Seniors Care, Dementia and Innovation

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CLPNA Think Tank on Dementia
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Aging in the Right Place: Alberta Continuing Care Strategy (Dec. 2008)

• Enhance Home Care
• Assist transition from continuing care to home or community
• Introduce technology for medical and safety monitoring

Innovation

• Assessments for transition planning

• Support aging in the right place (client & family)
  • Medication adherence
  • Wandering detection, safety monitoring
  • Fall detection, activities monitoring

• Support community health service providers
Gerontechnology

“Designing technology and environment for independent living and social participation of older persons in good health, comfort and safety”

(International Society for Gerontechnology – Home)

To support clients, their families and their care teams through the analysis of meaningful data collected at home or care settings.
Glenrose Rehabilitation Hospital
Independent Living Suite (ILS)

• focal point in transitioning patients to home
• opportunities to practice ADL in a realistic home environment (with immediate access to the health care team)
• introduce patients and clinicians to home-based rehabilitation technology
• facilitate patient/technology assessments
• providing opportunities for industry/research partners
Assessments for discharge or transition planning

- Validity of assessment is compromised when staff enter simulated home, e.g., Glenrose Independent Living Suite (ILS)
- Even if client does well, ILS does not resemble home
- Critical incidents may not occur during assessment
Smart Condo™

• A fully equipped, one bedroom home, designed using universal design principles
• Home health technologies (sensors, medical devices & prototypes, e-health software)
• A space for interprofessional education and research

http://www.360cities.net/image/smartcondo#183.10,6.70,66.3
Activities of Daily Living monitoring and support

• Monitoring
  – Sensing for motion and activity recognition
  – Wandering behaviour
  – Falls
  – Alerts
  – Mitigate risks, support autonomy

• Support in medication adherence

• Personal health records (PHR vs. EHR)
Smart Condo™ technology

- Tracks clients in precise, nonintrusive way
  - Wireless sensor networks

- Visualizes patient activities
  - Virtual world client
Analyses

Position: location, duration, movement

Physical activity: duration, frequency and intensity of mobility, locomotion, rest periods

Activities of Daily Living: timing, duration and frequency of bathing, using the bathroom, meal preparation, eating, other self-care and leisure activities, alerts

Comparison of activity levels over time

Comparison of activity levels with other clients or expected performance
The Smart Condo™ Architecture
**Partnerships**

3rd-party usability evaluation
Co-development with industry
Large scale evaluation with care providers

**Education**

Students across disciplines
(1) understand complex requirements of care environ.
(2) Collaborate to address problems of people with chronic conditions

**Research**

Unobtrusive monitoring and activity recognition
Physical and cognitive assessment
Engagement, Motivation and Support HQPs
Universal design

The Smart-Condo™ Agenda
Mobile devices for home and community assessment: Unilateral Spatial Neglect

Tiffany Cheung, Megan Labas, Angeline Lok, Victor Guana, Hossein Azari, Peyman Azad Khaneghah

Lili Liu (OT)
Eleni Stroulia (CS)
Assessments and Interventions

• Issues of paper-and-pencil tests
  – limited metrics
  – therapist multi-tasks

• Potential benefits of digital assessment
  – Performance automatically and precisely scored
  – Provide additional metrics
  – Equivalent versions for intervention use
  – A family of age- and culture-appropriate tests that are equivalent and standardized
Objectives

• Unilateral Spatial Neglect (USN) is a neurological condition common in stroke victims, where the client is unable to process stimuli on the contralesional side of their body or visual field.

• To standardize USN assessment (and similar conditions) in order to provide better (more detailed and systematic) feedback
Traditional Assessment

• Cancellation Tests
  – Multiple targets randomly dispersed throughout a page of distracters with an equal number of targets on the left and right side of the page
  – USN is assessed based on a percentage of targets cancelled on the right vs. targets cancelled on the left.

• Line Bisection
  – Several parallel lines laid out on a page
  – Client identifies the centre of the line
  – USN clients tend to identify a point far to the right of centre as they do not perceive the left portion of the line
Tablet-Based Assessment

• Create a family of age- and culture-appropriate tests that are “equivalent” and standardized

• The tablet version is equivalent to traditional pencil-paper test, EXCEPT
  – Symbols are user-specific (client-centred)
  – Client performance is recorded and automatically and precisely scored
  – Feedback to therapist and user is more complete and detailed
  – “Therapy” versions could be developed for home use

• The standardization enables
  – Longitudinal assessment of a single client
  – Systematically controlled test difficulty to enhance progress
The App
Collected Metrics

1. Neglect Score (NS): Number of targets cancelled expected-cancelled/expected not-cancelled
2. Number of Cancelled Targets (NTT): Number of expected targets cancelled.
3. Number of Touched Distracters (NTD): Number of not-expected-cancelled targets.
4. Number of Preservations (NP): Number of double cancelled expected and non-expected targets.
5. Latency: the average time between cancellation timestamps.
6. Distance: the average Euclidean distance between (T/F) cancellation position
Literature Review (Katie Woo)

• Very little research exists on MATs and older adults
• Even less research in Canada
• Clinical relevance (% adherence)

MEMS
(med event monitoring system, silent monitoring, no feedback)

MATS
(active monitoring, feedback)
2011 Survey by Woo (n=210)

- Physicians (17%), nurses (36%), OTs+PTs+SWs (20.5%), pharmacists (25%)
- 63% in community care services
- Urban/Rural: 82/18

Frequency of encountered non-adherence

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A few times (25%)</td>
<td>52</td>
<td>25%</td>
</tr>
<tr>
<td>About half the time (50%)</td>
<td>121</td>
<td>58%</td>
</tr>
<tr>
<td>Much of the time (75%)</td>
<td>37</td>
<td>17%</td>
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Technology Acceptance Model: Participant #1 and MATs

Technology Acceptance Model: Participant #2 and MATs

Unified Theory of Acceptance and Use of Technology

Lili Liu
Antonio Miguel Cruz
Adriana Rios Rincon
Rehab Professionals’ use of new technologies
HCA-T: Technology in support of Home-Care Aides

Lili Liu (OT)
Eleni Stroulia, Ioanis Nikolaidis (CS)
Sharla King (Ed Psych, HSERC)
Objectives and Method

• Support and facilitate service provision by HCA & teams through the use of ICT, to address
  – quality of care
  – Efficiency of service delivery
• Understand workflow of HCAs & homecare teams
• Identify problems that can potentially be addressed by technology
• Develop and deploy solutions
• Educate HCA teams on how to use them
• Evaluate the impact of the change
HEALTH CARE AIDES & MOBILE TECHNOLOGIES

Training
We provided
• training for HCAs over 2-3 hours, followed by
• two simulated home visits with "clients".
HCAs completed pre/post-training/simulation questionnaires, and a focus group at the end of each session.

Total number of HCA participants:
53 (range/site: 1-5, mean/site: 3)
Focus group participants: range/zone: 8-15, mean/zone: 6
Percentage Rural/Urban: 75/25%
Post-training and simulation
The majority of HCAs responded they would use ICT for:

- Internet (91%)
- Voice recognition (88%)
- Skype (88%)
- Camera (97%)
- Messaging (94%)
- E-mail (91%)
- GPS (91%)
Problems and Solutions

1. Information from HCAs is too slow to make it to the patient’s record
2. Scheduling is inefficient, inflexible
3. Communication is infrequent ➔ contextual cues are lost
4. HCA tasks are too rigidly scoped
5. Support HCAs in their task

1. Develop the HCAMobile App to record care-plan activities
2. Develop an extendible scheduler, for multiple criteria
3. Use off-the-shelf tools (skype) to support communication
4. Use video to bring the case manager in the visit
5. Give access to knowledge at the point of care; Support emergency response; Guide navigation
The Software Architecture

Services Layer (on the cloud)

- HCAMobile
- CCD
- Google Navigation
- TiKL

Apps Layer

- SafeTracks
- Skype

Knowledge Resources

Encrypted communication

- App Server
- Patients
- Schedules
- HCAs

Patients

HCAMobile

Encrypted communication

App Server

Schedules

HCAs
The Case Manager
What the HCAs Thought...

• “... an **online schedule** would be a lot easier and go through a heck of a lot less paperwork”.

• “Access to **taking photos**, we see a lot of clients with wounds, and ... safety issues or concerns in a bathroom that they find would be harmful to them or a safety issue for them or the client we could at least have that communication going back and forth through pictures...”

• “If they could **document it right away** or take a picture of it, then I could assess as a nurse...what does this wound need?”
Locator Device Project

Lili Liu (UofA)
Tracy Ruptash (AHS)
Shannon Barnard (AHS)
Dementia

• Over 45,000 Albertans live with a form of dementia (1.1% population)

• By 2038, number of Albertans with dementia will exceed 100,000 (2.2% population)
  (Rising Tide: The Impact of Dementia in Alberta 2008-2038; Oct. 2009)

• 3 out of 5 living in the community experience wandering
  (Alzheimer Society of Canada)
Tom Bateman/Daily Herald-Tribune  Tracy Ruptash, the project lead for the Locator Device Project, holds a GPS enabled phone watch in front of a virtual map that can track the wearers movements.
Locator Device Project

- GPS enabled
- Calgary (n=20)
- Grande Prairie (n=20)
Cost-benefit analysis

• Economic analysis
  – Investment, outcomes, efficiency of system, benefit to client (health and quality of life), beyond the project

• Financial analysis
  – Costs of project only
LPNs and technology adoption

User acceptance (intention to use) is based on:

– What you expect the technology to do for you and your clients
– How much effort does it require of you
– Are you influenced by your social circle
– Does your employer support your use of tech?
– What is your comfort level (gender, age, experience)
– Is the use voluntary or mandatory
Funders and Partners

Glenrose Rehabilitation Hospital (AHS)

Health Sciences Education and Research Commons (University of Alberta)