantified Self. The Economist. Retrieved January 31, 2016, from <http://www.economist.com>
- Cardiio. (n.d.). Retrieved January 31, 2016, from <http://www.cardiio.com>
- EmWave2. (n.d.). Retrieved April 08, 2016, from <http://store.heartmath.com/emwave2>
- Granado-Font, E., Flores-Mateo, G., Sorlí-Aguilar, M., Montaña-Carreras, X., Ferre-Grau, C., Barrera-Uriarte, M., & Satué-Gracia, E. (2015). Effectiveness of a Smartphone application and wearable device for weight loss in overweight or obese primary care patients: protocol for a randomised controlled trial. BMC Public Health, 15(1), 1-6.

Activated Patients

References 2 – Lecture b

References

- Guidi, G., Pollonini, L., Dacso, C. C., & Iadanza, E. (2015). A multi-layer monitoring system for clinical management of Congestive Heart Failure. BMC medical informatics and decision making.
- HapiFork. (n.d.). Retrieved January 31, 2016, from <https://www.hapi.com/product/hapifork>
- Ithlete heart rate variability training tool. (n.d.). Retrieved April 08, 2016, from <http://www.myithlete.com/>
- Killingsworth, Matt. Track your happiness. Retrieved January 2016, from <https://itunes.apple.com>
- Li, I. (n.d.). Moodjam. Retrieved April 08, 2016, from <http://moodjam.com>
- Lumo Lift - Posture Coach & Activity Tracker. (n.d.). Retrieved April 08, 2016, from <http://www.lumobodytech.com/lumo-lift/>
- Marceglia S., Fontelo P., Rossi E., Ackerman M.J. A standards-based architecture proposal for integrating patient mHealth apps to electronic health record systems. Applied Clinical Informatics. Retrieved April 11, 2016, from <http://www.ncbi.nlm.nih.gov/pubmed/26448794>
- Moodscope - Lift your mood with a little help from your friends. (n.d.). Retrieved April 11, 2016, from <https://www.moodscope.com/>
- Optimism Mental Health Apps for Self-Tracking. (n.d.). Retrieved April 11, 2016, from <http://www.findingoptimism.com/>

Activated Patients

References 3 – Lecture b

References

PWC Health Research Institute. Top health industry issues of 2016. Retrieved January 2016 from <http://www.pwc.com>

“Quantified Self.” Wikipedia. Wikipedia Foundation. Retrieved January 2016 from https://en.wikipedia.org/wiki/Quantified_Self

Sequence Your Microbiome - Gut Flora, Microbiota. (n.d.). Retrieved April 11, 2016, from <http://ubiome.com/>

Sleep Cycle alarm clock on the App Store. (n.d.). Retrieved April 11, 2016, from <https://itunes.apple.com/us/app/sleep-cycle-alarm-clock/id320606217?mt=8>

Track anything, collect data and gain insight over time. (n.d.). Retrieved April 11, 2016, from <https://www.mercuryapp.com/>

uBiome. Retrieved January 31, 2016, from <http://ubiome.com/>

Withings. Retrieved January 31, 2016, from <http://www.withings.com>

Patient-Centered Care Activated Patients Lecture b Quantified Self & mHealth

This material was developed by The University of Alabama at Birmingham, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number 90WT0007.