The Long-Term Rehabilitation Management of Stroke Patients

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Faculty/Presenter Disclosure

• Faculty: Robert Teasell

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  – Consulting Fees: None
  – Other: None

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**Objectives**

At the end of this presentation, the learner will be able to:

1. Discuss the importance of long term stroke rehabilitation management and the evidence underpinning it.
2. Develop a long-term rehabilitation management plan for your stroke patient.

**Early Stroke Rehabilitation**

- Resources have focused largely on acute and subacute phase of stroke rehabilitation and there has been a concerted effort to try to provide rehabilitation earlier in order to improve outcomes
- The window of opportunity for rehabilitation has long been thought to be that first 3 months of stroke recovery
Probability of Walking >150 ft With Assistance

Copenhagen Stroke Study

• Prospective study of 1,197 stroke patients admitted to 63 bed stroke unit serving area of 239,000
• Average length of stay was 37 days
• Mean age 74.3 (SD 11) yrs
• 46% male
• 56% single/widowed

### Neurological Recovery (Scandinavian Stroke Scale)

<table>
<thead>
<tr>
<th>Stroke Type</th>
<th>Acute Admit</th>
<th>Discharge</th>
<th>Weeks to 95% of Best Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Severe</td>
<td>19%</td>
<td>4%</td>
<td>13</td>
</tr>
<tr>
<td>Severe</td>
<td>14%</td>
<td>7%</td>
<td>15</td>
</tr>
<tr>
<td>Moderate</td>
<td>26%</td>
<td>11%</td>
<td>10</td>
</tr>
<tr>
<td>Mild</td>
<td>41%</td>
<td>47% (+31% with none)</td>
<td>6</td>
</tr>
</tbody>
</table>


### Functional Recovery (Barthel Index)

<table>
<thead>
<tr>
<th>Disability Severity</th>
<th>BI Gain in Hosp</th>
<th>Months to 95% of Best Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Severe</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Severe</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>Moderate</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>Mild</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

Community Rehabilitation

Cochrane Review of OutPt Rehab

• 14 RCTs of 1,617 patients (Outpatient Trialists 2003) involved in home based, day hospital and outpatient clinic
• Therapy reduced the odds of a poor outcome (death, deterioration or dependency) (OR 0.72; 95% CI 0.57-0.92; p=0.009) and increased personal activity of daily living scores (SMD 0.14; 95% CI 0.02-0.25; p=0.02)
• Number needed to treat in order to spare one person from experiencing a poor outcome was 14
• For every 100 stroke patients resident in community receiving therapy-based rehab services, 7 would be spared a poor outcome assuming 37.5% would have had a poor outcome in absence of treatment
Outpatient Therapy

• Outpatient therapy improves short-term functional outcomes
• Outpatient therapy is relatively inexpensive (1 PT/1 OT/0.5 SLP/0.5 SW = cost of 1 rehab inpt bed)
• Reduces rehospitalization and allows earlier discharge home
• Estimated savings is $2 for every $1 spent on outpatient therapies

Best Practice Recommendation 6.6
Community Reintegration following Stroke (2010)

“People with stroke living in community should have regular and ongoing follow-up to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes, and improve quality of life (Evidence Level B)”
**Best Practice Recommendations 5.6**

**Outpatient and Community-Based Stroke Rehabilitation (2010)**

“After leaving hospital, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs.”

**System Implications:** There is a marked lack of outpatient and community-based rehabilitation resources and the health system must provide the following:

- Organized and accessible stroke care in communities
- Increased number of experienced clinicians practicing in outpatient and community rehabilitation
- Timely access to stroke rehabilitation services in the community after discharge
- Stroke rehabilitation support for caregivers.”

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**Ontario Stroke Rehabilitation Outpatient Clinics**

- Outpatients are an important part of stroke rehab
- Survey of 49 facilities providing outpatient therapy to more than 5 stroke patients in 2009/2010
- 42 facilities answered the survey
- No mandatory data reporting for outpatient therapy
- Only 6 facilities were able to report the number of stroke patients who received stroke rehab and the total number of rehabilitation sessions
- 15 hospitals reported stroke OP resources declined of which 8 were eliminated; 11 reported expanding of which 2 were new
- First thing cut with budget pressures
Community-Based Stroke Rehab

- 14 LHINs in Ontario – 13 responded to survey (CCACs/Home Care)
- 2007-2008 proportion of stroke pts discharged alive from acute care able to access Home Care services ranged from 30-64%
- Average ratio of annual acute stroke admissions to outpatient therapists is 552:1 for P.T. and 1395:1 for O.T. (centers that report data)
- PT visits per discharge ranged 0.4-1.6; OT 0.8-2.8; SLP <1-0.1
- 4 LHINs reported no wait list
- Remaining 9 LHINs: mean wait times was 48-219 days PT, 56-145 days OT and 28-323 days SLP

The Importance of Outpatient Rehab

- Meyer et al. (2012) studied “avoidable” mild admissions to inpatient rehabilitation (FIM > 100; RPG 1160) - sufficient function to receive rehabilitation in the community
- Compared to community-based rehabilitation resources by LHIN throughout Ontario
- Correlation between lack of community outpatient rehabilitation therapy resources and likelihood mild stroke patients would be admitted to inpatient rehab
- Particularly true for SLPs

Concerns About Lack of Chronic Stroke Rehab

• Stroke survivors and their families are often frustrated by the scant clinical attention paid to chronic stroke rehabilitation management despite the fact that stroke can result in very significant long-term disability
• Once out of hospital and it appears patients and their families can cope in the community (without requiring rehospitalization), the health care system generally regards its job as done
• Stroke survivors, once they are discharged to the community, tend to receive minimal rehabilitation support

When Should Rehabilitation End?

• What is the evidence?
• How does time post stroke influence response to rehabilitation therapies? (Teasell et al. 2012; Stinnear et al. 2013)
• Is the 3 month recovery plateau a rehabilitation myth? (Korner-Bitensky 2013)
• Is the problem more how system treats patients (Page et al. 2004)

Teasell et al. Top Stroke Rehab 2012; 19(6)
Stinnear et al. Stroke 2013; 44:2039-2045
Brain Reorganization: Use It or Lose It

Rehabilitation training (enriched environments with animals) increases brain reorganization with subsequent functional recovery.

In animal studies key factors promoting recovery include increased activity and a complex, stimulating environment.

Lack of rehab causes decline in cortical representation and delays recovery.

Long-Term Rehab Management of Stroke

- Long assumed stroke patients plateau in their recovery within 3-6 months of stroke
- Natural recovery studies have examined the normal progression of a stroke in an environment where rehabilitation resources were invariably front-loaded
- Given that there is very limited rehabilitation resources available for chronic stroke survivors, there is concern that this recovery plateau may be a self-fulfilling prophecy
- Page et al. (2004) noted motor rehab often discontinued as soon as stroke rehab patients plateau – may reflect neuromuscular adaptation following exercise
  - need to use alternative or novel approaches

Long-Term Rehab Management of Stroke

- New and developing area
- Driven by pharmaceuticals (Botulinum toxin), technology (Saebo-flex, functional electrical stimulation) and patients unwilling to accept their disability with resources to fund private therapy
- Increasing interest in long-term management of stroke but the focus has been on registries, natural history, etc.
- 2013 Stroke Report from HSF “There is Life After Stroke” referring to stroke recovery as “a journey” and noting “stroke recovery can continue for months or even years”.

So What is the Evidence?

- Long assumed the evidence for acute and subacute rehabilitation therapies is very strong and there is a lack of data on long-term management
- Stinear et al. (2013) examined this for stroke rehab RCTs (largely using the SREBR) with a motor outcome, published in English which did not treat a secondary motor complication such as spasticity or shoulder subluxation
- Found 532 RCTs of motor rehabilitation post stroke which they divided into early (all patients enrolled in study within 30 days of stroke), late (30-180 days) and chronic (>180 days)
So What is the Evidence?  
Motor Rehab Post Stroke

<table>
<thead>
<tr>
<th>Category</th>
<th>All Patients Enrolled By</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>&lt;30 days</td>
<td>63</td>
<td>11.8%</td>
</tr>
<tr>
<td>Late</td>
<td>30-180 days</td>
<td>179</td>
<td>33.8%</td>
</tr>
<tr>
<td>Chronic</td>
<td>&gt;180 days</td>
<td>284</td>
<td>53.4%</td>
</tr>
<tr>
<td>Not Reported</td>
<td></td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Stinear et al. Stroke 2013; 44:2039-2045

So What is the Evidence?

- Less than 12% of stroke rehab RCTs enrolled all patients within 30 days of stroke
- Those with positive outcome are often limited by small sample size and a lack of follow-up measures
- “Misalignment between timing of RCTs and real-world delivery of stroke rehab may be an important aspect of the evidence-base that limits its translation into clinical practice” (Stinear et al. 2013)

Stinear et al. Stroke 2013; 44:2039-2045
What is the Evidence? Long-Term Management of Stroke Project (LOMOS)

• Wanted to examine studies where rehab interventions were initiated more than 6 months post stroke
• Literature search conducted of following databases: Medline, CINAHL, EMBASE and PsychInfo as well as SREBR from 1980 to present


Objectives

1. To identify RCTs across the continuum of stroke rehabilitation for interventions initiated 6 months or more following the onset of stroke.

2. To determine whether treatments provided post 6 months are effective in improving outcomes among stroke survivors.

Long-Term Management of Stroke (LOMOS) Project

- Literature search conducted of following databases: Medline, CINAHL, EMBASE and PsychInfo as well as SREBR from 1980 to present

Studies included if:

1) Participants had a history of stroke
2) Time since stroke at time of initiation of experimental intervention a mean of > 6 months
3) Participants received an intervention aimed at improving their neurological and functional recovery post stroke
4) A randomized controlled trial

Teasell et al. Topics in Stroke Rehabilitation 2012: 19(6)

RCTs of Rehabilitation Interventions Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Area of Stroke Rehabilitation</th>
<th>RCTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Interventions</td>
<td>256</td>
</tr>
<tr>
<td>Mobility and Lower Extremity</td>
<td>105</td>
</tr>
<tr>
<td>Upper Extremity</td>
<td>135</td>
</tr>
<tr>
<td>Hemiplegic Shoulder</td>
<td>16</td>
</tr>
<tr>
<td>Cognitive Interventions</td>
<td>39</td>
</tr>
<tr>
<td>Cognitive Disorders</td>
<td>19</td>
</tr>
<tr>
<td>Aphasia</td>
<td>20</td>
</tr>
<tr>
<td>Dysphagia and Medical Complications</td>
<td>17</td>
</tr>
<tr>
<td>Depression and Community Reintegration</td>
<td>19</td>
</tr>
<tr>
<td>Outpatient Therapy</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>339</strong></td>
</tr>
</tbody>
</table>

RCTs of Rehabilitation Interventions Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Broad Category</th>
<th>RCTs</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Function (gait and mobility, upper extremity, hemiplegic shoulder)</td>
<td>256</td>
<td>9,391</td>
</tr>
<tr>
<td>Cognitive Function (cognition, visual perceptual, aphasia)</td>
<td>39</td>
<td>10,967</td>
</tr>
<tr>
<td>Medical Interventions (not including secondary prevention)</td>
<td>17</td>
<td>2,065</td>
</tr>
<tr>
<td>Psychosocial Disorders and Community Reintegration</td>
<td>19</td>
<td>1,488</td>
</tr>
<tr>
<td>Outpatient Therapy</td>
<td>8</td>
<td>962</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>339</td>
<td>24,873</td>
</tr>
</tbody>
</table>


Gait and Mobility in Chronic Stroke

105 RCTs

1. Lower limb resistance training has capacity to improve gait speed and total distance walked (Mehta et al. 2013)
2. Cardiovascular conditioning resulted in clinically relevant gains in walking distance (Mehta et al. 2013)
3. Small but significant treatment effect of FES on 6 minute walk test (Pereira et al. 2013)
4. Pharmacological treatment reduced lower limb spasticity (McIntyre et al. 2013)

### Preliminary Review: Interventions to Improve Lower Extremity Function and Mobility Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RCTs (n)</th>
<th>Other (n)</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>TENS</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Spasticity</td>
<td>23</td>
<td>18</td>
<td>Strong evidence botulinum toxin reduces spasticity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate evidence antispastic medications improve spasticity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Conflicting evidence botulinum toxin improves functional outcomes</td>
</tr>
<tr>
<td>Assistive Devices</td>
<td>5</td>
<td>13</td>
<td>Strong evidence improves gait</td>
</tr>
<tr>
<td>Robotics/Virtual Reality</td>
<td>9</td>
<td>13</td>
<td>Conflicting evidence improves gait better than conventional therapy</td>
</tr>
<tr>
<td>Electrical Stimulation/FES</td>
<td>9</td>
<td>4</td>
<td>Strong evidence improves gait</td>
</tr>
<tr>
<td>Augmented Physiotherapy</td>
<td>3</td>
<td>9</td>
<td>Strong evidence improves gait</td>
</tr>
</tbody>
</table>

### Preliminary Review: Interventions to Improve Lower Extremity Function Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RCTs (n)</th>
<th>Other (n)</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofeedback</td>
<td>5</td>
<td>19</td>
<td>Strong evidence auditory, visual, EMG biofeedback improves gait</td>
</tr>
<tr>
<td>Balance Training</td>
<td>8</td>
<td>8</td>
<td>Strong evidence improves mobility</td>
</tr>
<tr>
<td>Motor Learning Approach</td>
<td>2</td>
<td>18</td>
<td>Strong evidence improves gait</td>
</tr>
<tr>
<td>Task-Specific Therapy</td>
<td>8</td>
<td>31</td>
<td>Strong evidence task-specific gait training improves gait</td>
</tr>
<tr>
<td>Cardiovascular Training</td>
<td>9</td>
<td>5</td>
<td>Strong evidence improves gait</td>
</tr>
<tr>
<td>Body Weight Support Treadmill Training</td>
<td>12</td>
<td>2</td>
<td>Conflicting evidence improves gait</td>
</tr>
<tr>
<td>Mental Practice</td>
<td>1</td>
<td>0</td>
<td>Moderate evidence improves sit to stand</td>
</tr>
<tr>
<td>Strength Training</td>
<td>9</td>
<td>1</td>
<td>Conflicting evidence improves gait</td>
</tr>
</tbody>
</table>
Cardiovascular Conditioning and Gait in Chronic Stroke

Objective: Meta-analysis to examine effectiveness of cardiovascular conditioning on comfortable gait speed and total distance walked in chronic phase of stroke

- 7 RCTs met inclusion criteria; PEDro scores all > 5


Cardiovascular Conditioning and Gait in Chronic Stroke: 6 minute walk test

<table>
<thead>
<tr>
<th>Study name</th>
<th>Std diff in means</th>
<th>Standard error</th>
<th>Variance</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>Z-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan 2007</td>
<td>0.193</td>
<td>0.340</td>
<td>0.116</td>
<td>-0.474</td>
<td>0.860</td>
<td>0.568</td>
<td>0.570</td>
</tr>
<tr>
<td>Ada 2003</td>
<td>0.617</td>
<td>0.394</td>
<td>0.155</td>
<td>-0.155</td>
<td>1.390</td>
<td>1.566</td>
<td>0.117</td>
</tr>
<tr>
<td>Pang 2005</td>
<td>0.190</td>
<td>0.253</td>
<td>0.064</td>
<td>-0.305</td>
<td>0.685</td>
<td>0.751</td>
<td>0.453</td>
</tr>
<tr>
<td>Goban 2011</td>
<td>0.336</td>
<td>0.336</td>
<td>0.113</td>
<td>-0.322</td>
<td>0.994</td>
<td>1.000</td>
<td>0.317</td>
</tr>
<tr>
<td>Macko 2008</td>
<td>1.551</td>
<td>0.292</td>
<td>0.085</td>
<td>0.978</td>
<td>2.124</td>
<td>5.396</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>0.581</td>
<td>0.277</td>
<td>0.077</td>
<td>0.037</td>
<td>1.125</td>
<td>2.092</td>
<td>0.036</td>
</tr>
</tbody>
</table>

-2.00 1.00 0.00 1.00 2.00

Favours A  Favours B

Cardiovascular Conditioning and Gait in Chronic Stroke: Comfortable gait speed

Cardiorespiratory training resulted in moderate and statistically significant effects in improving total distance walked, as measured by 6MWT, post treatment with an average pooled increase of over 100 m.

Although significant improvements in comfortable gait speed were not seen with an increase of only 0.08 m/s, the avg gait speed of patients was 0.72 m/s (mild deficit).

Resistance Training for Gait Speed and Total Distance Walked During Chronic Stroke

Objective: Meta-analysis examining effectiveness of resistance training on comfortable gait speed and total distance walked in chronic phase of stroke

- 10 RCTs met inclusion criteria
- Effect of strength training on gait speed – pooled data from 9 RCTs
- Effect of strength training on endurance as measured by 6MWT – pooled data from 8 RCTs


Resistance Training and Gait in Chronic Stroke: Endurance as Measured by 6MWT

Resistance Training and Gait in Chronic Stroke: Comfortable Gait Speed


Resistance Training and Gait in Chronic Stroke: Comfortable Gait Speed Followup

Resistance Training for Gait Speed and Total Distance Walked During Chronic Stroke

- Significant improvement was seen for gait speed with a small effect size (0.295 ± 0.118; 95% CI, 0.063-0.526; p<.013) and a pooled post mean speed of 0.79 m/s.
- For 6MWT a small effect size improvement was seen (0.247 ± 0.111; 95% CI, 0.030-0.465; p=.026) with a pooled post mean total distance walked of 271.9 m.
- CIMT > 6 months post stroke has capacity to improve comfortable gait speed and total distance walked.

Chronic Upper Extremity Disorders Post Stroke

135 RCTs for U/E Disorders

- Interventions with most RCTs were spasticity interventions, constraint-induced movement therapy (CIMT), functional electrical stimulation (FES), robotic devices and bilateral arm training.
### Preliminary Review: Interventions to Improve Upper Extremity Function Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RCTs (n)</th>
<th>Other (n)</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral arm training</td>
<td>11</td>
<td>8</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Constraint Induced Movement Therapy</td>
<td>20</td>
<td>37</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Feedback</td>
<td>4</td>
<td>12</td>
<td>Moderate Evidence for force-feedback and EMG biofeedback</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Level 4 (conflicting evidence) for extrinsic feedback</td>
</tr>
<tr>
<td>Functional Electrical Stimulation</td>
<td>13</td>
<td>15</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Mental Practice</td>
<td>7</td>
<td>9</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Mirror Therapy</td>
<td>2</td>
<td>3</td>
<td>Moderate Evidence</td>
</tr>
<tr>
<td>Robotic Devices</td>
<td>15</td>
<td>5</td>
<td>Strong Evidence (not effective)</td>
</tr>
</tbody>
</table>

### Preliminary Review: Interventions to Improve Upper Extremity Function Greater Than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RCTs (n)</th>
<th>Other (n)</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spasticity Interventions</td>
<td>19</td>
<td>32</td>
<td>Strong Evidence for Botulinum toxin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate Evidence for Stretching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate Evidence Splinting not effective</td>
</tr>
<tr>
<td>Task-Specific Training</td>
<td>4</td>
<td>0</td>
<td>Moderate Evidence</td>
</tr>
<tr>
<td>Additional/Enhanced Therapies</td>
<td>3</td>
<td>N/A</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Strength Training</td>
<td>2</td>
<td>N/A</td>
<td>Moderate Evidence</td>
</tr>
<tr>
<td>Sensory Motor Training/Somatosensory Stimulation</td>
<td>12</td>
<td>N/A</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Trunk Restraints</td>
<td>4</td>
<td>4</td>
<td>Strong Evidence</td>
</tr>
<tr>
<td>Virtual Reality</td>
<td>7</td>
<td>4</td>
<td>Strong Evidence</td>
</tr>
</tbody>
</table>
CIMT for Upper Extremity Function in Chronic Stroke

- Objective: Conduct a systematic review and meta-analysis of the effectiveness of constraint-induced movement therapy (CIMT) in the hemiparetic upper extremity among individuals more than 6 months post stroke
- 16 RCTs (PEDro scores 4-8) met inclusion criteria and included a pooled sample of 572 individuals


Pre-treatment to post-treatment difference in Amount of Use (AOU) means among those treated with CIMT versus traditional rehabilitation and a random effects pooled difference in means.

Pre-treatment to post-treatment difference in **Quality of Movement (QOM)** means among those treated with CIMT versus traditional rehabilitation and a random effects pooled difference in means.

Pre-treatment to post-treatment difference in **Fugl-Meyer Assessment (FMA)** means among those treated with CIMT versus traditional rehabilitation and a fixed effects pooled difference in means.
Pre-treatment to post-treatment difference in **Action Research Arm Test (ARAT)** means among those treated with CIMT versus traditional rehabilitation and a fixed effects pooled difference in means.

![ARAT](image)

Control  CIMT

Pre-treatment to post-treatment difference in **Wolf Motor Function Test (WMFT)** (function) means among those treated with CIMT versus traditional rehabilitation and a fixed effects pooled difference in means.

![WMFT](image)

Control  CIMT
Pre-treatment to post-treatment difference in Functional Independence Measure (FIM) means among those treated with CIMT versus traditional rehabilitation and a fixed effects pooled difference in means.

CIMT for Upper Extremity Function in Chronic Stroke

- Meta-analysis revealed a significant treatment effect on the amount of use and quality of movements subscales of the Motor Activity Log (p<.001 for both), Fugl-Meyer Assessment (p=.014) and Action Research Arm Test (p=.001)
- There was no treatment effect demonstrated by the Wolf Motor Function Test (p=.12) or FIM (p=.07).
Chronic Cognitive Disorders Post Stroke

- 39 RCTs of Cognitive Disorders Interventions More than 6 months Post Stroke
- 16 RCTs of Memory and Executive Function
- 3 RCTs of Neglect
- 20 RCTs of Aphasia

Evidence for Treatment of Chronic Aphasia

20 RCTs
Aphasia treatment effectiveness found for:
- Computer-based treatments
- Constraint induced therapy
- Group language therapy
- Training conversation/communication partners
- Community-based aphasia programs
- Caregiver/patient education programs
- rTMS and transcranial direct stimulation
- A number of pharmacological measures

Psychosocial Disorders in Chronic Stroke

19 RCTs of Psychosocial Interventions More than 6 months Post Stroke

1. Positive results for rTMS, pharmacological agents, exercise and psycho-education to manage psychological disorders (Mehta et al. 2013)
2. Psycho-education provided to caregivers resulted in increased competence and improved use of coping strategies; however, it did not improve level of caregiver burden (Mehta et al. 2013)


Long-Term Rehab Management of Stroke

- **339 RCTs** therapeutic interventions initiated > 6 months post stroke
- **251 RCTs** motor function (gait & mobility, upper extremity and hemiplegic shoulder)
- **39 RCTs** cognitive interventions (cognition, visual-perceptual, aphasia)
- **19 RCTs** psychosocial interventions (depression and community reintegration)

- Motor vs. Cognitive RCTs ratio is over **6:1**
- Motor vs. Psychosocial RCTs ratio is over **13:1**
The Paradox of the Long-Term Rehabilitation Management of Stroke

- Impressive evidence-based for rehabilitation interventions > 6 months post stroke with 339 RCTs
- The evidence for therapies designed to improve motor function is impressive; cognitive disorder interventions is modest; interventions to deal with psychosocial issues is surprisingly weak

Creates a number of potential paradoxes:
1) Most important areas have least evidence
2) Despite a strong evidence-base there are very limited resources.