Acute Care Physical Therapy

Guest Editor: Sharon Gorman, PT, DPTSc, GCS

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Physical Therapy Virtual Conference

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 10/28</td>
<td>A Practical Approach to Managing Socially Complex Patients in Acute Care</td>
<td>Mona Wong, PT, DPT</td>
</tr>
<tr>
<td>Tues 10/29</td>
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<td>Angela Rusher, PT, DPT, NCS</td>
</tr>
<tr>
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<td>Jennifer Liu, PT, DPT, NCS</td>
</tr>
<tr>
<td>Thurs 10/31</td>
<td>Management of Psychiatric Comorbidities for the Acute Care PT</td>
<td>Emily Fleischman, PT, DPT, GCS</td>
</tr>
<tr>
<td>Fri 11/01</td>
<td>Beyond Burnout: Returning to Satisfaction and Purpose in Health Care</td>
<td>John Corsino, PT, DPT</td>
</tr>
</tbody>
</table>
Beyond Bed Exercise in the Acute Neurologic Population

Angela Rusher, PT, DPT
Board Certified Neurologic Clinical Specialist

October 29, 2019 (12:00 -2:00pm)

Introduction

Angela Baldwin Rusher, PT, DPT
Board Certified Neurologic Clinical Specialist

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Samuel Merritt University

Sr. Neuro Outpatient PT – Kaiser Permanente
Learning Outcomes

After this course, participants will be able to:

- Identify at least three strategies that utilize an interdisciplinary team approach incorporating mobility technology into treatment interventions for improved patient outcomes and discharge planning.
- List at least three therapeutic exercises that maximize trunk balance/control to improve functional outcomes.
- Identify at least three appropriate outcome measures for the acute neurologically involved patient.
- List at least three Aerobic Exercise activities, with focus on appropriate dosing and assessment, for the acute neurologically involved patient.

Defining Acute Neuro Patient

- An individual with a NEW dysfunction and impairment/s
- Where might we treat them?
  - Acute care-hospital; ICU
  - SNF
  - Acute Rehabilitation Unit
  - Home Health
- Goals?
  - To promote optimal functional mobility to discharge to next level of care or link to community resources
Hospitalization Risks – Bed Rest

- 4-5% loss of muscle strength for each week of bed rest
- ICU acquired neuromuscular weakness
- Pressure ulcers
- Bed rest contributes to:
  - Fluid loss
  - Postural hypotension
  - Tachycardia
  - Decreased stroke volume
  - Decreased cardiac output

Hospitalization Risks & Risk for Re-hospitalization Factors

<table>
<thead>
<tr>
<th>Hospitalization Risk</th>
<th>Re-hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>Results from:</td>
</tr>
<tr>
<td>Delirium/Confusion</td>
<td>- Poor HH care/ SNF</td>
</tr>
<tr>
<td>Hospital acquired infections</td>
<td>- No PT within 30 days of discharge</td>
</tr>
<tr>
<td>Increased disability and mortality</td>
<td>- Racial &amp; socioeconomic disparities</td>
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</tbody>
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<pre><code>                                                                                   |  - Poorly staffed inpatient nursing                                               |
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Rehab = Function

Early vs. Progressive Mobility

**EARLY MOBILITY**
- Where? ICU
- When? Once medically stable
- Outcomes?
  - ↑ patient function
  - ↓ delirium
  - ↓ time on ventilator
  - ↑ likelihood home D/C

**PROGRESSIVE MOBILITY**
- Where? All care environments
- When? Throughout course of care
- Outcomes?
  - ↑ patient function
  - ↓ delirium
  - ↓ time on ventilator
  - ↑ likelihood home D/C
Early & Progressive Mobility

- Mobility hallmarks
  - Weight-bearing
  - Progressive Vertical positioning
- Active & Passive devices
  - Passive as a step towards active participation
  - Example = Unresponsive patient
    - Turning schedule
    - Increased head of bed
    - Weight bearing on foot board
    - Bed-in-chair position

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Early & Progressive Mobility - Function

- Martinez-Velilla N et al 2019 showed that moderate intensity individualized programs that included walking and balance training 2x/day improved functional outcomes in acutely hospitalized frail elderly
- Lang CE et al 2015 addressed dose and timing in neuro-rehabilitation after stroke
  - Early Contact
  - More intense therapy
Early & Progressive Mobility - Cognition

- Physical Exercise has been shown to improve:
  - Cognitive function such as executive function
  - Verbal fluency

- 5 days of individualized exercise in acute care can help REVERSE cognitive impairment associated with the acutely ill older adult

Physical Therapist Role

- Continued dynamic assessment with rapid decision making for discharge planning considering patient mobility and safety

- Provides critical communication within patient care team
Physical Therapy Goals – Acute Care

- Improve patient mobility
- Maintain patient safety
- Create optimal plan of care
- Appropriate discharge setting per individual patient

Barriers to Early Mobilization

**Clinician**
- Expectations and knowledge
- Safety concerns surrounding line/tube management
- Environmental influences

**Patient**
- Hemodynamic instability
- Respiratory instability
- Sedation
- Agitation
- Patient refusal
Rehabilitation – Barriers to Discharge

- Rehab therapist vs. triage therapist
  - How do we change the culture?

Neuro Rehab: What we know

*Kleim & Jones: Principles of Plasticity 2008*

- Use It or Lose It
- Use It and Improve It
- Specificity
- Repetition Matters
- Intensity Matters
- Time Matters
- Salience Matters
- Age Matters
- Transference
- Interference
Neuro Rehab: What we know


- Endurance
- Supportive Device
- Assistance Given
- Developmental sequence
- Work
- Regional
- Amplitude

- Velocity
- Environmental
- Variability
- Components of Movement
- Task Attention
- Feedback

Early Mobility Technology – What?

Can be found here: https://www.shermanoaksmedical.com/shop/product/liko-sabina-200-electric-sit-to-stand-lift

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Early Mobility Technology – What?

- Benefits:
  - Safe
  - Decrease patient effort
  - Decrease clinician burden
  - Accomplishes early mobility
    - Improve patient endurance
    - Improve patient strength
  - Decreases clinician time (5 min less than manual transfers)
    - This includes time needed to locate and set up equipment

Early Mobility Technology- What?

- <$2,000
  - Slide sheet
  - Non-motorized sit-to-stand
  - Cycle ergometer
- $2,000 – $10,000
  - Motorized sit-to-stand
  - Floor lift
  - Tilt table
  - Recliner chair
  - ICU walker
- >$10,000
  - Critical Care Bed
  - Upright Lift Bed
  - Ceiling Lift
Early Mobility Technology – Who?

- Physical Therapists
- Occupational Therapists
- Nursing Staff
- Caregivers/Family Members as appropriate

Early Mobility Technology Interventions

- In Bed
- Around the Bed
- Beyond the Bed
Interventions – Slide Sheet

- Functional Mobility
  - Rolling
  - Lateral shifting
  - Repositioning
  - Patient assist in self care

- Collaborative Team Approach
  - Nursing and Family training to use for bed mobility to allow active patient participation

Interventions – In Bed Slide Sheet
Interventions – Around Bed Slide Sheet

- Transfers
  - While utilizing a transfer board
  - Scooting in bed in long sit
  - Consider posterior scoot into wheelchair/chair/commode

- Seated
  - Anterior/posterior pelvic tilt
  - Lateral pelvic tilting
  - Reciprocal scooting

Interventions – Tilt Table/Upright Tilt Bed/Geri Chair

Interventions – In Bed

Tilt Table/Upright Tilt Bed

- Allows slow progression to upright
- Allows incremental weight bearing for longer duration
- Other exercises can be performed while tilting
- Facilitates arousal and acclimatize patient to position change
- Neuro Patients:
  - Improve: respiration, decrease tone with WB, orientation to upright/head righting, follow commands

Interventions – In Bed

Ceiling Lift

https://www.multicaremedical.co.uk/product/gh3-ceiling-hoist-positioning-lock/

<table>
<thead>
<tr>
<th>Interventions – In Bed Ceiling Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slings</strong></td>
</tr>
<tr>
<td>- Repositioning or Transfer sling</td>
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<tr>
<td><strong>Functional Mobility</strong></td>
</tr>
<tr>
<td>- “walking” along the bed while hovering</td>
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<tr>
<td>- Supported upright sitting vs. sling on slack sitting EOB</td>
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<tr>
<td>- Allows transition from supine to sit in decreased time to work on sitting activities and upright tolerance</td>
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<tr>
<td>- Add task practice approach - ADLs</td>
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<tr>
<td><strong>Collaborative Team Approach</strong></td>
</tr>
<tr>
<td>- Have nursing/family incorporate patient participation</td>
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</tbody>
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Interventions – Around Bed Ceiling Lift

- Slack sling in sitting to improve trunk activation but safe
- Consider walking sling to promote weight bearing

Interventions – Beyond Bed Ceiling Lift vs. Hoyer/Liko Lift


Interventions – Beyond Bed Ceiling Lift vs. Hoyer/Liko Lift

- Expands patient’s environment
- Orientation to executive function (ie: self care tasks)
- Consideration for higher functioning patients should progress towards more independent forms of locomotion.
- Facilitate balance reactions skills (ie: reactive)

Interventions – In & Around Bed Cycle Ergometry

- Systems
  - Cardiopulmonary
  - Musculoskeletal
- Active Participation
  - Assisted cycling
  - Resisted cycling
- Can be set up by nursing staff once appropriate dosing is determined to get increased amount in during the day for improved endurance/strength
  - Adjunct to other skilled PT/OT interventions
Interventions - Around Bed
Sit-to-Stand Device

- Motorized
  - Static standing, transfers, ambulation
  - Therapy & Nursing tasks
    - BP, posterior wound care
- Non-Motorized
  - Can initiate stand, but may buckle


Interventions – Beyond Bed
Sit-to-Stand

- Transfers to bathroom or another part of the room for self care
- Some allow for ambulation
- Initiation of weight bearing activities in an absence of normalized strength
Interventions – Around Bed

Others

- Wheelchairs
  - Pressure relief, LE mobility, seated ADLs
  - Seated therex, posture, UE strengthening
  - Balance, reaching out of BOS
- Cardiac Chair
  - Improve upright tolerance, progressing to seated positions
- Walking device (FWW, SPC, etc.)
  - Side stepping along the bed
  - Standing tolerance
  - Balance

Target the Trunk

- Proximal trunk control is pre-requisite for balance, distal limb control, and functional activities
- Early predictor for improved functional outcomes after stroke
- Spending time focusing on the trunk in acute care can help prepare a patient to progress functionally in their next discharge location.
Low Tech – Target the Trunk

- Deshmukh & Kumar 2018
  - Compared trunk exercises with swiss ball vs. on bed in 40 people with stroke.
    - Six 45 min sessions a week for 2 weeks
  - Results found swiss ball exercises more effective than plinth exercises on trunk balance
  - Why swiss ball?
    - Postural perturbation with reactive balance responses in the trunk
    - Increased trunk lateral flexion and trunk rotation (compared to plinth exercises)

Trunk Control - Physioball

- Exercises:
  - Supine
    - Pelvic bridging
    - Unilateral bridging
    - Trunk rotation
  - Seated
    - Static sitting balance
    - Trunk flexion
    - Trunk extension
    - Trunk lateral flexion
    - Trunk rotation
Now we know what to do, but how do we measure it?

Outcome Measures – Bed Level

- AM-PAC score (Activity Measure for Post-Acute Care Inpatient Short Form
  - Designed to assess from completely DEPENDENT to INDEPENDENT
  - The Short Form is often used – can be answered by patient or surrogates or PT’s opinion on how they would perform.
- FIST = function in sitting
- 5x sit to/from stand
Outcome Measures – Ambulatory

- Gait Speed
  - Quick measure of gait
  - Able to determine category of fall risk and level of mobility
- 6 minute Walk Test
- TUG
- DGI vs. FGA
  - Assesses higher level balance
  - Appropriate to help support need for Acute Rehab for ambulatory patients
  - Con = need stairs, cone, and blocks

Tracking Progress Objectively

- Time
  - Cycle Ergometry time
    - Endurance
  - How long for each functional activity (transfers, bed mobility, etc.)
    - Shows efficiency
  - Weight Bearing or Tilt bed angle & Time
    - Endurance; Upright tolerance
Tracking Progress Objectively

- Distance
  - Forward, backward, lateral along the bed
  - Rest breaks sitting vs. standing? How many?
- Assist level
  - With/without assistive device?
  - Assist provided?
  - How many therapists?
  - Use of mobility technology?
    - How much support used?
    - Sling on slack?

Aerobic Exercise in Acute Care?
Aerobic Exercise Application

- Aerobic Exercise (AE) improves aerobic capacity and reduces morbidity in neurologic populations
  - Contributes to other health benefits
- Application of AE in adult neuro-rehabilitation is often challenging
  - Barriers and perceived barriers
  - Lack of adaptive equipment
  - Lack of screening tools
    - RPE often used along with heart rate monitoring

Post CVA AE Training Parameters

- Interventions
  - Walking (treadmill, overground)
  - Stationary cycle
  - UE and/or LE ergometry
  - Seated stepper (Nu-Step)
- Parameters
  - 40-70% peak O2 uptake
  - 40-70% HRR
  - 50% - 80% Hrmax
- Parameters (cont)
  - RPE 11-14
  - 3-7 days/week
  - 20-60 min/session (at least 10 min bouts)
- Outcome Measures
  - VO2
  - 6 min walk test
  - 10 meter walk test
  - RPE
  - SF 36
  - Stroke Impact Scale
Post SCI AE Training Parameters

- BWSTT
  - Ranges between 60-300 min/wk
  - 3-23 weeks
  - Enhances functional ambulation in ASIA C & D

- UE Ergometry
  - Intensity threshold of 70% HRmax
  - 20 – 60 min/day
  - 3 days/wk
  - 6-8 wks

- Functional Electrical Stimulation
  - 3 days/wk for 8 weeks

Neurodegenerative AE Training Parameters

**Multiple Sclerosis**
- Interventions
- Parameters
  - 50-70% VO2max
  - 60-80% of Hrmax
  - RPE 12-14
  - 10-60 min
  - 2-3 days/wk

**Parkinson’s Disease**
- Parameters
  - ≥ 150 mins moderate intensity/week
  - ≥ 75 mins of vigorous intensity/week – OR –
  - Combo of both
    - 3 days moderate + 2 days vigorous intensity
### Neurodegenerative AE Training Parameters

<table>
<thead>
<tr>
<th>ALS</th>
<th>Huntington’s Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Aerobic activities at submax levels</td>
<td>• Use RPE, monitor vitals, S/S</td>
</tr>
<tr>
<td></td>
<td>• 3x/wk</td>
</tr>
<tr>
<td></td>
<td>• 30 min/sessions</td>
</tr>
<tr>
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<td>• 50-80% HRmax</td>
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### AE: When should you stop?

- Indications to terminate exercise session
  - Any abnormal response
  - New onset of ataxia
  - Dizziness, c/o feeling faint
  - Pt appears pale or cyanotic
  - Marked fatigue, SOB or wheezing
  - Severe leg cramps
  - C/o chest pain
  - The patient desires to stop!
Take Home Messages

- Safe Patient Handling Mobility Tech
  - ↓ Therapist burden
  - ↓ Patient effort
  - ↑ Efficiency
  - ↑ Early mobility/Progressive mobility participation
  - ↑ interdisciplinary approach/collaboration
- Low tech equipment can enhance patient outcomes (target the trunk). Don’t be afraid to use in Acute Care!

Take Home Messages

- Aerobic Exercise should be considered in any neuro-rehabilitation program
- Use outcome measures to support your interventions to show need for rehab instead of triage
Thank You

- Special Thanks to Dr. Sharon Gorman for her mentoring and support in developing this course

- Thank you, Dr. Kristen Ikeda for contributions to the Aerobic Exercise training parameters.

References

- Please see attached PDF for References
Questions??

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