Neurologic Physical Therapy from 10,000 feet – Implications for Individual Practice

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Main References for Presentation

- Acute Care:

- Inpatient Rehab:

Functional Independence Measure®

- Mobility
  - transfers (bed/chair/wheelchair)
  - transfers (toilet)
  - transfers (tub/shower)
  - walking/wheelchair locomotion
  - stairs

- Self-Care
  - eating
  - grooming
  - bathing
  - dressing-upper body
  - dressing-lower body
  - toileting
  - bladder management
  - bowel management
Functional Independence Measure®
- Cognition
  - comprehension
  - expression
  - social interaction
  - problem solving
  - memory

Settings for Rehab
- Acute
- SNF - unique to USA
- Inpatient Rehab - guideline by Weinstein et al. advocates admission here as opposed to SNF.
- Trends over the last 2 decades.
- Home Health
- Outpatient - compared to nothing, outpatient rehab reduces odds of a poor outcome (dependency in ADLs) in patients s/p stroke, for every 100 patients treated, 7 will avoid a poor outcome.

Stroke
- Parkinson Dz.
- MS
- Guillain-Barré
- TBI
- SCI

Stroke - Age of onset
- 74% < age 45
- 24% aged 45-64
- 25.4% aged 65-74
- 31.6% aged 75-84
- 19% > 85 y.o.

Stroke - Co-morbidities
- 22.8%
Stroke – Co-morbidities
(For those w/o prior stroke)
- 10.
- 9.
- 8.
- 7.
- 6.

- T4.
- T4.
- 3.
- 2.
- 1.

BP Recommendations
Post-Stroke

Neurologic PT Based on Pathology
- Stroke
- Acute
- Inpatient rehab
- Parkinson Dz.
- Multiple Sclerosis
- Guillain-Barre
- Traumatic Brain Injury
- Spinal Cord Injury

Top 3 Reasons
Patients Get PT in Acute Care
1. Joint replacement
2. Rehabilitation care
3. STROKE

Type of Acute Setting
Stroke Center
- Better outcomes obtained here
  - Decreased mortality rate 1 year later,
  - Less d/c to LTC,
  - Less dependency
  - Shorter LOS

General Medical Ward
- Commonplace
Rehab in acute stroke unit is one of the features that leads to lower levels of disability, lower mortality, and lower rate of institutional care one year later.1

Stroke guidelines indicate PT should be a default referral for patients w/ acute stroke who can tolerate it.1

How many patients w/ stroke do not get PT in acute?

Patients receiving no therapy were more likely to:
- be of European-descent;
- be male;
- from suburban or rural areas;
- have short LOS of 1-2 days;
- less impaired;
- more likely to be discharged home;
- have had a higher risk of readmission.

Predictors of PT Use in Acute Post-Stroke
- older age,
- on Medicaid or uninsured,
- LOS > 4 days, and
- hospital w/ major medical school affiliation.14

Predictors of NOT getting PT in Acute Post-Stroke
- CHF,
- a fib,
- hemorrhagic stroke,
- hospital uses contract PTs

$\text{Median Charge for PT}
\text{Charges in Acute}
\text{Maximum Charge for Rehab}

5% of total hospital bill
$1121 (in 2007)\textsuperscript{14}
\sim$1420 today


Intensity of PT (measured by charges)
HIGHER for...
- older patients,
- Medicaid,
- LOS 4-6 days,
- depression.\textsuperscript{14}

Intensity of PT LOWER for...
- females,
- patients w/ hemorrhagic stroke,
- renal failure, and/or
- COPD\textsuperscript{14}

Recommendations for Rehab in Acute Post-Stroke
- shorter, more frequent sessions
  - frequency of PT sessions is the 3rd best predictor of stroke outcomes behind age and stroke severity (AVERT Study)\textsuperscript{16}
  - not within 24 hours of stroke onset
- also AVERT Study, different article\textsuperscript{17}

LOS in Acute for Stroke
- Range 1 day to several months
- Mean = 3.0 days

Discharge Disposition Post-Stroke\textsuperscript{8}

Percentage of Patients Experiencing Readmissions

\textbf{Percentage of Readmissions}

\begin{tabular}{|c|}
\hline
1 Readmission & 46 \ 3+ Readmissions & 13 \\
\hline
\end{tabular}
**Outcome Variable**
- Hospital readmission within 90 days of discharge
  - To that same hospital
  - To any other hospital in that same state
- Also analyzed 30-day readmission rate

**Exposure Variable**
- Presence and intensity of Rehabilitation Services (PT, OT, Speech)
  - Charges for these services
  - Divided into quintiles
    - No Therapy
    - Low Intensity
    - Medium Low Intensity
    - Medium High Intensity
    - High Intensity

**Covariates**
- Demographic Characteristics (n=6)
  - Age
  - Sex
  - Primary Payer
  - etc.
- Hospital Quality Indicators (n=9)
  - Number of Patients with Stroke Admitted to the Hospital
  - Number of Hospital Beds
  - Medical School affiliation
  - etc.

**Covariates (cont.)**
- Stroke/Illness Severity Indicators (n=21)
  - Length of Stay
  - Discharge Disposition
  - Number of medical/surgical procedures
  - etc.
- Comorbidities (n=23)
  - HTN (81.2%)
  - Cardiovascular DZ (59.8%)
  - Dyslipidemia (52.0%)
  - etc.

**Statistical Model without Covariates**

<table>
<thead>
<tr>
<th>THERAPY INTENSITY</th>
<th>COX REGRESSION MODEL (95% CI)</th>
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<tr>
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<td>1.00 (1.00, 1.00)</td>
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<td>High Q</td>
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**Statistical Model with Covariates**

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<tr>
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<td>1.08 (1.03, 1.13)</td>
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<tr>
<td>High Q</td>
<td>1.08 (1.03, 1.13)</td>
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<tr>
<td>(All Ref. 95% CI)</td>
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Conclusions

The presence of and increased intensity of rehabilitation service use in the hospital setting was associated with a lower risk of 30-day hospital readmission. The results held true for 30-day readmission rates as well.

Inpatient Rehabilitation

Stroke and other Pathologies (PD, MS, GBS, TBI, SCI)

Trends in Inpt. Rehab Over Time


Program Interruptions & D/C to Acute (%)

Total FIM® Admission Score Mean

LOS (days)
MOST Likely to be Independent in ...
- Eating
- Grooming
- Walking/Wheelchair (SCI)
- Bowel continence (TB & Stroke)

LEAST Likely to be Independent in ...
- Stairs
- Bathroom-related activities
- Bathing
- Tub transfers
- Memory (TB)
- Problem-solving (TB & Stroke)

Discharge to Community (%)

- Patients coming to Inpt. Rehab in ...
  - more fragile medical conditions,
  - more dependent conditions
- LOS is shorter
- Efficiency of rehabilitation is the same or slightly improved
- Patients less independent at discharge
- Patients less likely to be discharged to community

- 52-year old male diagnosed with GBS
- following an episode of pneumonia and flu vaccine
- Outpatient PT clinic
- 24 visits
Key Components of Effective Inpatient Stroke Rehabilitation

1. Multidisciplinary/interdisciplinary team work
2. Team work coordinated by regular meetings
3. Goal focused activities and individualized goals
4. Emphasis on functional activities, e.g., mobility, ADL
   (don’t ignore relevant impairments)

5. Discharge planning, commenced early after admission
6. Involvement of patient and family in rehabilitation process
7. Education provision to patients and families
8. Staff w/ specialized skills and interest in stroke

9. The more (intensive) therapy, the better
   - Jette et al. found that part of this in SNFs who received more
     therapy showed shorter LOS and improved mobility and
     ADL functioning
   - Spivak et al. found that part of this in Inpt. Rehab who received
     more intensive therapy achieved a higher Rancho Level and
     better higher-level cognitive skills by 66.
   - Frazzita et al. found that part of this in Inpt. Rehab who received
     more intensive therapy had decreased medication
     requirements 3 year later.

Readmissions and Other Indicators of Poor Care

Percentage of Medicare patients in Inpt Rehab
- who were d/d back to community and
- did not die or get rehospitalized within 30 days.

63.7%

Factors that Increase Risk of Poor Outcomes

- Healthcare facility
- Healthcare utilization
- Sociodemographic Variables
- Medical Diagnosis
- Comorbidities
- Functional Outcomes
Healthcare Facility

Factors that Increase Risk of Poor Outcomes
- For-profit Inpt. Rehab (only by 0.1%)\textsuperscript{17}
- Inpt. Rehab facility in the...
  1. The South (higher rate of acute readmission after d/c from Inpt. Rehab facility)\textsuperscript{17}
  2. The West (community discharge rates lowest)\textsuperscript{16,18}

Healthcare Utilization

Factors that Increase Risk of Poor Outcomes
- Hospitalization during the previous 6 months\textsuperscript{18}
- ICU use during acute stay\textsuperscript{18}
- LOS (shorter Inpt. Rehab and longer acute care)\textsuperscript{18,20}

Sociodemographic

Factors that Increase Risk of Poor Outcomes
- No/Unreliable Social Support\textsuperscript{19}
- Public Insurance (for patients w/TBI)\textsuperscript{18,31}
- Age\textsuperscript{18,30,31}
  1. However, most patients >85 y.o. post-stroke improve their FIM scores and 34% are d/c'ed back to the community.)\textsuperscript{17}

Medical Diagnosis

Factors that Increase Risk of Poor Outcomes
- General debility\textsuperscript{19,21}
- Hemorrhagic stroke (vs. ischemic stroke)\textsuperscript{22}
- SCI\textsuperscript{22}
  1. 30-day rehospitalization rate = 23%\textsuperscript{22}
- TBI\textsuperscript{22}
  1. 30-day rehospitalization rate = 20%\textsuperscript{22}

Comorbidities

Factors that Increase Risk of Poor Outcomes
- Causes of rehospitalization w/in 30 days of d/c from Inpatient Rehab\textsuperscript{22,26}
  1. Infection = 4.3%
  2. Other common cause of rehospitalization during Inpatient Rehab
  3. Inadequate management of chronic conditions = 32.2%
  4. Inadequate management of other unplanned events = 24.7%

  * Concurrent pressure wounds\textsuperscript{27}
  * Less likely to be d/c'ed to community
  * Lower functional gains

Functional Outcomes

Factors that Increase Risk of Poor Outcomes
- Lower functional outcomes at admission to Inpt. Rehab associated w/ greater likelihood of d/c to institutional (vs. community) setting.\textsuperscript{28}
- Lower functional outcomes at d/c predictive of rehospitalization w/in 30 days of d/c from ...
  1. Inpatient Rehab.\textsuperscript{22,26}
  2. SNF\textsuperscript{22}
  3. Home Health\textsuperscript{22}
**Satellite (International) View**
Outcomes Comparison Between Different Countries

**Europe vs. USA**
- Longer LOS in Europe
- Outcomes somewhat more difficult to compare since Europe uses the Barthel Index
- Anecdotally, in Italy, inpatient rehab LOS is longer but intensity is more casual than in the US.

**Table 1. Comparing Stroke Rehabilitation in New Zealand, the United States, Canada, and Australia**

<table>
<thead>
<tr>
<th>Country</th>
<th>Male Median</th>
<th>Female Median</th>
<th>Male Mean</th>
<th>Female Mean</th>
<th>Male 95% CI</th>
<th>Female 95% CI</th>
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<td>25</td>
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<td>31-33</td>
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<tr>
<td>Canada</td>
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<td>26</td>
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<td>32-38</td>
<td>30-38</td>
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<tr>
<td>Australia</td>
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<td>28</td>
<td>36</td>
<td>31</td>
<td>33-39</td>
<td>32-33</td>
</tr>
</tbody>
</table>

**Implications for Practice**
Structures, Processes of Care, & Policy

- Make stroke units or teams in your setting
- Make _______ units or teams in your setting
**Processes of Care**

**Implications for Practice**

- Early time to admission, if possible
- If on the border between recommending SNF vs. Inpt. Rehab, go with Inpt. Rehab
- Send patients w/ GBS to Inpt. Rehab, unless they gain indep. in acute

**Processes of Care**

**Implications for Practice**

- Begin therapy early
  - early intervention – better for plasticity; better for FIM score gains, irrespective of the severity of the stroke
  - not within 24 hours of stroke onset (AVERT)
  - get patients upright as quickly as possible

**Processes of Care**

**Implications for Practice**

- Raise the intensity of therapy, –
  - Patients w/TBI and stroke in the US spend lots of time in rehab in sedentary positions (83% for TBI), and doing non-therapeutic activities (78% for TBI; 73% for stroke).
- Empower patients to do therapeutic activities outside of the session.

**Processes of Care**

**Implications for Practice**

- Task-specific therapy –
  - evidence emerging of superiority of task-specific training re: cortical reorganization, ADL gains, and reduced LOS.
- Early discharge planning

**Processes of Care**

**Implications for Practice**

- Use harnesses and BWS systems to maximize repetitions
- Teach the patient and family to do PROM and spend therapy time doing upright activities.

**Processes of Care**

**Implications for Practice**

- In light of short LOS, focus on independence and safety 1st in institutional settings, then ameliorating impairments in community setting (home health & outpatient)


**Processes of Care**

- In acute and Rehab, push for therapy over the week-end
- In Rehab, push for longer LOS where warranted
- Community-based Rehab in Neuro setting – (e.g. Day Rehab)

**Policy**

Implications for Practice

Insert Your Idea Here

**References**

(see attachment)

Thanks for flying!
Reference List

Neurologic Rehab from 10,000 Foot View
Bill Andrews PT, MS, EdD

Board Certified Specialist in Neurologic Physical Therapy
Professor – Elon University


