Intensity of Stroke Rehabilitation

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Brain Reorganization

• The brain has significant capacity to reorganize itself to recover from loss of function following a stroke
• Reorganization depends on training or rehabilitation and will not occur spontaneously
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.

Brain Reorganization

- Key elements of stroke rehab should be increased activity and a complex and stimulating environment.
Therapy Intensity

Intensity of Therapy
Canadian Stroke Guidelines 2010

• “Stroke patients should receive, through an individualized treatment plan, a minimum of 3 hours of direct task-specific therapy by the interprofessional stroke team for a minimum of 5 days per week.”
More is Better

- Post-stroke rehab increases motor brain reorganization, while lack of rehab reduces reorganization
- More intensive motor training in animals further increases brain reorganization

Role of Intensity of Therapy

- The greater the intensity of therapies clinically, the better the outcomes
- Seen to be true for physiotherapy, occupational therapy, aphasia therapy, treadmill training and upper extremity function in selected patients (i.e. CIMT)
- One exception is the VECTORS trial (Dromerick et al. 2009) showed high intensity U/E CIMT (6 hrs/day) at day 10 showed less improvement at 3 mos than less intense Rx; Rationale uncertain – not a large trial
Frontloading

- RCT of 146 “middle band” strokes to stroke unit (SU) or gen med (GM) unit
- Median Barthel Index = 4/20 initially in both
- Stroke Unit - BI = 15 after 6 wks; discharged at 6 wks
- General Medical Unit - BI = 12 after 12 wks; discharged at 20 wks

Kalra et al. 1994

Frontloading (Kalra et al. 1994)
Frontloading (Kalra et al. 1994)

Amount of Physiotherapy and Occupational Therapy
Therapy Intensity: Front Loading

Kalra et al. 1994

Therapy Participation

• Lenze et al. (2004) poor participation in therapy during inpatient rehab was common
• Associated with less improvement in FIM scores and longer lengths of stay even when controlling for admission FIM scores
In a therapeutic day
– >50% time in bed
– 28% sitting out of bed
– 13% in therapeutic activities
– Alone for 60% of the time

Contrary to the evidence that increased activity and environmental stimulation is important to neurological recovery

The Challenge of Intensity

• In Canada we struggle to provide adequate therapy
• In Ontario/Canada estimate average rehab patient gets about 1.5-2 hours of direct patient-therapist time/day
• In United States - 3 hour rule which is tied to funding – but length of hospital stays are very short
• Challenge is to find ways to improve on intensity provided as both inpatients and outpatients
Comparing US to Canada

<table>
<thead>
<tr>
<th>Item</th>
<th>US PSROP (n=1161)</th>
<th>Canada (CIHI 2003, n=1003)</th>
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<tbody>
<tr>
<td>Mean Age</td>
<td>66.0</td>
<td>70.8</td>
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<tr>
<td>Lived alone Pre-Stroke</td>
<td>20.7%</td>
<td>24.5%</td>
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<tr>
<td>Mean Admission FIM</td>
<td>61.0</td>
<td>75.2</td>
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<tr>
<td>Median Stroke Onset to Rehab Admit (days)</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Mean Rehab LOS (days)</td>
<td>18.6</td>
<td>38</td>
</tr>
<tr>
<td>Mean Discharge FIM</td>
<td>87.2</td>
<td>96.3</td>
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<tr>
<td>Mean Increase in FIM</td>
<td>26.2</td>
<td>21.1</td>
</tr>
<tr>
<td>FIM Efficiency (FIM gains/day)</td>
<td>1.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Number of Patients Home</td>
<td>78.0%</td>
<td>67.3%</td>
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PSROP Centers (courtesy of Brendan Conroy at NRH)

U.S. Inpatient Stroke Rehabilitation is driven by Medicare which expects:

1. Participation (“the 3 Hour Rule”)
2. Progress (FIM Gain of 1-1.5/day)
3. Expedited Discharge Home or to SNF if progress is too slow or family unwilling/unable to take home
Participation Expectations in U.S. Centers

The 3 Hour Rule

• 3 hours/day of PT, OT & SLP 5-6 days/wk
• Psychol, RN, VR, TR don’t count (TR=OT sometimes)
• 55 min one-on-one therapy sessions with PT, OT, SLP daily and if pt can’t handle 55 min then 2x30 min is scheduled
• Patient: therapist ratio is 7:1 each day, supplemented with rehab techs (aids)

In Addition

• 1-2 hrs daily of OT +/- PT group sessions
• Weekly Speech/Cognitive group therapy sessions
• TR, VR, Psychology, RD, RN education
• Family are engaged very early in the process with caregiver training
Participation Accountabilities

- Therapist must record face-to-face interactions with pt in 15 min increments
- Manager responsible at end of day to ensure patient received their full 3 hrs of therapy
- Any missed therapy must have a strong medical justification documented by MD and therapist
- Failure to deliver enough time means loss of payment

Collaborative Evaluation of Rehabilitation in Stroke Across Europe (CERISE) Trial

- Study compared motor and functional recovery after stroke between 4 European Rehab Centers
- Gross motor and functional recovery was better in Swiss and German than UK center with Belgian center in middle

- Differences in therapy time not attributed to differences in patient/staff ratio (similar staffing)
- In German and Swiss centers, the rehabilitation programs were strictly timed while in UK and Belgian centers they were organized on a more ad hoc basis.

De Wit et al. Stroke 2007:38:2101-2107
Conclusions on Intensity of Therapies

• More therapy results in improved outcomes
• Actual amount of therapist-patient time and time spent in activation activities important
• Minimum of 1 hr/day of each therapy is the current recommendation
• Evidence supporting 3 hours per day remains arbitrary

Solutions
Therapy is Cheap; LOS is Not

- Core Therapies of PT, OT and SLP are most sensitive to intensity
- < 20% of total hospital budget in subacute rehab is spent on core therapies

Using Our Resources More Efficiently

- Increase the number of therapists – right-sizing
- Establish better accountabilities for therapy intensity
- Standardize and simplify assessments
- Simplify and tighten charting
- Reduce non-therapeutic activities
- Weekend and Group Therapy
- Accountabilities for LOS - Benchmarking
Doing Things Differently

- Increasing therapy aids and volunteers
- Large influx of therapy aids or rehab aids (cross between therapy and nursing aids)
- The lines between the therapies becoming blurred and how rehabilitation is done redefined
- Rehab becoming less discipline specific

Program and Interdisciplinary Team

- Current interdisciplinary stroke rehab team concept developed in the 1950-60’s
- Very discipline-specific
- No longer as relevant – rigid, expensive, inefficient
Program and Transdisciplinary Team

Rehab Therapies

Physiotherapy  |  Speech Therapy
---|---
Rehab Therapists
Recreational Therapy
Nurse Assistants

Occup. Therapy  |  Nursing

Doing Things Differently

• Creating a complex stimulating environment
• Rehab should be fun and interesting
• Promise of technology to further improve intensity of therapeutic experience
"The future is not what it used to be"
Yogi Berra