Using the iPad® in Brain Injury Rehabilitation
Presenter Information

• Catherine Cooper Hay  
  – MS OT Tufts University 1996

• Tara Scully  
  – MOT Nova Southeastern 2009

• Rachel Sieber  
  – MS OT Washington University

• Claire Vanlandingham  
  – MOT University of Florida 2010
Additional Contributors

• Kate Grove
  – MOT UTMB

• Leslie Ott
  – MOT UTMB
Conflicts of Interest and Disclosures

• The research conducted was funded by the TIRR Innovations Grant

• Employees of TIRR Memorial Hermann
Objectives

• Learn strategies to successfully use outcome measures and technology in rehabilitation
• Review iPad® tablet device and how it can be used in inpatient rehabilitation
• Have increased familiarity and practice with some of the available applications on the iPad® specific to rehabilitation
Our Practice

- Inpatient catastrophic rehabilitation hospital
- Specialize in neurological injuries
- OT participation in research
- Initial grant application
iPad® background

- iPhone® June 2007
- iPad® April 2010
- App Store
  - July 2008- 800 apps
  - July 2009- 65,000 apps
  - June 2013 900,000 apps
  - October 2013 1 million mark
  - Currently (March 2014) 1,135,438 apps available for download.
When the study began

- No published articles specific to using the iPad® with brain injury rehabilitation
- PDA’s as cognitive aids for people with MS. COPM both performance and satisfaction improved Gentry (2008)
- PDA’s as cognitive aids for people with TBI COPM both performance and satisfaction improved Gentry, T., Wallace, J., Kvarfordt, C., Lynch, KB (2008)
- Use of technology, including computers, with individuals who have an ABI Erikson, A., Gunnar, K., Sorderstrom, M., Tham, K. (2004)
iPad® study

• Effectiveness of using the iPad® to help organize morning ADL routines
• Two phases of the study
• Lessons learned during first phase
Outcome Measures

- Montreal Cognitive Assessment (MOCA)
- Canadian Occupational Performance Measure (COPM)
- ADL FIM
- ADL Timed Test
- Satisfaction Survey
COPM background

• COPM: Outcome measure that records a client’s perception of their occupational performance across the areas:
  – self care
  – productivity
  – leisure

• Initially published in 1991 - now in 4th edition

Law, M., Baptiste, S., Carswell-Opzoomer, A., McColl, M.A., Polantajko, H., & Pollock, N.
COPM background

• The reliability, responsiveness, and validity of the COPM repeatedly shown to be satisfactory-excellent

• Some challenges with clients who lack insight

Carswell (2004)
COPM in brain injury research

- Effectiveness of OT in addressing self identified goals in adult ABI population

- COPM and Community Integration Questionnaire
  Trombly (2002)
COPM in brain injury research

- OT outcomes for clients with TBI and CVA
- Mean time to administer COPM was 26 minutes
- Mean change in satisfaction was 3.53

Phipps et al (2007)
COPM in practice

- Chart stimulated recall: “interview with OT that focuses on how the clinician managed a client facilitated by medical chart”
- First study to establish clinical research evidence for the benefits to OT practice when COPM is administered
- 34% rate of COPM use on initial assessment

Colquhoun, Letts, Law, MacDemid & Missiuna (2012)
The most effective treatment is individualized to the client!
Full Circle

• COPM + iPad® Applications one way to remain client centered in rehabilitation
• COPM- important goals to client-choose target goal
• iPad® to access available applications to help patients work towards their goals
Our Target Areas

ADL’s and IADL’s

• Morning ADL routine
• Meal Prep
• Money Mgmt/Budget

Impairment Level

Interventions:

• Fine Motor Tasks
• Cognition
Stroke and Traumatic Brain Injury (TBI)

• “…leading cause of disability in the United States today.” (Barrett, Levy, and Gonzalez, 2007)

• Motor impairments typically seen after stroke and TBI
Physical components

- Hemi-paresis
- Spasticity
- Impaired range of motion
- Impaired coordination
  - Tremors
  - Ataxia
Factors other than motor deficits

- Apraxia
- Vision
- Impaired cognition: initiation, attention, memory
What does research say?

- According to Schaechter (2004), our understanding of brain plasticity is based on human brain mapping technologies.

- Variable recovery in regards to motor function from person to person.

- Increase excitability to the brain to increase neuro-plasticity (Schaechter, 2004)
• Yungher and Craelius (2012) utilize visual feedback to increase motor function

• Results showed that fine motor function improved in the short term

(Yungher and Craelius, 2012)
Research continued

• Seven Capital Devices for the Future of Stroke Rehabilitation

• Article explains recovery of the upper extremity is difficult

(Iosa, Morone, Fusco, Bragoni, Coiro, Multari, Venturiero, De Angelis, and Pratesi, Paolucci, 2012)
• “…Recovery has been shown to depend on the intensity of therapy, repetition of specified skilled movements directed towards the motor deficits and rewarded with performance dependent feedback”

(iosa et al., 2012)
• Utilizing tablets and/or iPad is another means to increase stimulation and excitability to the brain.

• Increased excitability = increased chances for neuroplasticity to occur

(losa et al, 2012)
The use of COPM determined an important goal for patient participant was to improve hand writing.

Trialed during 30 minute sessions daily.

Initially had to perform hand over hand to hold patient’s hand to perform fine motor tasks.
Apps utilized:

- Dexteria
- Angry Birds
- iMaze
- Marixgame 3
- Bubble pop
Cognition

- Cognition refers to the mental process of knowing
  - Includes: Awareness, orientation, memory, processing, learning, reasoning, problem solving, organization, judgment, etc.
  - Basic mental processes vs. executive functioning
TIRR evaluation

• Speech therapy/ Neuropsychology performs the cognitive screening/evals

• OT initial eval focuses on orientation
  – Can see how cognition affects ADLs, MMT, MAS, ROM, sitting balance, impulsivity, wheelchair propulsion, etc.
  – Can perform the MMSE or MOCA test
Research

– OT focus:
  • Keeping the process client centered
  • Matching the device to the client’s needs
  • Working directly within the employment setting

– Utilized adaptive devices including: a recording pen and power point

– Decreased patient’s anxiety, improved patient’s life satisfaction and work production

Hartman (2010)
Research

• Matching appropriate ATC and apps based on needs assessment and cognitive assessment.
• Consider how neuroplasticity plays a part in recovery with ATC
• Time for initial set up and assessment however worthwhile for long term benefits for individuals post ABI

iPad® apps

Memory:
- Picture Scheduler $2.99
  - Can set daily schedule with pictures and auditory prompts
- iP Prompts $49.99
  - Utilized at TIRR with patients to assist with memory/attention skills.
  - Primarily for ADLs however can set entire daily schedule
  - Can post own pictures
  - Break down tasks as needed
• Memory Matches FREE
  – Great for easy memory card activity
  – Modify the amount of cards

• Crazy Copy/I say FREE
  – Simon says game for attention/memory/processing speed

• Matrix Game 3 FREE
  – Visual processing/attention
  – Shapes and lines
• FitBrains
• Brain Trainer
• Brain Baseline

• All of these are free iPad® apps- great for memory, attention, vision, organization and processing speed
• Can view progress on line graph, receive percentage
Money Management

• iCoin Math $1.99: progressing from matching simple coins to money management tasks

• iSpend: tracks income and expenses, review monthly expenses by category (groceries, auto, entertainment)
Planning/Organization

- **Todo $4.99**
  - Detailed to do list for projects or checklists
  - Email list, set due date, add reminders to alert client
  - Sync with Microsoft Outlook, iCloud, etc.

- **Evernote FREE**
  - Keeps notes to remember specifics
  - Take pictures of receipts to decrease clutter
  - Record audio notes as memory aid
• Consider apps that will be the least confusing/overwhelming
• Eliminate apps that are unused to decrease clutter
• Compare features
Activities of Daily Living (ADLs)

• ADLs simply said are our self care tasks:
  – Dressing
  – Grooming
  – Eating
  – Toileting
  – Bathing
Instrumental Activities of Daily Living (IADLs)

- Multistep activities to care for yourself and others:
  - Household management
  - Medication management
  - Financial management
  - Meal preparation
AOTA Special Interest Summary:
“After a review of studies using electronic memory aids preliminary evidence supports that use of electronic memory aids are useful in increasing functional outcomes for certain clients using prospective memory tasks such as feeding the dog or brushing ones teeth.”

Morris, K., & Reinson, C (2010)
AOTA Special Interest Summary:

- Successful candidates for use of a memory aids: motivated adults who have a desire to increase functional levels
- Poor candidates: sedentary lifestyle, poor insight into deficits, high reliance on caregivers
- Further research comparing use of electronic memory aids and non electronic memory aids

Morris, K., & Reinson, C (2010)
Evidenced Based Research

• **Prompting devices: a survey of memory aids for task sequencing:**

• **Summary: from a review of literature**
  – Prompting devices are an effective means of teaching multi-stepped tasks
  – Further research must support for long term learning and adjust for additional support if needed

Apps to support increased independence in ADLs

- Functional Skills System: Grooming
- Cost: 1.99
  - Step by step instructions for:
    - How to get a hair cut
    - How to comb your hair
    - How to shave
    - How to put on makeup
    - How to trim fingernails
    - How to put on lotion
    - How to pluck your eyebrows
      - User can go to the previous step, repeat current step or go to the next step
      - Will provide a video of the whole task but then break the task down to individual steps
      - Repeating the phrase of the step at the beginning and the end of the step
Apps to support increased independence in ADLs

- Functional Skills Systems: Hygiene
- Cost: 1.99
  - Step by step instructions for:
    - How to take a bath or shower
    - How to floss and brush your teeth
    - How to use deodorant
    - How to wash your face and hands
    - How to control germs
      - User can go to the previous step, repeat current step or go to the next step
      - Will provide a video of the whole task but then break the task down to individual steps
      - Repeating the phrase of the step at the beginning and the end of the step
Apps to support increased independence in ADLs

• Life Skills Winner
• Cost: Free
  – Uses step by step by simulating the task with instructions with visual, sensory and auditory instructions for:
    • Washing hands
    • Brushing teeth
    • Brushing hair
Apps to support increased independence in IADLs

Visual Impact

Cost: Free

- Provides step by step instructions using visual written and auditory instructions for:
  - Making coffee
  - Taking blood pressure
    - User can go to the previous step, stay on current step or go to the next step
Apps to support increased independence in IADLs

• Pill Monitor:
• Cost: Free
  – Insert medications to be taken at the time to be taken. Pill Monitor will provide reminders at the time medication is to be taken
Apps to support increased independence in IADLs

Money

Cost: Free

Provides user with dollar and coin amounts at an easy or medium level
Apps to support increased independence in IADLs

• Live and Play
• Cost: free and packages for $.99 each
  – Provides step by step instructions using visual and auditory instructions for:
    • Free tasks: feed animal-bag
    • Washing hands
    • How to ride a scooter
Apps to support increased independence in IADLs

• Live and play (continued)
  – Packages:
    • Household chores: laundry
    • Loading the dishwasher
    • Making a bed
    • Vacuuming
    • Independent living skills: making a microwave meal
    • Making a PBJ sandwich
    • Make a phone call
    • Making coffee
    • Making popcorn
    • Getting ready for school
Apps to support increased independence in IADLs

Cookineo

Cost: free

Provides step by step instructions using visual instructions for a complete meal: starters, dishes, desserts
Apps to support increased independence in IADLs

• Grocery

• Cost: free
  – Provides user with an organized way to set up a grocery/shopping list
  – Once list is complete and user is shopping user can tap the item wanted to erase item from list
New research

- Commonly used everyday technology
- Individualized intervention process
- Type of ET varied from timer to hand held computer
- All participants rated an increased performance and satisfaction on COPM
- Interventions could compensate for difficulties even if long time since ABI

Linden et al (2011)
• Individuals with acquired brain injury
• Compared systematic instruction to trial and error learning
• Used Palm Tungsten E2 PDA
• 12 training sessions
• Post test plus 30 day follow up

Powell et al (2012)
Constant Therapy

• New app
• Allows therapist to develop individualized home programs and track patient’s participation and progress
• Recent study has preliminary results (4 case studies) that indicate it is feasible to implement in rehab programs.
  
  Kiran et al (2014)
Preliminary Results

• 4 subjects
• 4 different target task
  – Meal Prep
  – Money Management/Finances
  – Writing
  – Remembering Appointments
Pre/Post COPM Satisfaction Scores

Pre/Post Satisfaction Scores

COPM Score

Pre/Post Satisfaction Scores

Pre
Post

Subject

Pre
Post
Pre/Post MOCA Scores

Pre/Post MOCA Scores

0 5 10 15 20 25 30 35
Pre Post
MOCA Score
Subject One
Subject Two
Subject Three
Subject Four
Future Questions

• Use of iPad as a compensatory tool (long-term use) or as an intervention tool (during OT sessions)
• Role of OT
• Specific apps and their affect on the function of the target area
• How can we most effectively use this technology to meet the needs of our clients?
Resources

• www.aota.org
• www.otswithapps.com
  – Carol Leynse Harpold, MS, AdEd, OTR/L, ATP
• www.tbistafftraining.info
• www.brainline.org
References


[http://dx.doi.org/10.1155/2012/187965](http://dx.doi.org/10.1155/2012/187965)


