Internet of things and patient self care management

Summer Institute in Nursing Informatics 2017 | Sally Okun

patientslikeme
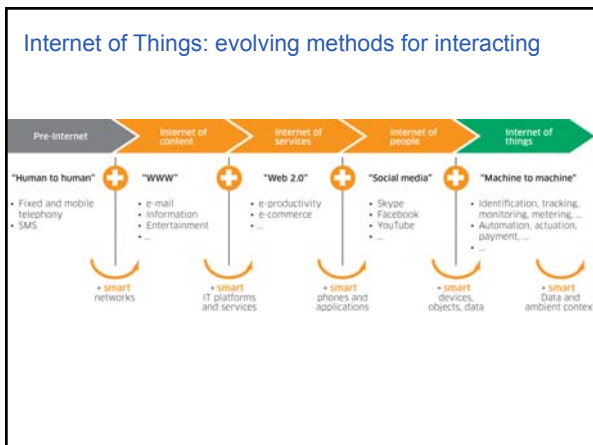
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Learning objectives

- Define the Internet of Things
- List at least two reasons that consumers are interested in technology enabled health care
- Describe the potential of smart home devices to impact the location of health care
- Discuss 1 – 2 opportunities to empower patients living with chronic and serious illnesses with digital tools and emerging technologies

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The Internet of Things

noun

interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.

abbreviation: IoT

Internet of Things: evolving methods for interacting

...moving towards the Internet of Everything...

source: www.aig.com/iot

The Internet of *Medical* Things

noun

the collection of medical devices and applications that connect to healthcare IT systems through online computer networks.
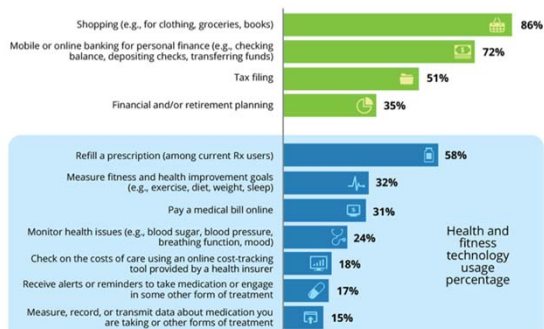
abbreviation: IoMT

Technology-enabled health care: survey findings

Consumers are interested - in using technology-enabled care.
- 7 in 10 consumers are likely to use at least one technology presented.

Telemedicine is most popular - 50% of respondents expressing interest
- Respondents most interested in using for post-op care and chronic disease monitoring.

Pay attention to subgroups – some are keen on technology-enable care
- Especially those with chronic diseases, millennials for telemedicine, and seniors for remote monitoring.

Caregivers are key audience - most consumers report they are likely to use sensor technology when caring for others rather than for themselves.
- Experienced caregivers are more likely to use telemedicine and remote monitoring technology than non-caregivers.

User experience demands – seamless and secure are important.
- Consumers demand high quality, personalized care and want assurance that their personal information will be safe.

Source: Deloitte 2016 Survey of US Health Care Consumers

Tech for health and fitness lagging behind other uses

Shopping (e.g., for clothing, groceries, books) — 86%
Mobile or online banking for personal finance (e.g., checking balance, depositing checks, transferring funds) — 72%
Tax filing — 51%
Financial and/or retirement planning — 35%

Refill a prescription (among current Rx users) — 58%
Measure fitness and health improvement goals (e.g., exercise, diet, weight, sleep) — 32%
Pay a medical bill online — 31%
Monitor health issues (e.g., blood sugar, blood pressure, breathing function, mood) — 24%
Check on the costs of care using an online cost-tracking tool provided by a health insurer — 18%
Receive alerts or reminders to take medication or engage in some other form of treatment — 17%
Measure, record, or transmit data about medication you are taking or other forms of treatment — 15%

Health and fitness technology usage percentage

Source: Deloitte 2016 Survey of US Health Care Consumers

IoT for basic nursing care in hospitals: a scoping review

INTERNATIONAL JOURNAL OF Nursing Studies

Abstract

BACKGROUND: The novel technology of the Internet of Things (IoT) connects objects to the Internet and its most advanced applications refine obtained data for the user. We propose that Internet of Things technology can be used to promote basic nursing care in the hospital environment by improving the quality of care and patient safety.

OBJECTIVES: To introduce the concept of Internet of Things to nursing audience by exploring the state of the art of Internet of Things based technology for basic nursing care in the hospital environment.
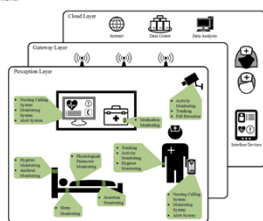

Fig. 3. Internet of Things solutions for nursing in hospital environments

The Internet of Things for basic nursing care—A scoping review. Mieronkoski, Riitta et al.International Journal of Nursing Studies, Volume 69 , 78 - 90

- Several papers highlight possibilities of IoT in healthcare; nursing care is rarely mentioned.
- IoT solutions are proposed for basic nursing care in hospitals but innovations still emerging
- Concept of IoT is at present mainly used in technology fields - not yet adopted to nursing research.
- Nursing could benefit from deeper understanding of concepts developed and used by other disciplines
- The intersection of the IoT between nursing and patient self care not included in this study

The Connected Home...

Opportunities / Expectations:
- Seamless connections
- Increased convenience
- Enable self-care management
- Greater control
- Peace of mind
- Integrated sensors for caregivers

Issues / Challenges
- Cost
- Complexity of use
- Coordination of various devices
- Connectivity to providers
- Lack of standards for interoperability
- Security
- Broadband / wireless capability

The Connected City...Louisville

Study Participants
- 1,147 citizens of Louisville
- 89% with uncontrolled asthma

Combined Data From Many Sources
- 1.2 m sensor data points with 251,000 medication puffs
- 5.4 m environmental data points from around Louisville (weather, air quality, asthma "hot spots")

Participants progress on goals
- 61% Feeling more control of asthma
- 60% Knowing more about triggers
- 56% Having fewer attacks
- 47% Feeling more confident taking medication on time
- 38% Not having to go to ER

Community Impact
- Increased city-wide awareness
- Policy changes about "no smoking/vaping" areas
- Redirected truck traffic to reduce exhaust exposure
- Increased distribution of tree planting to risk areas
- Influencing city planning to focus on health-centric zoning laws

AIR LOUISVILLE

Robert Wood Johnson Foundation   INSTITUTE FOR HEALTHY AIR WATER & SOIL   Propeller

PatientsLikeMe: Case Examples

Slide 1

PatientsLikeMe: early Internet-based disruptor
Create value from knowledge derived from shared real-world experiences and outcomes

- Founded in 2004 as a direct response to family's experience with chronic disease
- Online, open, patient-facing community for patients with life changing conditions
- Started in ALS and expanded to all conditions in 2011
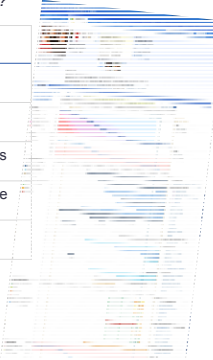- Deep patient data and experience in 40-50 life-changing conditions
- Free to join and free of advertising

Patients	Data	Insights
• 530,000+ patients • 2,700+ conditions	• 40+ million structured data points • 3+ million free-text posts • 15+ PROMs	• 100+ peer-reviewed publications • Patient-generated taxonomy • FDA Research Collaboration • iCarbonX Alliance / DigitalMe

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Slide 2

PatientsLikeMe: a decade of empowering patients with data
Given my status what's the best outcome I can hope to achieve and how do I get there?

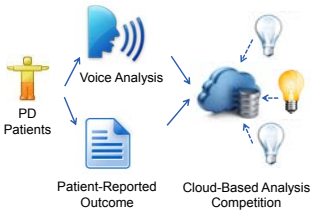| Patient centric engagement model	
Collect	Give voice to a person's story
Measure	Transform story into meaningful data
Aggregate	Illuminate community trends & outliers
Analyze	Generate new insights and knowledge
Translate	Share knowledge to improve lives

patientslikeme

Slide 3

Use of wearable and remote sensor in serious illness care

Boehringer Ingelheim

- We wanted to understand whether idiopathic pulmonary fibrosis (IPF) patients would be willing to use consumer grade devices to measure their health
- PLM deployed a Bluetooth LE pulse oximeter and an activity monitor Fitbit to a pilot group of patients
- Patients expressed a high degree of interest in wearables. A comprehensive engagement program enabled a large volume of data to be collected
- **Impact:** the methodology of deploying wearables now enables rapid testing of emerging technologies in any population within PatientsLikeMe community

patientslikeme

Slide 4

Engaging patients with chronic disease in novel diagnostics

Sage BIONETWORKS

- Collected voice recordings, linked to self-reported outcomes and safely analyzed in a distributed competition to validate the use of health sensors in diagnostic and biomedical research
- 3 methods: PRO collection, mass collection of voice samples, and reproducible collaborative data analysis on Synapse
- Collaborated in collecting audio samples from 500 patients with an aim to developing a cheap and simple tool to detect Parkinson's disease with 99% accuracy
- **Impact:** Proof-of-concept in bringing crowdsourced researchers to analyze data

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Slide 5

Connecting patients with Parkinson's disease specialists

JOHNS HOPKINS

- Characterize feedback to patients when participating in telemedicine visit.
- Visit consisted of hx, neuro exam and recommendations.
- Midway through patients did online satisfaction survey
  - It was great not having to drive 2 hours; pay for gas and parking or needing to miss work.
  - The interaction felt personal despite the 3000 mile distance
  - Concern that MD didn't have complete information.
- **Impact:** High satisfaction among patients with having access to specialists via telemedicine.

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Slide 6

Can digital technology enable patients to live as well as possible with illness?

Health…1946

Health is a complete state of physical, mental and social well-being and not merely the absence of disease or infirmity.

Source: World Health Organization

Health…2011

The ability to adapt and to self-manage in the face of social, physical and emotional challenges in the context of:

- Physical functioning
- Mental well-being
- Social participation
- Daily functioning
- Meaningfulness
- Quality of life
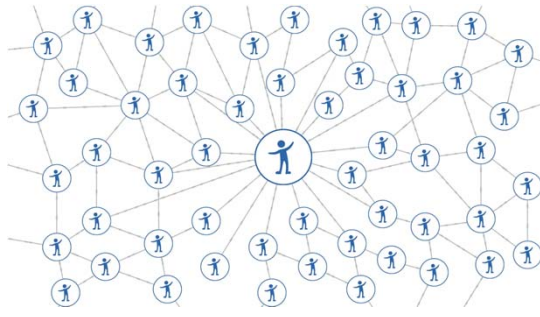
Source: Huber, etal. BMJ

Patient perspective on...

Health
How well my body and mind are doing.

Thrive / Well-being
How well I'm living the life I want.

Source: PatientsLikeMe members 2017

Imagining the future of healthcare...

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Empowering technology enabled personalized health

Connect *all of me - my experiences, environment, goals, DNA,'omics.*

Measure *my health, disease, and aging in states over time.*

Integrate *within a person-centric real time learning system.*

Aggregate *my data with others to increase knowledge driven options.*

Create *a personalized path for thriving that evolves with me on my journey.*

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Imagine... your journey

Perhaps it would be a good idea,
fantastic as it sounds,
to muffle every telephone and halt all activity
for an hour some day,
to give people a chance to ponder
for a few moments on what it is all about,
why they are living, and what they really want.

James Truslow Adams 1878 - 1949

Thank you...

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