Track 2:
Social Media Analytics and Mobile Technology

Thomas Clancy, MBA, PhD, RN, FAAN
Clinical Professor and Associate Dean
Faculty Practice, Partnerships and Professional Development
University of Minnesota School of Nursing

Martin Michalowski, PhD
Assistant Professor,
University of Minnesota School of Nursing
Objectives

• Discuss the impact of social media websites on improving Nursing care using CaringBridge as an exemplar.

• Describe benefits and challenges of sensor technology and the Internet of Things in the care and treatment of Alzheimer's Disease or a related disease (ADRD).

• Discuss the use of mobile technology for improved patient adherence to treatment through education and engagement within the context of cardiovascular disease.

• Review the benefits of online precision engagement in connecting with patients at the right time, in the right place and with the right information based on their personal readiness to engage.
Long Term World Growth in Gross Domestic Product/Per Capita

- Roads, books, Renaissance, Univ.
- First Industrial Revolution
- Second Industrial Revolution
- Computer Age
- Digital Age

Graph showing world GDP per capita (1990 international dollars) with key historical periods marked.
The Perfect Storm: Mobile Technology, Sensors, The Intranet & Artificial Intelligence
Sources of Data in Healthcare

- Electronic Health Record
- Health Insurance Claims
- Sensor Data (2.9 billion)
- Geo-spatial Data (GPS mapping)
- Patient Reported Outcomes (quantified self movement)
- Human Genome (6 billion/pair)
- Financial Systems (credit cards, bank accounts)
- Environmental and Weather Data
- Social Media (1.8 billion subscribers in top 5 websites)
Social Media

Forms of electronic communication (such as websites for social networking and microblogging) through which users create online communities to share information, ideas, personal messages, and other content (such as videos)

Merriam-Webster Dictionary at: https://www.merriam-webster.com/dictionary/social%20media
AI Algorithms -> Augmented Intelligence Embedded in Devices

The Intranet of Things

“The integration of people, processes and technology with connectable devices and sensors to enable remote monitoring, status, manipulation and evaluation of trends of such devices.”


https://www.youtube.com/watch?v=sGQeWRpmgIU
The Intranet of Things

- Smart Phones
- Smart clothing
- Nanotechnology
- Wearable Devices
  - Exercise
  - Sleep
  - Stress
- Telehealth
  - Virtual visit
- Desktop Computers
  - EHR
- Mobile Tablets
- In-home Sensors
  - Motion
  - Alarms
  - Medication
- Lab/Radiology
  - Surgical
  - Care-assist
  - Gero-tech
- Robotics
- Medical Devices
  - ECG
  - Vital signs
  - Ultrasound
- Drones
- Implantable Devices
  - Diabetes
  - Cardiac

Cloud
The Information Value Loop

- Create
  - Sensors (generate data)
- Communicate
  - Network (transmit data)
- Aggregate
  - Standards (gather data)
- Analyze
  - Augmented intelligence (patterns and signals)
- Act
  - Augment (change) behavior

Track 2:
Social Media Analytics and Mobile Technology

- 9:30 am  
  • Introduction – Tom Clancy and Martin Michalowski

- 10:00 am  
  • Nursing Insights From CaringBridge Notes – Karen Monsen

- 11:00 am  
  • The eNeighbor: A Proactive Health Monitoring Intervention for Dementia Caregivers – Rachel Zmora

- 12:00 pm  
  • Lunch

- 1:00 pm  
  • Improved Patient Adherence Through Mobile Technology – Martin Michalowski

- 2:00 pm  
  • Improving Care Through Precision Engagement and the Interactive Care Model – Karen Drenkard

- 3:00 pm  
  • Reflection (All)
Sentiment Analysis/Opinion Mining

• The process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc., is positive, negative, or neutral.

Sentiment Analysis

<table>
<thead>
<tr>
<th>District</th>
<th>Threads, n</th>
<th>Messages, n</th>
<th>Messages per thread, n</th>
<th>Messages containing quality factors, n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seoul</td>
<td>10,832</td>
<td>54,392</td>
<td>5.02</td>
<td>12,421</td>
</tr>
<tr>
<td>Daegu</td>
<td>8072</td>
<td>47,419</td>
<td>5.87</td>
<td>4240</td>
</tr>
<tr>
<td>Busan</td>
<td>5965</td>
<td>28,910</td>
<td>4.85</td>
<td>9509</td>
</tr>
<tr>
<td>Daejeon</td>
<td>3952</td>
<td>22,475</td>
<td>5.69</td>
<td>2358</td>
</tr>
<tr>
<td>Incheon</td>
<td>775</td>
<td>5184</td>
<td>6.69</td>
<td>1525</td>
</tr>
<tr>
<td>Gwangju</td>
<td>2826</td>
<td>15,368</td>
<td>5.44</td>
<td>2012</td>
</tr>
<tr>
<td>Total</td>
<td>32,422</td>
<td>173,748</td>
<td></td>
<td>32,065 (18.45%)</td>
</tr>
<tr>
<td>Average</td>
<td>5403.66</td>
<td>28,958</td>
<td>5.59</td>
<td></td>
</tr>
</tbody>
</table>

Data statistics (from Naver and Daum Web portals).

Yuchul Jung, PhD., Cinyoung Hur, MS Com Sc., Dain Jung, BSC and Minki Kim, PhD. Identifying Key Hospital Service Quality Factors in Online Health Communities. *J Med Internet Res.* 2015 Apr; 17(4): e90. Published online 2015 Apr 7. doi: 10.2196/jmir.3646
Use of the Omaha System for ontology-based text mining to discover meaning within CaringBridge social media journals
Karen A. Monsen, Sasank Maganti, Robert A. Giaquinto, Michelle A. Mathiason, Ragnhildur I. Bjarnadottir, Mary Jo Kreitzer

**Goals**
Examine the feasibility of using ontology-based text mining with CaringBridge social media journal entries to understand journal content from a whole-person perspective.

**Specific aims**
- Describe Omaha System problem concept frequencies in the journal entries over a four-step process overall, and relative to Omaha System Domains,
- Examine the four step method including the use of standardized terms and related words.
Alzheimer’s Disease or a Related dementia (ADRD)

- 5.7 million persons with Alzheimer’s disease or a related dementia (ADRD) in the U.S. (Alzheimer’s Association, 2018)
- Over 16 million family caregivers for these individuals in 2017 (Alzheimer’s Association, 2018)
- The majority of care hours (78%) provided to persons with ADRD is from family/unpaid sources (Friedman et al., 2015; Stone, 2015)
  - ADRD family care was valued at $232 billion (Alzheimer’s Association, 2018)
Specific Aims

• Do family caregivers of persons with dementia perceive a remote activity monitoring (RAM) system as feasible and useful over 6 months and up to 1.5 years?

• Whether and RAM technology improves key family caregiver outcomes over a 6-month period
  • Caregiver self-efficacy and competence
  • Caregiver distress
Passive Health Monitoring

1. Sensors detect a change in behavior
   By passively monitoring patterns in activities of daily living, the GreatCall system is able to identify residents who may be undergoing a significant behavioral change, generating an alert.

2. Algorithms generate an actionable alert
   The GreatCall dashboard generates a HealthNote™ alert that outlines the change in behavior, providing graphical and text representations of the observed change.

3. Caregiver provides an intervention
   A caregiver then interacts with the resident to determine if an intervention is required, whether it’s a change in medication, additional services, or simply wellness education.
Prevention: Cardiovascular Disease

Mobile Technology & Sensors

• Beat to beat variability
• Fluid status
• Sleep quality
• Apneic spells
• Vital signs
• Lab tests (via smart phone app)
• Med. adherence (via digitized pills)


Heart Disease Monitoring

1. Create
Sensors send ECG signals via home monitor.

2. Communicate
Signals sent via Bluetooth and the Intranet.

3. Aggregate
ECG tracked over time for and individual.

4. Analyze
ECG signals are trended and care plan created. (Augmented Intelligence)

5. Act
Patient adjusts medications and other factors (Augmented Behavior)

https://www.geek.com/chips/temporary-tech-tattoos-could-monitor-your-health-pay-for-your-coffee-1640423/
Intranet of Things: The Information Value Loop

• Augmented Behavior is the end of the information loop and results in an action:
  • Recommendation to a provider from a BPG
  • Text message to a diabetic patient to increase their insulin.

• Data Science
  Behavioral Science

Precision Engagement

Connecting with patients:
• At the right time,
• In the right place,
• With the right information based on their personal readiness to engage.

Key Imperatives for PE

1. Supported by evidenced based science
2. Engaged across the care continuum
3. Personalized patient education
4. Capturing the patient’s voice
5. Interoperability

Social Media Analytics and Mobile Technology

Questions?

https://thenpmom.wordpress.com/2012/01/01/the-future-of-nursing-a-nurse-practitioners-perspective