Re-app-ilitation
Smart use of Smart-Phones in Therapy

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optimal sp
Part 1 – Evidence Appetency (Emma)

Part 2 – Practical Applications (Colleen)
Systematic review

• Efficacy of electronic portable assistive devices for people with acquired brain injury: a systematic review. 2015
  – Dr. Grahame Simpson & Lauren Nguyen

• Evaluation:
  – RCT: PEDRO
  – Group: Downs & Black
  – Single: SCED
Other systematic reviews out there…

• de Joode et al., 2010
  • focused on the usability of assistive technology for patients with cognitive and memory deficits
• Morris & Reinson, 2010
  • focused on the usability of assistive technology for patients with memory deficits only
• Gillespie, Best, and O’Neil (2012)
  • Assistive devices that were and were not portable

Missing Communication!!
Variable methodological quality rating systems
Results

- Participants: Mix of neurologically based brain injury
- Range of Devices
- Training:
  - Range of clinicians
  - Training time: 30-180 min
- Cueing method:
  - Visual, auditory and/or tactile
  - Errorless learning
- Measures:
  - Participant
  - Carer
  - Clinician
- Outcomes:

<table>
<thead>
<tr>
<th>Positive</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDAs</td>
<td>Voice memo</td>
</tr>
<tr>
<td>Neuropage</td>
<td>AAC</td>
</tr>
<tr>
<td>Smart phones</td>
<td>Mobile phone</td>
</tr>
</tbody>
</table>
Results

Studies

- RCT
- Group
- Single Case

Results

- Positive
- Negative

Goals

- ADLs
- Information Recollection
- Navigation
- AAC
<table>
<thead>
<tr>
<th>Study</th>
<th>Device</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowman ‘07</td>
<td>Mobile Phone</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Bowman ‘10</td>
<td>PDA</td>
<td>Exercise &amp; ADL Recall</td>
</tr>
<tr>
<td>Culley &amp; Evans ‘10</td>
<td>Mobile Phone</td>
<td>Goal Recall</td>
</tr>
<tr>
<td>Dowds ‘11</td>
<td>PDA</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Evans ‘98</td>
<td>Neuro-page</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Fish ‘07</td>
<td>Mobile Phone</td>
<td>Phone Call Recall</td>
</tr>
<tr>
<td>Gentry ‘08</td>
<td>PDA</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Hart ‘02</td>
<td>Voice organiser</td>
<td>Goal Recall</td>
</tr>
<tr>
<td>Kirsch ‘04</td>
<td>Pager</td>
<td>Information Recall</td>
</tr>
<tr>
<td>Kirsch ‘04b</td>
<td>PDA</td>
<td>Navigation</td>
</tr>
<tr>
<td>Laffont ‘07</td>
<td>Speech Synthesizer</td>
<td>AAC</td>
</tr>
<tr>
<td>Study</td>
<td>Device</td>
<td>Goal</td>
</tr>
<tr>
<td>------------------------</td>
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<tr>
<td>Sohlberg ‘07</td>
<td>PDA</td>
<td>Navigation</td>
</tr>
<tr>
<td>Stapleton ‘07</td>
<td>Mobile Phone</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Svoboda &amp; Richards ‘09</td>
<td>Smart Phone</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Svoboda &amp; Richards ‘10</td>
<td>Smart Phone</td>
<td>ADL &amp; Phone call Recall</td>
</tr>
<tr>
<td>Thone-Otto &amp; Walther ‘03</td>
<td>PDA + Mobile phone</td>
<td>Information &amp; ADL Recall</td>
</tr>
<tr>
<td>Van Den Broek ‘00</td>
<td>Voice organiser</td>
<td>Information &amp; ADL Recall</td>
</tr>
<tr>
<td>Van Hulle &amp; Hux, 2006</td>
<td>Wrist alarm + voice recorder</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Wade &amp; Troy, 2001</td>
<td>Mobile phone</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Wilson et al., 1997</td>
<td>Neuro-page</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Wilson et al., 2001</td>
<td>Neuro-page</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Wright et al., 2001</td>
<td>Pocket computer</td>
<td>ADL Recall</td>
</tr>
<tr>
<td>Yasuda et al., 2002</td>
<td>Voice message recorder</td>
<td>Diary writing and ADL Recall</td>
</tr>
</tbody>
</table>
Barriers

- Devices
- Motivation
- Prior knowledge + acceptance
- Motor and sensory impairments
- Apps available
- Distractions
- Cost
- Accidental setting changes
- Internet connection
- Privacy
- Infection control
For the future

- Statistical analysis
- Validated outcome measures
- Document the details
  - Clinician’s background
  - Teaching + cueing strategies
  - Participant factors
  - Goal/function
  - Adverse events
- Larger participant numbers
- Control groups
- Randomisation + blinding strategies
- Independent assessors
Themes

• Majority of recent research is focused on:
  – App choice
    • Rapid rate of app development
  – Institution description of their methods
  – Single or small group case descriptions

• Broadening the EPAD scope:
  – Clinicians
  – Clinical populations
  – Types of devices
  – Functions and goals
  – Measurement tools
EVIDENCE SINCE THE REVIEW...
Our role

Rehab clinicians have a role in helping to select:

- Appropriate smartphone/tablet/mobile tech
- Apps and accessories
- AAC (augmentative and alternative communication) (Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2013)
- Evaluate appropriateness of app (Wild, 2014)
- Feature match Apps to the patient’s strengths and needs (Gosnell, 2011)
SELECTION

• Consider:
  – Length of time in marketplace
  – Frequency of updates
  – Functioning after updates
    • (Wild, 2014)
• Pre-injury familiarity with devices
  – Although they may not have been using them in a way that will help them post injury
    • (Wild, 2014)
• Consider limitations of a device i.e. trouble shooting if battery runs out
  • (Gentry, 2014)
<table>
<thead>
<tr>
<th>Study</th>
<th>Device + Apps</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Szabo &amp; Dittelman 2014</td>
<td>iPad, small talk aphasia, pictello and story creator for script development, photo editor, language therapy, dragon dictation, awesome memory</td>
<td>iPad used in group context for people who pre-stroke had little exposure to mobile technology mobile and tablet devices can be used by people with aphasia as a daily communication and organisational tool</td>
</tr>
<tr>
<td>Ramsberger &amp; Messamer 2014</td>
<td>iPad, dragon dictation, little story maker, notepad pro</td>
<td>Incorporate smart phone and tablet technology in a step-wise fashion incorporating client’s strengths/weaknesses and goals, considering the device, app and accessibility</td>
</tr>
<tr>
<td>Wong et al 2014</td>
<td>Smart phone</td>
<td>Difficulty learning new technology (stroke), forgetting how to use smartphone (TBI + stroke) - entertainments apps associated with less anxiety - therapy apps associated with more productivity - communication apps associated with better productivity, social integration and verbal learning</td>
</tr>
<tr>
<td>Kurland, Wilkins &amp; Stokes 2014</td>
<td>iPad, iBooks + GoToMeeting</td>
<td>iPads are a promising tool to maintain and progress treatment goals attained in intensive aphasia therapy regardless of aphasia type and familiarity with tablet technology.</td>
</tr>
<tr>
<td>Mehta et al (2012)</td>
<td>Smart phone</td>
<td>Monitors fundamental frequency, sound pressure level and model-based glottal airflow. Piloted an ambulatory biofeedback tool which has the ability to aid skill acquisition in voice therapy.</td>
</tr>
<tr>
<td>Hoover &amp; Carney 2014</td>
<td>iPad, proloquo2go, pictello, notes, maps, calendar, camera, small talk &amp; skype</td>
<td>Preliminary evidence to support use of tablet technology in a range of client centered goals with scope for generalisation across environments</td>
</tr>
<tr>
<td>Gurol-Urganci et al (2013)</td>
<td>Mobile phones</td>
<td>Low-moderate quality evidence shows that SMS and MMS reminders do improve attendance compared to no reminder or a postal reminder.</td>
</tr>
<tr>
<td>Study</td>
<td>Clinical factors to consider in device and app selection</td>
<td></td>
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<tr>
<td>-----------------------</td>
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</tbody>
</table>
| Ramsberger & Messamer (2014) | Assess then develop client centred goals  
                                  Assess motor, cognitive + sensory requirements of the device and apps under consideration  
                                  Assess the device + apps accessibility for the client |
| DeCurtis + Ferrer (2011) | Participants: age and developmental appropriateness  
                                  Parameters: cost and environment  
                                  Purpose: what is the advertised purpose of the app  
                                  Positioning: ability to hold, position and use the device  
                                  Playtime (ADLs/leisure): how is the device incorporated into usual activities  
                                  Potential: how can it be used in more everyday activities |
| Dunham (2011)          | Apps can serve the same purpose as books, toys, games, stimulus cards and worksheets.  
                                  Smartphone and App technology can aid generalisation of treatment goals to more natural environments  
                                  Care needs to be taken that treatment approach should not be dictated by the smartphone or app |
| Gosnell (2011)         | - Identify the person’s strengths + weaknesses and device access  
                                  - Clinician should be knowledgeable about apps and devices  
                                  - Clinician matches, compares and selects appropriate apps  
                                  - Functional assessment of appropriateness |
Part 2 - Practical Considerations
Objectives:
1. Offer thoughts on staying current in a changing app landscape
2. Outline a case where app-based therapy appears to have been integral to intervention.
3. Consider factors that may be important in smartphone/technology uptake.
- SLPs Talk Apps
- APPropriate Apps – SPA Member Group
- Tactus Therapy Solutions
- Jane Farral Consulting (AAC)
- iPhone, iPad, iTouch for Speech Therapy
- The Appy Ladies
- iTeach – Apps for the Classroom
- Appy therapy
- American OT Association (app repository – members)

Closer to home....
http://www.tbistafftraining.info/SmartPhones/SmartPhones1.html
For Patients

TAVISTOCK Aphasia Software finder

http://www.aphasiasoftwarefinder.org

National Aphasia Association

Aphasia Hope

But definite potential for too much information.....
Case Study 2 – Kay – 21yo
Motor vehicle accident 2010. GCS of 4 and required intubation at the scene of the accident. Traumatic brain injury characterised by left frontotemporal subdural haemorrhage with mass effect and intraventricular extension, bilateral frontal contusions, traumatic subarachnoid haemorrhage, left temporal contusions and midbrain haemorrhage. Bifrontal craniectomy, evacuation of the subdural haemorrhage and frontal haematoma and an extraventricular drain. Multiple left facial fractures, fracture of the right skull and a midclavicular fracture. PEG. History of depression and assault.

Kay does not show functional communication skills for daily tasks. She is unable to express her needs using talking/speech or gestures or to comprehend what is said to her. Kay’s daily needs are determined by her routine and what she is doing. Kay demonstrates ability to tolerate small amounts of puree however at this stage she remains nil by mouth.
<table>
<thead>
<tr>
<th>Observed Behaviours 12.12.11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looks towards unseen speaker</td>
</tr>
<tr>
<td>Looks outside in response to question about rain</td>
</tr>
<tr>
<td>(novel response not repeated in other contexts)</td>
</tr>
<tr>
<td><strong>Selective (le preferential) focus on TV channels</strong></td>
</tr>
<tr>
<td>objects/people on command</td>
</tr>
<tr>
<td>No gaze response to questions about bedroom, toys, Xmas tree.</td>
</tr>
<tr>
<td>Raises head and <strong>smiles when asked for photo</strong> (but response repeated at other times)</td>
</tr>
<tr>
<td>Lowers head/leans forward to disengage</td>
</tr>
<tr>
<td>Looks up to her name (not others)</td>
</tr>
<tr>
<td>Indiscriminate reaching/pulling of objects in room.</td>
</tr>
<tr>
<td>Intermittent response to offered hand – shakes gently (without grabbing)</td>
</tr>
<tr>
<td>Allows cleaning of clothes/hands by unfamiliar</td>
</tr>
<tr>
<td>Indiscriminate reaching/grabbing for carers but not for directional purposes</td>
</tr>
<tr>
<td>Leans body in chair to express interest about unseen speaker</td>
</tr>
</tbody>
</table>

| Indiscriminate ripping of paper/fabric |
| Carers report sustained interest in bubble wrap and shredding (and passing) tinsel |
| Throws spoon in agitation |
| Throws toy in agitation |
| **Holds lifter belt in place with verbal and context cue.** |
| Tucks blanket under legs. |
| **Attempts to self propel in wheelchair.** |

| Removes and rips paper/pictures but no meaningful response possible due to behaviour |

| Perseverative no-no-no (not meaningful) |
| Head nod/shake used in response to basic needs but no consistency for biographical or immediate environment |
| Discernible “Yup” when asked about food (novel response not replicated) |

| ✓ ‘would you like some yoghurt’ lifts head and looks at food on bench (novel response not replicated) |
| X Let’s go into your room (no gaze) |
| X Let’s watch the TV (no gaze) |
| X I can see you are ready for Xmas with the Xmas tree (no gaze) |
| ✓ Can you get the belt for me – looks down and holds belt |

| No verbal responses to questions. |
| Carers report occasional obscenities. |
| Responding to hand shake but not initiating |
| Not able to assess use of remote/light switches/phone due to behaviour (throwing) |
Pre-requisite cognitive skills

Eye-Contact
Eating – shaping

Matching pictures, photos (VAT)

Sorting socks

Matching dinner plates

Picture cards or object cues to accompany directions

Increasing periods of shared activity
Dyspraxia hierarchy
3.5 years post onset

Echolalic and some obsessive behaviours. Some response to questions and cued naming just emerging prior to interstate transfer.

I Get It - Social stories trialled for continence training but not successful – had to remove iPad for a time.

Facebook – picture selection, news from outings Those Days.

Skype to group home residents/family interstate.

Clinical handover provided by video on iPad and Story Creator (stories about me).

Ongoing improvement ??
Why did apps make a difference?

- High degree of carer interest/engagement – young ACWs

- All carers using smart-phones themselves and modelling to client

- Pre-injury behaviour of client

- Acceptability even on low level matching tasks

- Used in conjunction with real life activities and other therapy modalities

- Flexibility for upgrade as client needs changed – combination of apps and in-built features of device

- In this case no prospect of independent use so structured clinical apps were not used
Practice Directions Technology in Supported Accommodation
Sloan Monash University (2015 ASSBI in press)

• 138 supported accommodation residents - house manager surveys
• majority urban, ABI, tablet, often self-prescribed or self-provided
• primary use social, recreation, communication, education

“build successful integration of technology into daily lives of people with focus on independence, autonomy, social connection and skill development”

“deliver effective training, ongoing support structures and evaluation of technology over time to avoid abandonment”
colleenk.optimalsp@gmail.com

Emma.Charters@sswhs.nsw.gov.au
(Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2013)


