The Evidence Base for Home Health Technologies

George Demiris PhD, FACMI
University of Washington

The Future of Home Health Care: A Workshop
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Technology in the Home

• Pervasive, ubiquitous computing is affecting home health care

• Bridge geographic distance, increase access to information and experts
  – In 2003 a total of 556 Medline indexed articles on home care AND technology were published; in 2013 that number rose to 1390.

• Active vs. Passive Technologies in the Home
<table>
<thead>
<tr>
<th><strong>Examples</strong></th>
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<tbody>
<tr>
<td><strong>Active Monitoring</strong></td>
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<td><strong>Physiological Monitoring</strong></td>
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<td><strong>Functional monitoring/ Emergency detection and response</strong></td>
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### Examples (cont.)

<table>
<thead>
<tr>
<th>Safety monitoring and assistance</th>
<th>Alarm systems that detect fire or flooding, systems that support hands free communication with safety professionals</th>
<th>Stove sensors (combining heat and motion sensors) to detect and distinguish between meal preparation and having forgotten the stove on for too long</th>
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<tbody>
<tr>
<td>Security monitoring and assistance</td>
<td>Camera-based monitoring systems that allow for remote monitoring of residential space and visitors</td>
<td>Sensor based system that captures level of activity, number of visitors or if abnormal/unusual patterns of activity are recorded</td>
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## Examples (cont.)

<table>
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<tr>
<th>Social interaction monitoring and assistance</th>
<th>Use of social network software platforms, social media, using software that assesses self-perceived social connectedness</th>
<th>Sensor based systems that track number of visitors, time inside and outside the home, sedentary behavior</th>
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<tbody>
<tr>
<td>Cognitive and sensory assistance</td>
<td>Technologies that generate alerts and reminders, locators for lost objects, medication dispensing units</td>
<td>Automated features that operate in the background and trigger warnings, alerts and reminders.</td>
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![Image of a device for social interaction monitoring and assistance](image)
Evidence Base

• Growing

• At times contradicting

• Technology developments more rapid than research grant cycles

• Tailoring sometimes prohibitive in research
Lessons Learned

• Technology does not need to be sophisticated to be effective
PISCES

- Problem Solving Intervention to Support Caregivers in End of Life Care Settings
- Use of video to deliver PST
- 3 arm clinical trial (N=500)

Funded by NIH (R01NR012213)
Clinical Trial Record NCT01444027

http://www.telehospice-project.org
The ACTIVE Intervention

- Assessing Caregivers in a Team Intervention through Video Encounters
- Family caregivers become team members

Funded by the NIH (R01NR011472)
Lessons Learned

• Technology does not need to be sophisticated to be effective

• Tools to capture what we have always captured, more efficiently, and tools to capture new knowledge
Smart Home Study

- Stove sensor
- Sensor mat
- Motion sensors
- HydroSense
- ElectroSense

Funded by:
- NSF-CDI-1028195: Transforming Community-Based Elder Care through Heterogeneous Activity Sensing Analytics
- NSF-CNS-1405682: HomeSHARE - Home-based Smart Health Applications across Research Environments
“New” data

• Sleep quality
• Bathroom visits
• Restlessness at night
• Sedentary behavior
• Hygiene patterns
• Meal preparation
• Detecting patterns and deviations from what would be the norm for that participant
Lessons Learned

• Technology does not need to be sophisticated
• Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
• Interface Design
Tailoring hardware and software

Addressing:

• Functional limitations
• Hearing impairment
• Cognitive decline
• Prior experience with computers
• Visual impairment

http://www.health-e.info
My Wellness in October 2011

My Wellness Score Is

81.5/100

ME

My Community

My Age Group

Low

Good

Excellent

My progress over the last 12 months

Calendar

TODAY
Jane’s Birthday
4:30 pm Hair Cut

TOMORROW
6 pm Jane’s Birthday Party

Next Week

MONDAY
10:30 am Doctor’s Appointm...
12 pm Lunch with Paul, Harry...

TUESDAY
7 pm Movies night

THURSDAY
8 pm Happy Hour

FRIDAY
11 am Lunch with Amy, Sam
3 pm Shopping

Messages

Re: Happy Birthday Janet
27 mins ago
Thanks, Laura :) I am having a wonderful day. Are you coming...
Lessons Learned

• Technology does not need to be sophisticated to be effective
• Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
• Interface Design
• Understanding Acceptance
Obtrusiveness

• A summary evaluation by the user based on characteristics or effects associated with the technology that are perceived as undesirable and physically and/or psychologically prominent

Obtrusiveness Framework

Obtrusiveness Dimensions

• Physical
  – Physical aspects of a technology and their effects on users or the home environment

• Usability
  – Accessibility for users and the additional demands on time and effort associated with using a technology

• Privacy
  – Informational and physical privacy of the individual

• Function
  – How the equipment works, including its perceived reliability and effectiveness

Obtrusiveness Dimensions

• Human Interaction
  – Negative effects on human interactions, responses, or relationships

• Self-concept
  – Self perception as physical, social, and spiritual or moral being and how you think you are perceived by others

• Routine
  – Effects on users’ daily routines or rituals and/or the acquisition of new ones.

• Sustainability
  – Concerns about keeping or maintaining the technology in the future related to affordability or their own functional ability
Thank you

• gdemiris@uw.edu