Smart Health – CSE 40816

University of Notre Dame

Spring 2020

UNIVERSITY OF NOTRE DAME

The IHI Triple Aim

The IHI Triple Aim
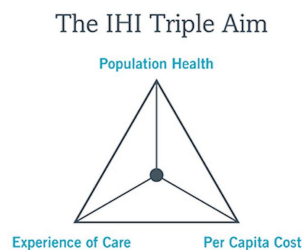
Population Health

IHI = **I**nstitute for **H**ealthcare **I**mprovement

Experience of Care   Per Capita Cost

- Improve the **health** of the population
- Enhance the **patient experience** of care
- Reduce the **per capita cost** of care

A Patient-Centric Ecosystem

Informed

↓

Involved

A Patient-Centric Ecosystem

- Patients are "key stakeholders in their care journeys"
- Update patients about their health at all times
- Educate patients ("health-literacy")

- What happens if you miss/mix medications?
  - https://www.youtube.com/watch?v=avuhY7D71sQ
- "Loose weight" -> Coaching
  - Personalized information (which exercises might work best)
  - Technology (videos, apps)
  - Self-management (apps)

eHealth

- A relatively recent term for healthcare practice supported by **electronic processes and communication**, dating back to at least 1999

- **World Health Organization**: "…*eHealth is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including healthcare services, health surveillance, health literature, and health education, knowledge and research…*"

- **European Commission**: "*…the use of modern information and communication technologies to meet needs of citizens, patients, healthcare professionals, healthcare providers, and policymakers…*"
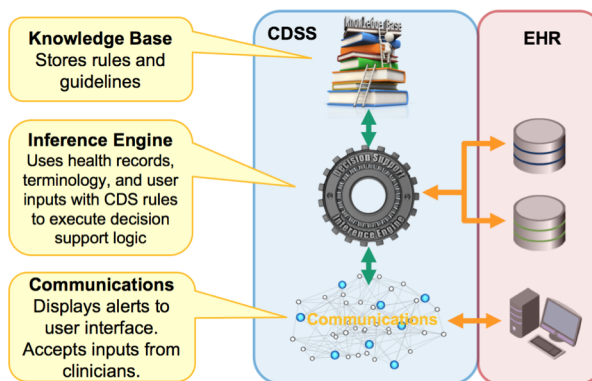
eHealth

- **Electronic health record** (**EHR**) or **electronic medical record** (**EMR**): systematized collection of patient and population health data in a digital format that is electronically-stored

- **Clinical decision support system (CDSS):** ICT solution designed to provide health professionals with clinical decision support (CDS) such as assistance with clinical decision-making tasks

- **Telemedicine:** physical and psychological diagnosis and treatments at a distance, including tele-monitoring of patient functions

Electronic Health Records

CDSS

- Patient-specific prompts
- Screening recommendations
- Warnings
- Treatment guidelines
- Medication dosing
- Overdue tests

Knowledge Base
Stores rules and guidelines

Inference Engine
Uses health records, terminology, and user inputs with CDS rules to execute decision support logic

Communications
Displays alerts to user interface. Accepts inputs from clinicians.

CDSS

EHR

eHealth in LMICs

- In many low- and middle-income countries (LMICs), health system challenges relating to weak governance, health workforce shortages, and geographic and economic barriers to care impede effective delivery of health services to those in need

- Information and communication technology (ICT) offers the potential for addressing some of these challenges with innovative solutions, especially if offered at scale

- LMICs account for three-quarters of the rapidly expanding Internet and mobile cellular subscriptions globally, thus creating opportunities for innovative and cost-effective health services through the use of ICT
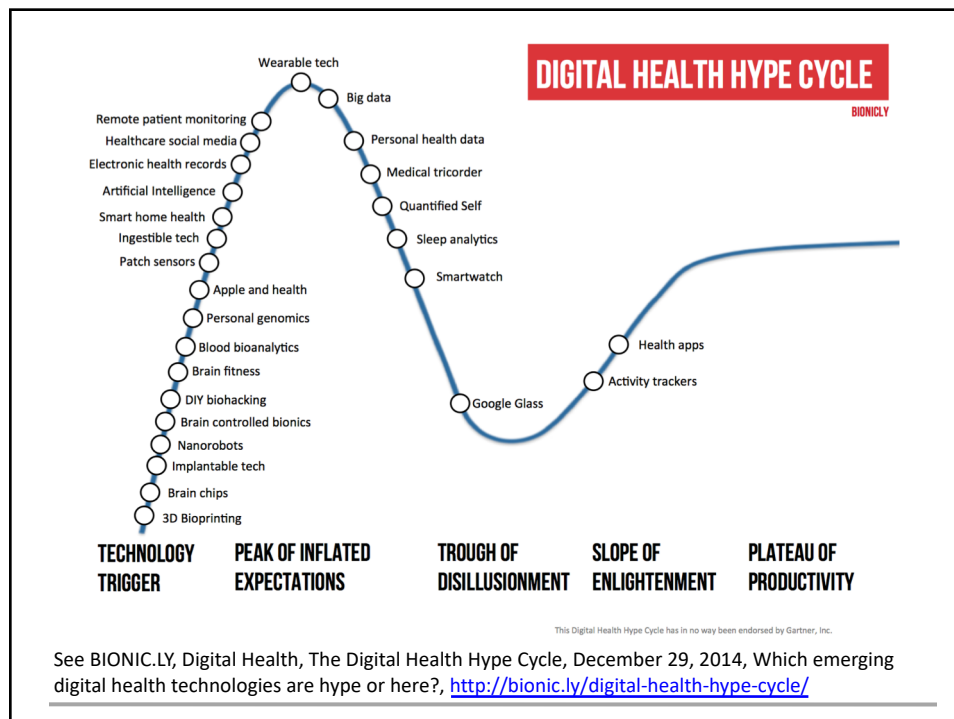
mHealth

- **Foundation for the National Institutes of Health (FNIH):** *"…the delivery of healthcare services via mobile communication devices…"*
- **NIH Consensus Group:** *"…mHealth is the use of mobile and wireless devices to improve health outcomes, healthcare services and health research…"*
- **mHealth Alliance:** *"…mHealth stands for mobile-based or mobile-enhanced solutions that deliver health. The ubiquity of mobile devices in the developed or developing world presents the opportunity to improve health outcomes through the delivery of innovative medical and health services with information and communication technologies to the farthest reaches of the globe…"*
- **World Health Organization (WHO):** *"…Mobile Health (mHealth) is an area of electronic health (eHealth) and it is the provision of health services and information via mobile technologies such as mobile phones and Personal Digital Assistants (PDAs)…"*

"Smart Health"

Source: The Future of Digital Health by Ranjan Karthik, Electronic Design, 2017

See BIONIC.LY, Digital Health, The Digital Health Hype Cycle, December 29, 2014, Which emerging digital health technologies are hype or here?, http://bionic.ly/digital-health-hype-cycle/

Summary: Smart Health

- **eHealth**: use *information and communication technologies (ICT)* to improve access, quality, and cost of healthcare

- **mHealth**: use *mobile/wireless* information and communication technologies to improve access, quality, and cost of healthcare

- **Smart Health**: use devices/solutions that have built-in *intelligence*