A 30,000 foot look at technologies to support seniors in the community

A look at the evidence around use and effectiveness

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The Market Potential

• In 2003, the US market was estimated at $54.5 million

• In 2010, total revenues were forecast to reach $260 million

• It is estimated that there will be an annual growth rate of 25%
Key Application Areas for Technology

- Mobility
- Safety & Security
- Cognitive Stimulation
- Health Monitoring & Treatment
- ADL Assistance
- Leisure
Technology to Support Mobility

• The most common mobility AT:
  • Walkers
  • Manual wheelchairs
  • Powered wheelchairs
  • Lifts and transfer devices
  • Environmental (grab bars, handrails, toilets, bathtubs, and showers).
Safety & Security

- Fall detection and patterns of living technologies (Lifeline, GrandCare, CareLink Advantage)

- Wandering Management Systems (HomeFree Systems)

- Medication reminding devices (Philips MD2, CompuMed)
Safety & Security

PHILIPS
Lifeline

Grand Care Systems

Revolutionizing Rehabilitation — Maximizing Life!
Cognitive Stimulation

• Cognitive fitness and assessment technologies include thinking games and cognitive challenge regimens.

• Many cognitive fitness technologies are computer- or internet-based, multi-media platforms, and include assessment and tracking components:
  • Brain Age (Nintendo Japan)
  • Brain Fitness (Posit Science, CA)
  • Happy Neuron (Quixit, France)
  • Mindfit (Cognitive Fit, Israel)
  • Lumenosity (Stanford University)
Health Monitoring & Treatment

• Wide range of devices and products, including simple motion monitoring (enviro), learning patterns of living (enviro), and physiological monitoring (wearable)

• More traditional tele-health / tele-medicine devices

• Key products:
  ▪ Tunstall Health
  ▪ Honeywell HomMed
  ▪ Vitel Care
Health Monitoring & Treatment

Care Team
- Medication management
- Measurement schedules
- Targeted interventions

Central Server
- Access to reports, alerts and patient health status indicators via Internet browser, Web service, email, messaging SMS, etc.
- Clinical measurement signals
- Questionnaire and other patient data

Internet

Remote Patient

Telehealth Monitoring System
- Questionnaires and patient clinical data

Weight
Blood Pressure
Spirometry
Pulse Oximetry
Glucose and/or INR
Electrocardiogram (ECG)
Temperature
Ambulatory Monitor (Transthoracic Accelerometry)
Assistance with ADL – The COACH

- The COACH (Mihailidis et al.)
- An intelligent cognitive assistive technology that tracks a user through an ADL, providing cues when necessary.
- Adapts to individual needs and preferences with respect to prompting strategies
Leisure

- ePAD (Hoey et al.)

- This system promotes participation in leisure activities through art

- Uses a multi-touch display and AI to actively engage a user in an art task.
### Evidence to Support Use

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of scientific evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia</td>
<td>Scientific evidence obtained from meta-analyses of randomized clinical trials.</td>
</tr>
<tr>
<td>Ib</td>
<td>Scientific evidence obtained from at least one randomized clinical trial</td>
</tr>
<tr>
<td>Ila</td>
<td>Scientific evidence obtained from at least one well-designed, non-randomized controlled prospective study</td>
</tr>
<tr>
<td>Ilb</td>
<td>Scientific evidence obtained from at least one well-designed, quasi-experimental study</td>
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<tr>
<td>III</td>
<td>Scientific evidence obtained from well-designed observational studies, such as comparative studies, correlation study or case-control studies.</td>
</tr>
<tr>
<td>IV</td>
<td>Scientific evidence obtained from documents or opinions of experts committees and/or clinical experiences of renowned opinion leaders.</td>
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</tbody>
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**Sackett’s Levels of Evidence**
Evidence

- The majority of long-term trials and deployments have been completed with technologies for chronic health monitoring (telehealth).
- These trials have typically been conducted in the UK, Australia, and US.
- The results have resulted in several new products in this specific application area.
- Very few studies have included older adults with dementia (and tend to be small samples).
Telehealth - Congestive Heart Failure

• In March 2007, study conducted with Tunstall system in Bristol (UK) with 18 CHF patients over 24 months

• Overall:
  - Hospital admissions were reduced by 46%
  - ER attendances were reduced by 67%
  - Number of GP visits were reduced by 16%
  - Medication adherence was increased

• Australia (NSW) estimates savings of > $56M per year through the use of telehealth for CHF

(Tunstall, 2010)
Medication Management

- Study completed in 2000 in US with MD2 system (n = 12)

<table>
<thead>
<tr>
<th></th>
<th>MD.2</th>
<th>Medi-Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalizations per patient</td>
<td>0.09</td>
<td>0.42</td>
</tr>
<tr>
<td>Emergency department visits per patient</td>
<td>0.18</td>
<td>0.42</td>
</tr>
<tr>
<td>Prescriptions per patient</td>
<td>7.62</td>
<td>8.65</td>
</tr>
</tbody>
</table>

*After 6 months of program data*

<table>
<thead>
<tr>
<th></th>
<th>MD.2</th>
<th>Medi-Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missed doses per patient per 2-month evaluation period</td>
<td>0.62</td>
<td>3.39</td>
</tr>
<tr>
<td>Total missed doses per patient during 6-month period</td>
<td>2.9</td>
<td>7.31</td>
</tr>
</tbody>
</table>

(Buckwalter et al., 2004)
PERS – Evidence is Mixed

• Subscribers (n=106) had a statistically significant decrease in per person hospital admissions and inpatient days (Rouse, 1995)

• Clinical studies indicate that usage reduces mortality rates by nearly 4x, reduce hospital utilization by 59%, and yield a positive benefit-to-cost ratio of over seven to one (Bernstein, 2000)

• There was no evidence that a PERS reduced anxiety, fear of falling, or return to the ED among older persons (n=86) discharged from the ED (Lee et al, 2007)
Why Are These Systems Not Being Used?

- Systems are difficult to implement and use
- Often these systems require extra input and vigilance from caregivers
- Cannot deal with multi-morbidities (e.g. dementia)
- Tech transfer in this field is difficult
- Technologies are not being developed to address the specific issues of the user
Where To Go From Here

• More evidence is needed
• Current research advances need to be supported and translated into products
• Ability to perform real-world testing of technologies needs to be improved
• More education and awareness is needed
• A better understanding of users is needed
• A multidisciplinary approach is a MUST!
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