Technologies to support persons with cognitive impairment

Inga-Lill Boman, OT (reg), PhD, Rehabilitation Medicin, Danderyd hospital
Hospital training apartment

- Patients with cognitive impairment after ABI (18-67 years)
- Stay 4 days
- Assessment of capacity for independent living
- Training in everyday activities
Safety watch

- Activity
- Sleep
- Alarm
Event-cued reminders

- Stove
- Refrigerator
- Freezer
- Coffee machine
- Water

- Windows
- Terrace door
- Front door

- Medication
- TV
- Lightning

Sensors
Time-cued reminders

Google calendar
Results sensors

Patients

Sensor technology support to:
– keep track of everyday technology
– remember to carry out activities

OTs

Sensor data:
– important information regarding patients’ capacity to carry out everyday activities
– need of strategies, assistive technology, assistance at home, rehabilitation plan

Giraff - a mobile telepresence robot

- Communication
- Safety monitoring

www.giraff.org
Equipment

- Computer
- "Giraffprogram"
- A pc-mouse to operate the robot
- Headset
- Web-camera

www.ds.se/traningslagenhet
Results robot Giraff study

- **Patients:**
  - Support daily living skills

- **Nurses:**
  - Useful tool for safety monitoring of patients
  - Handle alarms
  - Difficult to navigate

- **OTs:**
  - Assessments via robot more neutral than being physically present

Sensor technology in patient’s home

• Lacked knowledge of:
  
  - Installing sensor technology in patients’ home environments
  
  - Users experiences of sensor technology in their own homes
## Selected activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Patient 1</th>
<th>Patient 2</th>
<th>Patient 3</th>
<th>Patient 4</th>
<th>Patient 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exercise</td>
<td>Take medication</td>
<td>Take medication</td>
<td>Wake up</td>
<td>Take medication</td>
</tr>
<tr>
<td>2</td>
<td>Unload the washing machine</td>
<td>Have lunch</td>
<td>Close the front door</td>
<td>Go for a walk</td>
<td>Have lunch</td>
</tr>
<tr>
<td>3</td>
<td>Have a rest</td>
<td>Bring the cell phone</td>
<td>Have a rest</td>
<td>Have a rest</td>
<td>Have a rest</td>
</tr>
</tbody>
</table>
Results - Single-subject study

Results sensor technology at home

Internet-based rehabilitation

Inga-Lill Boman, OT (reg), PhD, Rehabilitation Medicin, Danderyd hospital
eRehab

- Interactive internet-based rehabilitation program for patients:
  - mild acquired cognitive impairment
  - chronic pain
Goal eRehab

• Develop self-management skills to handle problems in everyday life

- Information
- Tools and strategies
- Tasks and questionnaires
- Feedback therapist

ingga-lill.c.boman@sll.se
Methods

- Evidens-based methods
- Cognitive Behavioral Therapy
- Neuropsychological Theory
Rehabilitation program

• 10 modules
• Questionnaires
• Tasks, recognize problems, practice strategies
• Access to a new module every week
• 2-5 h weekly
• 10 weeks
• Access to the program 6 months after the intervention
Login

- www.1177.se
- Vårdguidens e-tjänster
- Electronic identification
Moduls

1. Brain and mild cognitive impairment
2. Attention
3. Memory 1
4. Memory 2
5. Executive function
6. Mental fatigue
7. Stress and sleep
8. Emotions
9. Communication
10. Summary
Body awareness exercises

- Movie clips
- Learn to take a short break, get more focused
- Learn to take a break as a routine
Example homework memory

Hemuppgifter
Du har nu fått läsa om minnesprocessen och att den består av olika sorts minnen. I denna hemuppgift ska du beskriva några situationer där dina minnessvårigheter yttrar sig i din vardag. Fundera över hur du tänker och känner kring dessa svårigheter.

*Fyll i de tomma textfälten nedan.*

<table>
<thead>
<tr>
<th>Situation</th>
<th>Tankar</th>
<th>Känslor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exempel 1: Det händer flera gånger i veckan att jag glömmer bort när jag ska träffa mina vänner.</td>
<td>Jag känner mig dum, klantig, slarvig</td>
<td>Arg Irriterad Ledsen</td>
</tr>
<tr>
<td>Exempel 2: Jag missar mötestider på mitt arbete.</td>
<td>Jag har ingen kontroll över min situation</td>
<td>Osäker Otilräcklig</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>
Procedure

- Before intervention:
  - meeting with therapist
  - training how to use the program

- During the intervention
  - feedback via webplatform
  - tasks, questions

- After 10 weeks intervention:
  - meeting with therapist
  - results and evaluate the program
Pilot study

• 10 patients mild cognitive impairment

• Recruited from Danderyd hospital, Huddinge hospital
Inclusion- and exclusion criteria

- **Inclusion criteria:**
  - > 3 months after injury/illness
  - ≤ 25MoCa
  - motivated
  - good ability to communicate
  - computer, internet
  - ability to perform the internet program independent

- **Exclusion criteria:**
  - severe aphasia
  - neglect
  - severe attention
  - high score on anxiety or depression scales
  - dementia
  - abuse
Preliminary results pre-pilot

- Increased awareness
- Training to set realistic goals
- Training to use strategies in everyday activities
Co-workers

Aniko Bartfai, professor, neuropsykolog, Inga-Lill Boman, leg arbetsterapeut med dr Azra Ramovic, leg psykolog, Pia Linde Runeskog, leg arbetsterapeut, Pär Lindholm, leg sjukgymnast, Caroline Dalfors, PTP, Margaretha Risén, utbildningsledare, Stefan Arousell, webbredaktör, Margareta Fundin pedagog

Thanks to

- Innovationsfonden
- Stiftelsen Back2Life
- Stiftelsen Promobilia
- VINNOVA
- Rehab Danderyds Sjukhus AB
Mobilephone and apps

Inga-Lill Boman, OT (reg), PhD, Rehabilitation Medicin, Danderyd hospital
Mobile phones/smartphones

- Mobile phones should be provided as external memory strategy (Haskins et al., ACRM, 2012)

- Smartphones effective to compensate for memory impairment and executive dysfunctions (Ferguson et al., 2015; Jamieson, et al., 2017; Svoboda et al., 2014; Wong et al., 2016)
Benefits

• Owned by the majority of people
• Familiar
• Portable
• Multiple functions in one device
• Individual customisation
• Socially acceptable
Barriers

- Complex (design, many steps, invisible steps)
- Too much information
- Format
- Contrast

- Forget how functions/apps should be used
- Forget the mobile phone
- Forget to charge battery
- Upgrades might require new learning
Rapid development

• Difficult for therapists to be updated latest mobile phones, new functions, apps (Ravenek, 2016)

• Many brands and models: Iphone, Samsung, Sony, Huawei, LG, HTC, Nokia…, IOS, Android, Symbian…
Many apps....

- Nearly 3 million apps 2017
Useful apps for patients with cognitive impairment?
www.appskok.se

- Validation apps
- 200 aspects are checked

- Availability
  - Cognition
  - Visuell
  - Auditiv
  - Motor
  - Taktil
Appsök

Kategorival

Kognitivt stöd

Tid och planering

Vardagsnysslor

Minnesstöd

Hitta & bli hittad

Kompenserande läs- och skrivstöd

Kommunikativt stöd

Pedagogik och träning

Hälso, fritid och noje

Service och tjänster

Verktyg och funktion
Categorize apps

(Ravenek & Alvarez, 2016)
General considerations apps

1. Who is the author of the app?
2. When was the app last updated?
3. Has the app been sponsored or externally funded?
4. Does the app contain advertisements?
5. Are free and paid features of an app clearly described?
6. How have current users rated the app?
7. Does the app have an attractive and intuitive user interface?
8. Does the app require permissions of your mobile phone?

(Jin, & Kim, 2015; Ravenek & Alvarez, 2016)
Working group mobile phones and apps

- OT guidelines mobile phones/smarphones as external memory strategy

- Checklist questions to ask

- Checklist match problem with app

<table>
<thead>
<tr>
<th>Dessa funktioner använder jag</th>
<th>Ofta</th>
<th>Sällan</th>
<th>Aldrig</th>
<th>Självständig</th>
<th>Behov av hjälp</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Kontakter/kontaktbok</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Telefonsamtal</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o SMS</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o MMS</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o E-post</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Videosamtal (Skype, Facetime)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Klocka, väckarklocka, larm</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Påminnelser</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Anteckningar</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Röstandeckning</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Kamera</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Banktjänster (ex. mobilt bank-id, Swish)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Kartor, GPS</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Internet</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Mediaspelare (musik, radio, ljudbok)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>o Mediaspelare (film, video, klipp)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
References


http://habilitering.se/stockk/appskok