Abstract Presentations

1. A Three Part Educational Intervention to Enhance Nursing Knowledge of ICU Delirium: Cynthia K. Fine, MSN; Christine DeForge, BSN; Natalie Yip, MD; Abigail Zemmelman, OTR/L; Amy Dzierba, Pharm. D; Patrick Ryan, MS; Winsoe Overstreet, MSN
   Affiliation: New York Presbyterian Hospital: Columbia Irving University Medical Center

2. Early In-Line Speaking Valve Use Improves Outcomes for Long‐Term Acute Care Hospital Patients: Beth Sarfaty, PT, MBA; Amanda Dawson, PhD; Tessa Terwilliger, RN; Erica Hill, MPA; Elizabeth Hoffert, RN; Nancy Toms, SLP‐CC; LoriAnn Kettler, RT; Samuel Hammerman, MD
   Affiliation: Select Medical

   Affiliation: Amsterdam University of Applied Sciences, Amsterdam, The Netherlands

4. Mobility in the Critically Ill Pediatric Patient on ECMO Support: Jennifer E. Snider, MSN, CPNP-AC; John Young, RRT; Margret Birdsong, MSN, CPNP, CWON; Sapna R. Kudchadkar, MD; Alejandro Garcia, MD; Emily Warren, MSN, CNS; Yun Kim, MS, OT/L; Angela Prouty, Kieran McGuigan, Melania Bembea, MD, PhD
   Affiliation: Johns Hopkins University School of Medicine

5. When There Aren't Enough People: Promoting Interdisciplinary Mobility Throughout the ICU Stay Through Use of Safe Patient Handling and Mobility Equipment: Margaret Arnold, PT, CEES, CSPHP
   Affiliation: Inspire Outcomes LLC

6. Evaluation of Safety and Quality Following Implementation of an Early Mobilization Program in a Pediatric Intensive Care Unit: Cosme Taipe RN; Brittany Sobin RN; Bettina Di Franco, OT; Alix Watson CCLS; Chani Traube MD; Christine Joyce, MD
   Affiliation: New York Presbyterian Weill Cornell
Abstract Presentations

   Affiliation: Johns Hopkins Hospital

9. Exploring Nursing Perceptions to Early Mobilization in the Cardio-Thoracic Intensive Care Unit at Columbia Irving University Medical Center: Alicia Tucker, BSN, RN, Cynthia Fine MSN, CRRN, Deborah Burns MSN, CNS
   Affiliation: Columbia Irving University Medical Center

10. Understanding Perceived Barriers to Patient Mobility in a Medical ICU Using a Validated Early Mobility Barriers Survey: Carrie M. Goodson, MD MHS; Lisa A. Friedman, ScM; Earl Mantheiy, BA; Kevin Heckle, BS; Annette Lavezza, OTR/L; Amy Toonstra, PT DPT CCS; Ann Parker, MD; Jason Seltzer, PT DPT; Michael Velaetis, PA-C MS; Mary Glover, MSN RN CCRN; Caroline Outten, BSN RN CCRN; Kit Schwartz, BS RRT MHA; Antionette Jones, PCT; Sarah Coggins, OTR/L; Dale M. Needham, FCPA MD PhD
    Affiliation: Division of Pulmonary and Critical Care Medicine, Johns Hopkins School of Medicine

11. Creating a Protocol for the Mobilization of Patients with Critical Lines: A Physical Therapist Driven Multidisciplinary Initiative: Sara Krasney, PT, DPT; Janelle Jablonski, PT, DPT; Allison Kras, PT, DPT
    Affiliation: Tufts Medical Center

    Affiliation: University Health Network, Toronto General Hospital
Poster Presentations

1. Networking for Occupational Therapists: The Significance of The NYC OT ICU Discussion Group
   Lauren Cohen, BS, MS
   Affiliation: New York Presbyterian Hospital - Columbia University Medical Center

2. Patient- and Family-Centered Occupational Therapy with a Patient with Bilateral Subarachnoid Hemorrhage with Right Middle Cerebral Artery Bifurcation Aneurysm
   Sela Han, MS Neuroscience, MSOT
   Affiliation: St. Jude Medical Center in Fullerton, CA

   Sung J. Cho, SPT
   Affiliation: UF Health Shands Hospital

4. Acute Critical Care in the Classroom: Designing Realistic and Effective Teaching Tools Throughout Curriculum
   Andrea Attorri, PT, DPT
   Affiliation: Wake Forest Baptist Health

5. Training the Next Generation of ICU Early Mobilization Therapists
   Lauren Cohen, BS, MS
   Affiliation: New York Presbyterian Hospital-Columbia University Medical Center

6. Utility of Early Mobility in Post Open Heart Surgery Patients
   Dalton Morgan, BS
   Affiliation: Southern Illinois Healthcare

7. ICU Rehab in a Small Community Hospital
   Samantha Bates, MOTR/L
   Affiliation: Camden Clark Medical Center

8. A Country-Wide Educational System for Early Mobilization
   Hajime Katsukawa, PhD
   Affiliation: Japanese Society for Early Mobilization
Poster Presentations

9. Development and Implementation of a Pediatric Intensive Care Unit Diary
   Elizabeth A. Herrup, MD
   Affiliation: Johns Hopkins department of anesthesia and critical care medicine

10. What Makes Early Mobilization Different in the Neurologic ICU?
    Carly Goldberg, MS
    Affiliation: NYPH-Columbia

11. The Mobilization of Multiple Patients Requiring Biventricular Support Via CentriMag: A Retrospective Case Study
    Allison Kras, DPT
    Affiliation: Tufts Medical Center

    Tsung-Hsien Wang, PhD student
    Affiliation: Landseed Hospital, Taiwan

13. Importance of Early Mobilization in Mechanically Ventilated Oncology Patient Receiving Chemotherapy and Radiation
    Lindsay Riggs, BS, DPT
    Affiliation: The Ohio State University Wexner Medical Center/The James Cancer Hospital

14. A Quality Improvement Initiative to Optimize Goal-Directed Sedation in the Pediatric Intensive Care Unit
    Meghan Shackelford, MSN, CRNP-AC
    Affiliation: Johns Hopkins University School of Medicine

15. The Incidence, Characteristics and Effects of Chronic Pain in ICU Survivors
    Helen Devine, BSc (Hons) Pg Dip
    Affiliation: NHS Greater Glasgow and Clyde

16. Picking up the Pieces -Qualitative Evaluation of Follow-Up Consultations with Patients Post Intensive Care Treatment
    Ann Louise Hanifa, B.Sc
    Affiliation: Aalborg University Hospital
17. Correlation of Pre-Surgery Frailty-Related Measurements with Post-Transplant Outcomes in Patients After Lung Transplant
   *Angela N Henning, MSPT, B.Sc, B. HSc*
   Affiliation: University of Kentucky HealthCare

18. Mobility Level as an Indicator of Survival for Patients Requiring Acute Mechanical Circulatory Support Via Axillary Impella 5.0
   *Allison Kras, DPT*
   Affiliation: Tufts Medical Center
Abstract Presentations

6th Annual Johns Hopkins Critical Care Rehabilitation Conference
Baltimore, MD
A Three Part Educational Intervention to Enhance Nursing Knowledge of ICU Delirium
Greetings from NYP: Columbia University Irving Medical Center
What is Delirium?

- Delirium is defined as a disturbance of consciousness with inattention accompanied by a change in cognition or perceptual disturbance that develops over a short period of time (hours to days) and fluctuates over time [The Diagnostic and Statistical Manual of Mental Disorders (DSM IV)].
What do we know about Delirium?

- Delirium is an under recognized, under diagnosed problem that according to the literature occurs in anywhere from thirty to ninety percent of patients in the ICU.

- It is unpredictable.

- It has **multiple causes** which are often hard to pinpoint. (Vanderbilt University)

- It has an impact on outcomes: short term and long term.
Impact of Delirium on Outcomes

- Increased ICU Length of Stay (8 vs 5 days)
- Increased Hospital Length of Stay (21 vs. 11 days)
- Increased time on the Ventilator (9 vs 4 days) - Higher costs ($22,000 vs $13,000 in ICU costs)
- Estimated $4 to $16 billion associated U.S. costs
- 3-fold increased risk of death
- Possibly increased Long-Term Cognitive Impairment (aka, ICU accelerated dementia)

Types of Delirium

- Delirium is often invisible unless you are assessing for it!
- There are three motoric types of delirium:
  - hyperactive (often called ICU Psychosis): < 1% of all patients who are diagnosed with delirium!
  - hypoactive (also called quiet delirium): 35% of patients who are diagnosed with delirium. Older age is predictor of hypoactive delirium.
  - mixed (fluctuation between hypo and hyper): 64% of patients who are diagnosed with delirium.
At New York Presbyterian Hospital, policy is that the nurse taking care of a patient in the MICU would assess their patient at least once per shift, report the findings to the health care provider and the on coming nurse.

An educational offering was done in January 2012 by Nursing Education for all ICU nurses.

Shortly there after, a similar offering was done for OT and Speech Language Pathology.

Educational efforts for onboarding new nurses were also implemented.
What Do we Know about Delirium Assessment at NYP: CUIMC in 2016?

A retrospective chart review showed that delirium continued to be and under assessed and under addressed in our MICU.
Increasing Knowledge and Comfort in Performing the CAM-ICU

- Intensive day long program was held with an expert from Vanderbilt University to develop “Delirium Champions”.

- This group designed a three part educational intervention:
  - Didactic education on delirium.
  - Bedside education on the implementation of the CAM-ICU, with validation of clinical skills
  - Development of an interdisciplinary, non-pharmaceutical delirium bundle.
Development and Use of Non Pharmaceutical Bundle

- What did the Bundle consist of?
  - Family education re: delirium
  - Digital clocks with time and date
  - Large dry-erase calendars on wall
  - Sign with hospital name, city
  - Calming sensory environment
  - Availability of interpreter services
  - Music and TV

Delirium Learning Goals & Objectives

- Raise awareness about delirium in hospitalized medically ill adult patients, especially the elderly and be able to
  - Describe at least 3 risk factors
  - Cite occurrence rates of delirium in the general hospital and in the ICU
  - State 3 outcomes of delirium in the elderly
- Learn how to detect delirium and be able to
  - Describe generally how the CAM and the DOSS are used to detect delirium
  - Learn how to manage, treat, & prevent delirium and be able to
    - Describe general pharmacologic and non-pharmacologic treatment and prevention strategies
Percentage of MICU Patients Assessed for Delirium

![Bar chart showing the percentage of MICU patients assessed for delirium from 2012 to 2016. The chart indicates an increasing trend with the highest percentage in 2014.](image-url)
Nurses Self Reported Knowledge of the CAM-ICU
Use of the Non Pharmaceutical Bundle

Data is still being analyzed.
Conclusion

The multi-faceted educational program increased the nurses in this MICU comfort level with utilizing the CAM-ICU and implementing interventions to assist in the management of delirium. We need to continue with increasing the utilization of the CAM-ICU throughout the team.
EARLY SPEAKING VALVE USE IMPROVES PATIENT OUTCOMES

Beth Sarfaty, PT, MBA; Amanda Dawson, PhD; Tessa Terwilliger, RN; Erica Hill, MPA; Elizabeth Hoffert, RN; Nancy Toms, SLP-CC; LoriAnn Kettler, RT; Samuel Hammerman, MD

Select Specialty Hospitals
Recovery from Critical Illness

Communication Challenges

• Estimated 790,257 hospitalized patients on mechanical ventilation (MV) annually\(^1\)

• More than half of those patients may be awake/alert and have some capacity to communicate while on MV\(^2\)

• Inability to communicate contributes to social withdrawal, anxiety, stress, poor sleep, and lack of participation in care\(^3\)

\(^2\) Happ et al, Heart Lung, 2015; 44: 45-49
\(^3\) Sutt et al, Crit Care, 2016; 20: 91.
Recovery from Critical Illness

Communication Challenges

Potentially eligible patients identified through billing data and further screened for being awake, alert, and attempting to communicate for at least one nursing shift, SPEACS-2 study 2009–2011.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Billing data (^a)</th>
<th>EMR screened</th>
<th>Inclusion criteria not met</th>
<th>Assessed for “awake” criteria</th>
<th>Met “awake” criteria</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplant</td>
<td>1240</td>
<td>591</td>
<td>76</td>
<td>515</td>
<td>240</td>
<td>46.60%</td>
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<tr>
<td>NeuroTrauma</td>
<td>520</td>
<td>491</td>
<td>73</td>
<td>418</td>
<td>240</td>
<td>57.42%</td>
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<tr>
<td>Neurological</td>
<td>833</td>
<td>673</td>
<td>85</td>
<td>588</td>
<td>240</td>
<td>40.82%</td>
</tr>
<tr>
<td>Trauma</td>
<td>1064</td>
<td>410</td>
<td>67</td>
<td>343</td>
<td>240</td>
<td>69.97%</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>1014</td>
<td>397</td>
<td>49</td>
<td>348</td>
<td>240</td>
<td>68.97%</td>
</tr>
<tr>
<td>Medical</td>
<td>805</td>
<td>525</td>
<td>66</td>
<td>459</td>
<td>240</td>
<td>52.29%</td>
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<tr>
<td>Total</td>
<td>5476</td>
<td>3087</td>
<td>416</td>
<td>2671</td>
<td>1440</td>
<td>53.91%</td>
</tr>
</tbody>
</table>

\(^a\) mechanical ventilation for >2 days, and first ICU admission during incident hospital stay; EMR – electronic medical record.

Happ et al, Heart Lung, 2015; 44: 45-49
Recovery from Critical Illness

Communication Challenges

“Being on the ventilator wasn’t the worst thing in the world, but not being able to talk was horrid.”

“I think my concern was that I wasn’t able to call anybody to help.”

“There would be times I would be flailing for somebody and they’d say, ‘I’ll be right back.’ And you’re like, ‘No, you don’t understand. I can’t breathe right now. You need to help me right now.’”

Guttermson et al., Intensive Crit Care Nurs, 2015; 31: 179-186
Recovery from Critical Illness

Communication Challenges

Fig. 2. VASES scores prevoice and postvoice.

Freeman-Sanderson et al., J Crit Care, 2016; 33: 186-191
Recovery from Critical Illness

Communication Challenges

Figure 2. Time to phonation.

Freeman-Sanderson et al., Crit Care Med, 2016; 44(6): 1075-1081
Recovery from Critical Illness

Communication Challenges

Fig. 2 Comparison of expiratory volume through the upper airway after swallowing each bolus size with (black columns) and without (striped column) a speaking valve (ANOVA; valve effect $p = 0.0003$; volume effect $p = 0.54$)

*Prigent et al., Intensive Care Med, 2012; 38: 85-90*
Project Goals

1. Multi-disciplinary assessment of ventilator patients’ readiness to use an in-line speaking valve
2. Routine scheduling of speaking activities for ventilated patients
3. Consistent inclusion/exclusion criteria
Determine Readiness During Wean Team Rounds

Ready? Obtain Order

Place on schedule for activity

Post activity, establish routine schedule

Not Ready? Reassess AT LEAST weekly in Wean Team Rounds
**Wean Team Progress Note**

- Completed on all patients weekly as part of wean team
- Screened for readiness to ambulate/speaking valve

---

<table>
<thead>
<tr>
<th>PULMONARY – WEAN TEAM PROGRESS NOTE</th>
<th>Patient: ________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Record #: ________________</td>
<td></td>
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</table>

Wean team rounds conducted and the following has been identified:

- No barriers to weaning, continue current plan of care
- Stalled wean or prolonged weaning due to the following:
  - Copious Secretions
  - Sedation
  - Nutrition
  - Infection
  - Cardiac Instability
  - Fluid imbalance
  - Anxiety/ Depression
  - Other:

Is patient a candidate for in-line Speaking Valve use? Yes ___ No ___ NA ___ Actively tolerating Speaking Valve: ______________

Is patient a candidate for ambulating with a transport ventilator? Yes ___ No ___ NA ___ Actively tolerating Ambulation on vent: __________

Plan to address identified barriers and/or new orders received:

_________________________________________________________________________________________

RT Signature: ________________________________
Is patient appropriate for in-line speaking valve?
- Hemodynamically Stable
- Awake, Responsive
- PIP < 40, PEEP < 6, FiO₂ < 60%
- Does not have foam cuffed trach
- Air flow noted with cuff deflation
- Trach placement > 72 hours

**YES**
- RT or SLP to obtain a physician’s order
- Document event settings, suction tracheal and oral secretions, turn off PEEP, and slowly deflate the cuff
- Does PIP drop by 50% from normal range?
  - **YES**
    - Place speaking valve in-line, and adjust V̇t until PIP matches Pre-Speaking Valve PIP, up to a max of 50%
  - **NO**
    - Stop. Place patient on previous vent settings. Re-inflate the cuff.
- Monitor patient & vital signs. Has the following “Stop Criteria” been met?
  - SpO₂ below 88%
  - Increased Work of Breathing
  - HR increased > 20 BPM
  - **YES**
    - Stop. Place patient on previous vent settings. Re-inflate the cuff. Notify MD
  - **NO**
    - Continue speaking valve trial. Increase time gradually. Provide supervision at the bedside (RT, RN, and/or SLP), and document per policy.

**NO**
- Document and reassess for readiness weekly.
## Speaking Valve

### Candidate for speaking valve (Y/N)

<table>
<thead>
<tr>
<th>Week</th>
<th>Y/N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>10</th>
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<tr>
<td>Week 1</td>
<td>Y</td>
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<td>Week 2</td>
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<td>Week 3</td>
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### In-Line Speaking Valve Trial

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>First Pressure Support Trial</td>
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<tr>
<td>First In-Line Speaking Valve Trial</td>
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<tr>
<td>First Meaningful Communication</td>
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<tr>
<td>Liberation from Ventilator</td>
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<tr>
<td>Decannulation</td>
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<td>First PO Trial</td>
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<td>First Meal</td>
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### Additional Events

<table>
<thead>
<tr>
<th>Event</th>
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### Perceived Barriers

1. Does not meet medical stability criteria
2. Bed rest orders
3. Patient on comfort/palliative care measures
4. Patient sedated
5. Level of consciousness
6. Patient unavailable
7. Patient declined
8. Patient is too weak to progress
9. Staffing
10. Other
11. Unknown

### Adverse Events (In-Line Speaking Valve)

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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### Adverse Events

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</table>
Results

[Graph showing the relationship between days to first pressure support trial and medical stability criteria. The x-axis represents medical stability criteria with two categories: meets criteria and does not meet criteria. The y-axis represents days to first pressure support trial. The graph displays data points and a trend line indicating a positive correlation.]
Results
Conclusions

1. Medical instability and weakness were more detrimental to speech-related functional goals than other identified readiness barriers.

2. Earlier assessment and completion of an in-line speaking valve reduced the time to ventilator liberation independent of patient acuity measures.

3. The regular assessment of readiness and barriers to readiness may have a beneficial impact on functional milestones that are meaningful to patients on mechanical ventilation.
More Information:
Quality & Healthcare Analytics Department
qualityrequests@selectmedical.com
SURVIVING CRITICAL ILLNESS, WHAT IS NEXT?

An expert consensus statement on physical rehabilitation after critical illness

Mel Major-Helsloot
PhD candidate in post-ICU rehabilitation
European School of Physiotherapy
Amsterdam University of Applied Sciences
Dr. M. Van der Schaaf
Prof. Dr. R.H.H. Engelbert
CONTENT

• The bumpy road to recovery
• Research question
• Methods
• Results
• Further questions
THE BUMPY ROAD TO RECOVERY: HOW CAN WE HELP?
RESEARCH QUESTION

What are physical therapy goals, what are recommended measurement tools and what constitutes an optimal physical therapy intervention for survivors of critical illness?
DELPHI CONSENSUS METHODOLOGY

1: Generating ideas
2: Ranking statements
3: Reaching consensus

Hand Grip Strength
Circuit training
**ESSENTIAL HOSPITAL DISCHARGE INFORMATION**

<table>
<thead>
<tr>
<th>Premorbid level of functioning</th>
<th>Course of recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental, cognitive, physical state</td>
<td>Delirium</td>
</tr>
<tr>
<td>ICU-Acquired Weakness</td>
<td>ICU &amp; hospital length of stay</td>
</tr>
<tr>
<td>Severity of illness</td>
<td>Physiological response to exercise</td>
</tr>
</tbody>
</table>
PT GOALS AFTER ICU & HOSPITAL DISCHARGE

- Aerobic capacity
- Muscle strength
- ADL function
- Quality of Life
- Understanding of recovery process
- Pain
OUTCOME MEASURES TO USE

Core outcome set

- 6MWT, 4m timed walk/gait speed (SPPB)
- Sub-maximal cycle ergometry
- Handgrip strength or HHD
- MIP / MEP
- Spirometry / MRC Dyspnea scale
- Ultrasound / anthropometry
- KATZ-ADL or BI or Lawton’s iADL
- SF36 or TUG or FIM or DEMMI or SPPB
- EuroQoL
- VAS (for pain)
PT INTERVENTIONS

Combine strength training with nutrition (protein / amino acids)


Don’t forget the respiratory muscles
SCREEN FOR ADDITIONAL PROBLEMS

Additional screening tools

Fatigue: MFI
Sleep: RCSQ
Nutrition: MUST/
SNAQ
Mental/cognition:
HADS, IES-R
Cognition: MMSE
CAN WE FILL THE POTHOLES IN THE BUMPY ROAD?
FURTHER QUESTIONS

• What are the needs and experiences of patients and caregivers with regards to recovery after critical illness?
• Is the proposed consensus framework feasible in primary care?
• Is such a PT intervention effective?
• Can we validate outcome measures for this specific population?
ACKNOWLEDGEMENTS

All members of the Delphi panel

ACHIEVE - Centre of Applied Research, Faculty of Health, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands

European School of Physiotherapy, Faculty of Health, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands

Academic Medical Center, University of Amsterdam, Department of rehabilitation medicine, Amsterdam, the Netherlands

This research is funded by the Netherlands Organization for scientific research (NWO)
MORE INFORMATION

DOI 10.1186/s13054-016-1508-x

RESEARCH

Surviving critical illness: what is next? An expert consensus statement on physical rehabilitation after hospital discharge

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Mobility in the Critically Ill Pediatric Patient on ECMO Support

Jennifer Snider, MSN, CPNP-AC
Department of Anesthesiology and Critical Care Medicine – Pediatric Intensive Care Unit
Objective

• Describe ICU mobility within the context of safe-patient handling in regard to the pediatric patient on ECMO support
  – Briefly discuss the results from the chart review
    • Identify current mobility practice
    • Incidence of pressure injuries (PIs)
    • Proportion of Physical Therapy (PT) and Occupational Therapy (OT) consults and interventions
  – Brief discussion of guidelines as implemented in the QI project
Introduction

- ECMO has been used for more than 2 decades in the neonatal, pediatric and adult intensive care units to treat cardio-respiratory dysfunction/failure which has been unresponsive to conventional medical therapies.
Background

- **Safety concerns**
  - Cannula dislodgment: life threatening
  - Patient illness and tolerance to movement
- Prolonged immobility while on ECMO support
- Adequate management of pain and sedation
- Costs related to physical therapist and Occupational therapist dedicated to the PICU
Consequences of Prolonged Immobility

- Pressure injuries
- Critical illness myopathy
- Prolonged hospitalization
- Increase in cost and economic burden
- Poor functional outcomes
- Decrease in family satisfaction
Risk factors: Pressure injuries

• Risk factors
  – Assisted ventilation
  – PICU stay > 4 days
  – Inotropic support
  – Cardiac arrest/cardiac surgery
  – ECMO
  – Weight loss
  – Immobility (no change in body position)
  – Nutritional deficits
  – Marked edema
  – Exposure to prolonged pressure from devices

• Body proportion of children
  – Infants and younger children: OCCIPUT
  – Older Children - Sacrum
# Risk Factors: Therapeutic Interventions

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≤2 y</td>
<td>1.091</td>
<td>0.886 - 1.343</td>
<td>.41</td>
</tr>
<tr>
<td>Stay ≥4 days</td>
<td>5.684</td>
<td>4.481 - 7.21</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Bilevel or continuous positive airway pressure</td>
<td>2.004</td>
<td>1.509 - 2.661</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>1.334</td>
<td>1.031 - 1.726</td>
<td>.03</td>
</tr>
<tr>
<td>High-frequency oscillatory ventilation</td>
<td>2.057</td>
<td>1.142 - 3.704</td>
<td>.02</td>
</tr>
<tr>
<td>Extracorporeal membrane oxygenation</td>
<td>2.490</td>
<td>1.208 - 5.134</td>
<td>.01</td>
</tr>
<tr>
<td>Pediatric Index of Mortality 2 score</td>
<td>1.132</td>
<td>1.055 - 1.215</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Site variable (dummy variable)</td>
<td>NA</td>
<td>NA</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Abbreviation: NA, not applicable.
Financial Costs of Pressure Ulcers

• More than 2.5 million people in the USA develop pressure ulcers
• Pain, associated risk for serious infection, increased health care utilization
• Cost of pressure ulcers
  – $9.1 – $11.6 billion per year in the USA
  – Individual patient: $20,900 to $151,700 per pressure ulcer

Berlowitz D, et al. AHCPR Publication No. 11-0053-EF; US Department of Health and Human Services; 2013
# Feasibility of Early Physical Therapy

<table>
<thead>
<tr>
<th>Table 3. Implemented Physical Therapy Sessions for Patients on ECMO Support and Vital Signs As Well As Safety Events During Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Received PT Sessions</strong></td>
</tr>
<tr>
<td><strong>Number of sessions</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>62</td>
</tr>
<tr>
<td><strong>Vital signs after PT</strong></td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
</tr>
<tr>
<td>Arterial oxygen saturation (%)</td>
</tr>
<tr>
<td>Respiratory rate (per minute)</td>
</tr>
<tr>
<td>Heat rate (per minute)</td>
</tr>
<tr>
<td>PT interruption Causes</td>
</tr>
<tr>
<td>Tachycardia</td>
</tr>
<tr>
<td>Tachypnea</td>
</tr>
</tbody>
</table>

Values were mean ± SD or sessions (%).
PT, physical therapy; EMS, electrical muscle stimulation; PROM, passive range of motion.

Ko et al. 2015, ASAIO Journal
Examples of Mobilizing Adult Patients

Ko et al. 2015, ASAIO Journal
Trends in Participation in Physical Therapy

Figure 2: Trends in active physical therapy participation by ECMO patients in the MICU over time. ECMO extracorporeal membrane oxygenation; MICU Medical Intensive Care Unit; PT physical therapy.
Infant on ECMO Support
Method

- Single center retrospective chart review from July 2011 to June 2017
  - Identify the mobilization practice
  - Incidence of pressure ulcers in the patients on ECMO support
  - Proportion of OT and PT consults to the proportion of OT and PT interventions
- Collaboration with PICU UP! quality initiative project to improve early mobilization in critically ill children
<table>
<thead>
<tr>
<th>Total charts reviewed: N=150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>Range: 0 days - 21.82 years old</td>
</tr>
<tr>
<td>Median: 1.53 months</td>
</tr>
<tr>
<td><strong>Newborn (0 - 30 days)</strong></td>
</tr>
<tr>
<td>70 (46.6%)</td>
</tr>
<tr>
<td><strong>Pediatric (1month - &lt; 18 years)</strong></td>
</tr>
<tr>
<td>77 (51.33%)</td>
</tr>
<tr>
<td><strong>Adult (&gt; 18 years)</strong></td>
</tr>
<tr>
<td>3 (2%)</td>
</tr>
<tr>
<td><strong>Hours ECMO support</strong></td>
</tr>
<tr>
<td>Range: 1 to 1336 hours</td>
</tr>
<tr>
<td>Median: 115 hours</td>
</tr>
<tr>
<td>Average: 364.36 hours</td>
</tr>
<tr>
<td><strong>Mode of ECMO support</strong></td>
</tr>
<tr>
<td>VA: 139 (92.8%)</td>
</tr>
<tr>
<td>VV: 11(7.33%)</td>
</tr>
<tr>
<td><strong>Cannulation sites</strong></td>
</tr>
<tr>
<td>Neck: 109 (72.6%)</td>
</tr>
<tr>
<td>Femoral vessels: 16 (10.66%)</td>
</tr>
<tr>
<td>Transthoracic: 25 (16.66%)</td>
</tr>
<tr>
<td><strong>ECPR</strong></td>
</tr>
<tr>
<td>61 (40.66%)</td>
</tr>
<tr>
<td><strong>Elective cannulation</strong></td>
</tr>
<tr>
<td>89 (59.33%)</td>
</tr>
<tr>
<td><strong>Decannulation/2 week post ECMO survival</strong></td>
</tr>
<tr>
<td>99 (66%)</td>
</tr>
</tbody>
</table>
## Summary of PI's, PT & OT Data

<table>
<thead>
<tr>
<th></th>
<th>Total Charts Reviewed (N= 150)</th>
<th>Patients Decannulated (N= 99) 2 weeks post ECMO support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pressure Ulcers identified</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Location of Pressure Ulcers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occiput</td>
<td>3(30%)</td>
<td>22(56.41%)</td>
</tr>
<tr>
<td>Heels</td>
<td>3(30%)</td>
<td>9(23.07%)</td>
</tr>
<tr>
<td>Ears</td>
<td>2(20%)</td>
<td>2(5.1%)</td>
</tr>
<tr>
<td>Sacrum</td>
<td>3(30%)</td>
<td>10(25.6%)</td>
</tr>
<tr>
<td>Upper Back/Nape of neck/Scapula's</td>
<td>1 (10%)</td>
<td>13(33.33%)</td>
</tr>
<tr>
<td><strong>Consults: Skin/wound</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td>22 (14.66%)</td>
<td>42 (42.42%)</td>
</tr>
<tr>
<td>Derm</td>
<td>9(9%)</td>
<td>1(1%)</td>
</tr>
<tr>
<td>GPS</td>
<td>2 (2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Position/Repositioning</strong></td>
<td>150 (100%) Flat &amp; Supine</td>
<td>99 (100%) repositioned with HOB elevated range of 10 to 30 degrees</td>
</tr>
<tr>
<td><strong>Occupational Therapy (OT) Consults</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OT Interventions:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning</td>
<td>n = 74</td>
<td>n = 66</td>
</tr>
<tr>
<td>Splints</td>
<td>9 (12.1%)</td>
<td>29 (43.9%)</td>
</tr>
<tr>
<td>ROM</td>
<td>6 (8.1%)</td>
<td>8 (12.12%)</td>
</tr>
<tr>
<td>ADLs</td>
<td>13 (17.5%)</td>
<td>21 (31.8%)</td>
</tr>
<tr>
<td>Physical Therapy (PT) consults</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PT Interventions:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROM</td>
<td>n = 37</td>
<td>n = 33</td>
</tr>
<tr>
<td>AROM</td>
<td>6 (16.2%)</td>
<td>7 (21.21%)</td>
</tr>
<tr>
<td>Positioning</td>
<td>0</td>
<td>16 (48.48%)</td>
</tr>
<tr>
<td>Sitting</td>
<td>0</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>OOB</td>
<td>0</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Active mobilization</td>
<td>2 (5.4%)</td>
<td>NA</td>
</tr>
</tbody>
</table>
Strategy: Implementing Evidence

• Identified guidelines
  – ECMO skin protection and repositioning bundle
• Collaboration with PICU UP! work group
  – Align progressive mobilization with the PICU UP1 levels
• Revised and update current policies associated with the nursing care and management of the ECMO patient
• Staged approach at implementing the interventions
• Post implementation
  – Rounding sheet
    • Coaching and supporting bedside RN and ECMO specialist
    • Ongoing data collection
ECMO Skin Protection & Repositioning Bundle

Pre-ECMO
- Appropriate mattress: Sizewise gel infant mattress, VersaCare mattress with gaymar overlay
- Minimize linen layers: 1 Sheet ± absorbent layer
- Mepilex Border Lite to Occiput or Mepilex Border to Sacrum
- Z-Flow positioner placed under the head
- Undo all hair braids
- Heels: float heels and/or heel protector boots
- NOTE: The earlier the better! Implement pre-ECMO interventions for all critically ill patients at risk for ECMO

Immediate Post ECMO Cannulation
- Encourage surgeon to apply Mepilex Lite between skin and cannula
- Bleeding at site: Apply Stat Seal hemostatic powder
- Assess Cannula position
- Coordinate plan to remove shoulder roll
- Positioning: align head and body
- Consults: OT/PT; wound/skin; Nutrition; Other

Ongoing ECMO Support
- Remove shoulder roll within 24 hours post cannulation
- Ensure continued head/body alignment
- Repositioning Q2 hour
- Skin assessment Q shift
- Change mepilex Q7 days
- Policies: GEN044, PICU065, & PICU011
Step 1-Screening Process: Early Activity and Mobility Levels

These are the criteria for inclusion at each level of the screening process.

**LEVEL 1:** Parameters for Inclusion
- Intubated with FiO2 > 60% or
- Intubated with PEEP > 8 or
- Intubated difficult airway or
- New tracheostomy or
- Acute neurological event or
- Sedated and SBS -3 to -2 or
- Vasopressor other than Milrinone

**LEVEL 2:** Parameters for Inclusion
- Intubated or tracheostomy with FiO2 ≤ 60% +/or
- PEEP ≤8 and SBS -1 to +3 or
- Noninvasive respiratory support with FiO2 > 60% or
- Dialysis/Renal Replacement Therapy or
- Femoral access

**LEVEL 3:** Parameters for Inclusion
- Non-invasive respiratory support with FiO2 ≤ 60% or
- Baseline pulmonary support or
- EVD cleared by NUS and SBS -1 to +3

Wieczorek B et al. PCCM 2016; 17:12
# PICU UP! Levels and Activities

<table>
<thead>
<tr>
<th>PICU UP! Level</th>
<th>Parameters for Inclusion</th>
<th>Activities</th>
<th>Criteria to Pause Activity, rest and reassess</th>
</tr>
</thead>
</table>
| **Level 1ECMO** | • VV or VA ECMO: femoral or neck cannulation  
• Stable and secure ECMO cannula  
• Stable hemodynamics with stable ECMO flows, stable inotropic support  
• No significant bleeding  
• Stable SVO2 | • Lights on/shades up by 0900  
• Bed/bath/weight by 2300  
• Lights dimmed/out by 2300  
  - Increase lighting as needed for cares/interventions  
• TV limited to 30 minutes at a time and a goal of <2 hours per day for children >2 years of age  
• HOB elevated > 30°  
• Turn q2h during the day and q4h at night  
• OT and PT consulted on ECMO initiation  
• Maintain head and body alignment during activity and/or repositioning  
  - PROM as per discussed by PICU team  
• Positive touch for infants and toddlers  
• pCAM or psCAM assessment BID if SBS -1 to +3 | • Decrease in SvO2 by 20% of baseline or SvO2 < 50%  
• Decrease in NIRS by 20% from baseline  
• New arrhythmia or ST changes  
• Reportable conditions to provider  
  - Increase in bleeding around cannula site and/or general increased bleeding  
  - Persistent changes to ECMO flow or pump pressures |
Limitations

• Single center study
• Retrospective chart review
  – Documentation
    • limitations
Conclusion

• ECMO increases the risk for development of pressure injuries due to prolonged immobility
• Multidisciplinary team
  – Promote education and support staff to safely facilitate and improve early mobilization activities of the critically ill pediatric patient on ECMO support
  – Daily assessment and discussion on rounds regarding activity level for the patient
• Aligns with ABDCEF ICU liberation bundle
• Goal
  – Reduce the incidence of pressure injuries and increase OT and PT interventions to promote early rehabilitation
Thank You and Acknowledgments

• Dr. Mela Bembea, MD (PI & Medical Director ECMO Program)
• Dr. Alex Garcia, MD (Surgical Director, ECMO program)
• ECMO mobility workgroup
  – John Young, RRT, ECMO coordinator
  – May Wilkinson, RRT, ECMO specialist
  – Emily Warren, MSN, CNS
  – Margret Birdsong, MSN, CPNP, CWOCN
  – Yun Kim, MS, OTR/L
  – Angie Prouty, MSN, RN
  – Kieran McGuigan (student nurse, Fuld Fellow)
• PICU Up work group
  – Dr Sapna Kudchadkar, MD
  – Beth Wiezoreck, DNP, APRN
  – PICU UP! committee members
References

- Schwartz, S,M., & Schmidt, A. (2013). Medical and nursing care of the child on mechanical circulatory support. Pediatric Critical Care Medicine, 14(5), S43– S50.
WHEN THERE AREN’T ENOUGH PEOPLE

Use of Safe Patient Handling and Mobility Technologies to Promote Mobility across all Disciplines and Levels of Mobility

Margaret Arnold, PT, CEES, CSPHP

6th Annual Johns Hopkins ICU Rehab Conference
November 3, 2017
**OBJECTIVES**

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Understand</strong></td>
<td>Understand the risks and limitations of manual assistance for weak and dependent patients</td>
</tr>
<tr>
<td><strong>Discuss</strong></td>
<td>Discuss the role of Safe Patient Handling and Mobility devices in helping overcome some of the barriers to EM</td>
</tr>
<tr>
<td><strong>Discuss</strong></td>
<td>Discuss how Safe Patient Handling Devices can be used to promote mobility</td>
</tr>
<tr>
<td><strong>Integrate</strong></td>
<td>Integrate progression and regression of activities using SPHM devices</td>
</tr>
</tbody>
</table>
I want to emphasize that I am NOT endorsing any particular piece of equipment you see in the videos. The videos represent the equipment that I have access to, and have been provided by various vendors. I strongly encourage you to visit the vendor area and compare and contrast the solutions for yourselves. There are more than one version of all the solutions you will see in the videos today. The objective today is to provide ideas and a variety of examples of how to mobilize even the most challenging patients, and how to do so safely, through incorporating SPHM technologies into your EM programs.

- Margaret Arnold, PT, CEES, CSPHP.
SMALL STEPS LEAD TO LARGE GAINS

• Mobility includes all activities that challenge the heart, lungs, brain, muscles, circulatory, and other systems to respond and work.

• Ultimate Goal is Functional Mobility

• Never underestimate the physiological or the psychological value of small mobility steps from one level to the next.
PATIENT MOBILITY CANNOT BE AT EXPENSE OF CAREGIVER SAFETY

- Each day, the average nurse lifts the equivalent of a mid-size car with 4 people in it through their spine
- Evidence shows that injured caregivers change their treatment interventions, favoring more in-bed activities

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NEVER DO FOR A PATIENT WHAT THEY CAN DO FOR THEMSELVES

“Always remember, when we do for the patient what they can do for themselves, we deprive them of an opportunity to mobilize and we make them weaker.”

Mobility Clips using SPHM devices
SPHM technologies can promote patient mobilization.

Patients should always actively participate to the extent possible.

The objective today was to provide a variety of examples of how to mobilize even the most challenging patients safely, through incorporating SPHM technologies into EM programs.

SPHM can help overcome barriers such as not enough people, patient fear, certain precautions, and can enable you to mobilize the greatest number of your patients to the highest level that they are capable of, without fear of injuring yourselves in the process.
REFERENCES

- Arnold M. Building a Foundation of Mobility: From ICU and Across the Continuum of Care. International Journal of Safe Patient Handling and Mobility 2017;7:40-44.

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QUESTIONS

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Implementation of a PICU Early Mobilization Program

Bettina Di Franco, OTR/L, C/NDT
November 3, 2017
Background

• Critically ill patients are at risk for significant morbidity

• Some evidence in support of EM in the pediatric critical care community, EM is not yet widely adopted

• Limited institutional mobilization of PICU patients on Positive Pressure Ventilation

• The early mobilization (EM) of critically ill adults has been shown to be safe and feasible, with numerous wide ranging benefits
Objective

• Using results from a literature review and institutional survey, we developed and implemented a Pediatric EM program, evaluating feasibility and safety.
Methods

• Beginning January 2016, a multidisciplinary team was established

• Survey data was collected assessing baseline knowledge surrounding EM

• Screening and implementation tools were created

• Tools vetted and approved by multiple disciplines
Inclusion / Exclusion Screening Guide:
**Inclusion Criteria:** All patients >3 are eligible for early mobilization. Each of these patients should be assessed for any exclusion criteria below. If none are met, confirm eligibility with fellow/attending.

**Exclusion Criteria:**

**Equipment:**
- Presence of femoral hemodialysis catheter
- EVD inpatient with need for ongoing ICP management
- Open lumbar drains

**Respiratory:**
- Known history of difficult airway
- Unstable airway (tracheal reconstruction, fresh tracheostomy)
- Requiring FiO2 >50%
- PEEP >8
- Alternate modes of ventilation: high frequency ventilation (oscillator), bilevel (APRV)

**Cardiovascular:**
- Hemodynamic instability as defined by:
  - Requirement of continuous infusion of vasoactive medications,
  - OR signs of hypoperfusion including elevated lactate
- Uncontrolled arrhythmias

**Neurologic:**
- Known or suspected elevated intracranial pressure
- Uncontrolled seizures
- Patients with RASS < -2
  → Please discuss lightening sedation with primary team, unless deep sedation targeted as part of medical management

**Surgical:**
- Open surgical sites (chest, abdomen)
- Immobilization requested per surgical team

**Hematologic:**
- Known active/uncontrolled bleeding
- Platelets <10,000

**Renal:**
- Any patient actively receiving continuous veno-venous hemofiltration (CVVH)

**Limitations:**
- For patients with RASS score > +2 in previous 2 hours, limit mobilization to at most sitting up in bed
  → Speech therapy/occupational therapy/child life may work unrestricted with these patients
EM Checklist
(Pre / Post - EM)
### PICU Early Mobilization (PEM) Checklist:

Date: ________________  EM Start Time: ________________  Medications given as prep for session: ________________

#### Before Early Mobilization:
Completed by RN & Rehab immediately before mobilization

**Nursing:**
- [ ] All members of team available (RN, RT, Rehab)
- [ ] Endotracheal tube secure (if applicable)
- [ ] Airway bundle filled out
- [ ] Airway box available at bedside
- [ ] RASS ≥ -3 and ≤ +3 in preceding 2 hours: ___________  RASS score: ___________
- [ ] Pain assessed & treated prior to mobilization (if appropriate)
  - [ ] Pain score pre-EM: ______  [ ] Pain medication given: [ ] Yes: ___________ [ ] No
- [ ] Family prepped (by RN, CL, or MD)
- [ ] Peripheral IVs secured & lines untangled
- [ ] Central lines dressed appropriately & secured (2 points of attachment)
- [ ] Appropriate monitoring (transport monitor if applicable)
- [ ] Wheelchair available to follow patient (if mobilized OOB)
- [ ] Fellow/attending readily available for adverse respiratory event (i.e. unplanned extubation)

Name of MD notified prior to PEM: ________________

**Respiratory:**
- [ ] Endotracheal tube secure (if applicable)
- [ ] Airway treatments given prior to EM (i.e. albuterol)
- [ ] Suctioned prior to mobilization
- [ ] FiO2 increased by 10% (to not more than 60% FiO2)
- [ ] ETCO2 monitoring (if mechanically ventilated)
- [ ] Equipment readily available (transport ventilator and ETCO2)
- [ ] BiPAP mask secure (if applicable)
- [ ] Level of respiratory support: [ ] Ventilator [ ] BiPap [ ] CPAP [ ] HFNC [ ] Conventional NC
  - [ ] Settings: ________________

#### During Session

- [ ] Pain score: ________  Pain meds given: ___________  Scale Used: ___________
- [ ] RASS score: ___________
**After Mobilization:** Completed by RN & Rehab immediately after mobilization

EM End Time: __________________________
Duration of active EM (in minutes)? __________
If OOB (ex. OOB to chair) – Duration (in minutes)? __________

Who was present for early mobilization?

- [ ] Bedside nurse
- [ ] Respiratory therapist (how many: ____)
- [ ] Occupational therapist (how many: ____)
- [ ] Attending
- [ ] Child Life
- [ ] Other: __________________________
- [ ] Additional nurse (how many: ____)
- [ ] Physical therapist (howmany: ____)
- [ ] Fellow
- [ ] Resident/PA
- [ ] Family members (how many: ____)

Early mobilization performed?

- [ ] Activities in bed Description: __________________________
- [ ] Activities OOB Description: __________________________
- [ ] Ambulating Description: __________________________
- [ ] Communication Can patient communicate? [ ] Yes (Refer to SLP) [ ] No

Adverse events? (Check all that apply and describe)

- [ ] None
- [ ] Increased pain
- [ ] Removal of IV
- [ ] Removal of central catheter
- [ ] Desaturation (oxygen saturation < 85%)
- [ ] Unplanned extubation
- [ ] Hemodynamic changes (sustained change in HR or BP) or other events, please explain below:

Scores immediately following EM

- [ ] Pain score: __________ Pain meds given: __________ Scale Used: __________
- [ ] RASS score: __________

Did mobilization result in referral to another discipline? [ ] Yes [ ] No
Discipline: ________________ (ex. Speech Language Pathology-SLP for communication needs)

Feedback post EM session

Family: __________________________
RN: __________________________
RT/PT/OT: __________________________
MD/PA: __________________________
So how did we go from identifying the patient to mobilizing the patient???
PICU “I See You” in Motion Process Map

1. PICU Rounds Start 8:00AM-10:30AM
   - Discuss Eligibility for EM via FastHug

2. Multidisciplinary Huddle: 10:30AM
   - ID patients (3 per day)
   - MD decides
   - Rehab/CL confirms
   - Fellow/Resident inputs order including precautions

3. Rehab/CL brings checklist to RN

4. Communication to Team
   - Rehab/CL confirms with RN
   - RN confirms with RT
   - Time slot confirmed

5. Verify
   - PEM Checklist
   - RN & RT begin checklist
   - RN & RT address issues
   - Continuation Checklist
   - RN & RT begin checklist
   - RN & RT address issues

6. RN/CL Notifies Family
   - MD Present
   - RT Present
   - Rehab Present
   - RN Present

7. Treat 1-3pm
   - MD completes Airway Bundle
   - RT completes checklist
   - Rehab completes checklist
   - RN completes checklist

8. Document
   - MD Documents
   - RT Documents
   - Rehab documents decides progression
   - RN Documents activity

NewYork-Presbyterian
Phyllis and David Komansky
Children's Hospital
How did we mobilize?

• Begin slowly, use positive touch and a calming voice

• Talk your patient through the process no matter your patient’s level of alertness (encouragement for both patient and family present)

• Continuously observe and monitor your patient as well as the environment around you
Mobilization continued....

• Minimize visual clutter or amount of people around to maintain calm state (i.e. reduce sensory overload)

• If high anxiety, help your patient move one limb at a time to help them gain confidence and trust in the process

• Mobilize in steps appropriate to the patient’s response (i.e. sitting up with support & monitoring response before incorporating EOB or standing, etc.)
Mobilization continued....

• After mobilization, briefly summarize what was accomplished to both patient and family

• Provide a simple program for family to carry over throughout the day (i.e. ROM, touch, communication, etc.)

• Briefly huddle post session with bedside team as to what worked and what didn’t for carry over and for future mobilization sessions with team
Results

10 Patients

4 NIPPV

6 MV
Results:

- **260 Sessions**
  - 40 In Bed ROM
  - 51 Supine to Sit
  - 68 Edge of Bed
  - 42 Standing
  - 31 Out of Bed
  - 28 Ambulation

**No adverse events were recorded, either on paper records, or in our hospital’s event reporting system (KEEPSAFE)**
“It felt great, and it’s been wonderful & amazing, giving him motivation” - PICU Mom

“They’re good. They’re getting me back on track” - PICU Patient

“That went swimmingly well!” - PICU RN
Lessons Learned

• EM can be safely implemented in the PICU, without significant adverse events using an interprofessional team approach.

• Future studies should be performed evaluating EM outcomes in the Pediatric population
Thank You
Questions?
Families PICU Up!

Evaluating Family Perspectives and Needs for Development of a PICU Family Engagement Program

Presented by: Emily Carlton, BS, CCLS and Emily Warren, MSN, RN, CNS

November 8, 2017
Objectives

• Describe the analysis of family perspectives on involvement in care
• Discuss the role of parents and family members in supporting care
Parent participation in caring for hospitalized children is understood as norm in pediatric nursing, though parent involvement of children who are chronically ill versus acutely ill may vary.

While initial compliance with early mobility in a Michigan SICU fell as low as 66%, activity sessions increased to 94% following an initiative to involve family daily.

A series of quality improvement studies found that children cried less, were less restless, and required less medication when their parents were present and assisted in pain assessment and management.
Parents feel that their presence and participation in their child’s care is very important and beneficial to their child, to nurses and to themselves.

Parents see themselves as making an important contribution to their child’s care in hospital because of their unique knowledge of their child and their ability to reassure and provide comfort him/her.

Early mobility presents an opportunity to engage families in their natural role.
Methods

• 12 question parent and family survey
  – Demographic questions
  – Likert scale questions pertaining to interest, comfort, inclusion, and education related to participation in care
  – Identification of preferred activities

• Surveyed all English speaking parents and family members on day 3 of PICU admission
Results

50 parents and family members participated

• 86% were interested in participating in care
• 88% were very comfortable in participating in care
• 80% felt very included in care
• 34% strongly agreed educational materials were available
### Activities Appropriate for Parent Participation

#### Percent of Parents Believing Activities Appropriate for Parental Assistance

<table>
<thead>
<tr>
<th>Category</th>
<th>Activity</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent Cares</td>
<td>Bathing</td>
<td>81.63</td>
</tr>
<tr>
<td></td>
<td>Bathroom needs</td>
<td>79.55</td>
</tr>
<tr>
<td></td>
<td>Putting on lotion</td>
<td>87.76</td>
</tr>
<tr>
<td></td>
<td>Changing diaper</td>
<td>87.76</td>
</tr>
<tr>
<td></td>
<td>Combing hair</td>
<td>90.35</td>
</tr>
<tr>
<td></td>
<td>Clipping nails</td>
<td>90.35</td>
</tr>
<tr>
<td></td>
<td>Wiping eyes or face</td>
<td>87.76</td>
</tr>
<tr>
<td></td>
<td>Suctioning mouth</td>
<td>90.35</td>
</tr>
<tr>
<td></td>
<td>Washing hair</td>
<td>90.35</td>
</tr>
<tr>
<td></td>
<td>Dressing</td>
<td>90.35</td>
</tr>
<tr>
<td></td>
<td>Oral feeding</td>
<td>69.39</td>
</tr>
<tr>
<td></td>
<td>Walking</td>
<td>85.71</td>
</tr>
<tr>
<td></td>
<td>Turning</td>
<td>85.71</td>
</tr>
<tr>
<td></td>
<td>Play</td>
<td>85.71</td>
</tr>
<tr>
<td></td>
<td>OOB</td>
<td>87.76</td>
</tr>
<tr>
<td></td>
<td>Holding</td>
<td>87.76</td>
</tr>
<tr>
<td>Treatment</td>
<td>Splinting</td>
<td>24.49</td>
</tr>
<tr>
<td></td>
<td>ROM</td>
<td>38.78</td>
</tr>
<tr>
<td></td>
<td>Incentive Spirometer</td>
<td>40.82</td>
</tr>
<tr>
<td></td>
<td>CPT</td>
<td>77.55</td>
</tr>
</tbody>
</table>

**November 8, 2017**
Activities Parents Not Comfortable Performing

- Splinting: 69.77%
- ROM: 58.14%
- Incentive Spirometer: 32.56%
- CPT: 67.44%
- Oral Feeding: 18.6%
- Walking: 18.6%
- Turning: 13.95%
- Play: 18.6%
- OOB: 16.28%
- Holding: 11.63%
- Wiping eyes or face: 20.93%
- Brushing teeth: 34.88%
- Suctioning mouth: 16.28%
- Putting on lotion: 16.28%
- Washing hair: 13.95%
- Dressing: 16.28%
- Changing diaper: 13.95%
- Combing hair: 23.26%
- Clipping nails: 23.26%
- Bathroom needs: 18.6%
- Bathing: 18.6%

Percent of Parents Not Comfortable with Activities

November 8, 2017
Parent and Family Concerns

• Some activities are not part of parenting, are medically oriented
• Not sure how to perform activity properly, fear of harming child
• Concerns for causing pain
• Lack of knowledge or education
• Belief permission is needed for activity
Parent and Family Recommendations

• Comfort increases when condition improves
• Engaging parents/families would support transition home
• Requests for more involvement in daily cares – like giving medications
• Education needed
Next Steps

• Introduce parent and family engagement menu this fall

• Re-survey parents and family members post-implementation
References


Exploring Nursing Attitudes Towards Early Mobilization in the Cardio-Thoracic Intensive Care Unit

Alicia Tucker, BSN, RN and Cynthia K. Fine, MSN, CRRN

11.04.17
New York Presbyterian Hospital: Columbia Medical Center
Disclosures

- Alicia Tucker
- Cynthia Fine
Early Mobilization Program History

- Initiated January 2012 in the Cardio Thoracic ICU (CTICU)
- Perceived negatively overall by RNs in the CTICU
- Cited numerous barriers to early mobilization (EM) of patients
- Provided EM treatments to a large number of patients since 2012
- Provided continuing education and hands-on experience to demonstrate EM program safety and efficacy to RNs
- Identified areas for improvement based on RN feedback, inclusive of examining RN attitudes and perceived barriers to EM
Objective

- Background:
  - EM of CTICU patients has been proven to improve patient outcomes
  - RNs function as facilitators across disciplines to promote EM
  - RN perceptions of EM have not been explored

- Objective:
  - Assess RNs’ perceptions of EM for patients in the CTICU on mechanical ventilation, ventricular assistive devices, and ECMO to identify barriers to promoting EM.
  - Analyze and address barriers to increase RN perceptions and promotion of EM in the CTICU.
Methods

- Developed electronic survey for CTICU RNs
  - Administered in July 2017-August 2017
  - 14 question evaluation of RN attitudes and perceived barriers to EM in the CTICU
  - Brief, only 5 minutes to complete
Results

Please identify what you think are significant barriers to mobilizing CTICU patients (check all that apply):

40 responses

- Nursing Time: 36 (90%)
- Respiratory Therapy: 28 (70%)
- Physical Therapy: 11 (27.5%)
- Patient in Procedure: 3 (7.5%)
- Over-Sedation: 17 (42.5%)
- Mobility is not important: 0 (0%)
- Delirium: 23 (57.5%)
- Access to Safety: 31 (77.5%)
- Staff Safety: 25 (62.5%)
- Patient Safety: 29 (72.5%)
- Physical barrier: 1 (2.5%)
Results

How many years of Cardio-Thoracic ICU nursing experience do you have?

40 responses
Results

I have sufficient equipment to safely mobilize patients.

Access to safe patient handling equipment would improve my promotion of early mobility.
Results

Mobilization of ICU patients should occur automatically via a nursing and PT protocol unless the physician specifically orders otherwise.

40 responses

Do you believe early mobilization reduces duration of mechanical ventilation?

40 responses
I can't get out of bed. These blankets have accepted me as one of their own and if I leave now I might lose their trust.
Analysis Using A3 Problem Solving

“A3 thinking” is a problem solving approach. It is a visual aide to work through the PLAN-DO-CHECK-ACT model for performance improvement projects.
A3: Safe Patient Handling During EM

Owner: Alicia Tucker
Mentor: Deborah Burns & Cynthia Fine
Date: 8/23/17

Countermeasures
- Host inter-disciplinary in-service on Body Mechanics and Early Mobilization
- Collaborative Trials of 2-3 products for Safe Patient Handling
- Use Mobile Heartbeat for Communication with PT and RNs
- Standardize Mobility Assessment
- Nurse Driven EM Protocol

Confirmation (results)
- Data from 1st Quarter
- 80% of staff in-service
- 100% of PT's on Mobile Heartbeat
- Standardized Mobility Assessment Tool in Bedside Binder
- Development of Nurse Driven EM Protocol

Follow up (actions)
- Re-evaluate Nursing Perceptions to Safe Patient Handling during EM
- Assess use of Safe Patient Handling Devices

Analysis

Most Significant Barrier is access to Safe Patient Handling Devices for Mobilization/ Employee Injury During Mobilization
Where are we now in our PDCA Cycle?
Interdisciplinary In-service on Patient Safe Handling
Inter-disciplinary Evaluation of Patient Safe Handling Devices

- Held two evaluation sessions in October 2017 for Night & Day Staff
- Received positive feedback on potential safe patient handling devices.
- Well attended by RN’s, PT’s, MD’s and PA’s.
BONUS!
Improved Interdisciplinary Relationships

- CTICU Retention, Recruitment & Recognition (R3) Committee
  - Celebrates unit and staff accomplishments
  - Rewards staff for teamwork and collaboration
    - Physical Therapist recognized as “Employee of the Month” May 2017
Conclusion

- CTICU RN perceptions and attitudes towards EM continue to improve since implementation of EM program in 2012
- Patient Safe Handling initiatives are a driver in RN engagement with EM
- Repeat survey will be conducted in December 2017 following full implementation of patient safe handling devices and in-services!
Thank You.

Contact Information

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alh9083@nyp.org

Cyndy Fine: ckf9001@nyp.org
Understanding perceived barriers to patient mobility in a medical ICU using a validated early mobility barriers survey

Carrie M. Goodson, MD MHS; Lisa A. Friedman, ScM; Earl Mantheiy, BA; Kevin Heckle, BS; Annette Lavezza, OTR/L; Amy Toonstra, PT DPT CCS; Ann Parker, MD; Jason Seltzer, PT DPT; Michael Velaetis, PA-C MS; Mary Glover, MSN RN CCRN; Caroline Outten, BSN RN CCRN; Kit Schwartz, BS RRT MHA; Antionette Jones, PCT; Sarah Coggins, OTR/L; Dale M. Needham, FCPA MD PhD
Disclosures

• None
Objectives

- Background
- Methods
- Results
- Conclusions
Early mobility in the ICU

- ICU survivors
  - Poor strength
  - Poor physical function

- Early mobility can improve outcomes
  - Including from nurses, non-PT providers
    - Intervention vs usual care: functionally independent at hospital discharge 51% vs 28%
Quality Improvement (QI) project:

• Goal:
  – ↑ RN/tech-led MICU patient mobilization

• Step 1: Gather data
  – Barriers to be overcome?
    • All MICU staff
METHODS
Barriers Survey

• Knowledge
• Attitudes
• Behaviors
• 26 questions
• Answers:
  1 – 2 – 3 – 4 – 5
  Strongly Disagree Neutral Strongly Agree

• Physicians/APP
  – Attendings
  – Fellows
  – Nurse Practitioner or Physician Assistant

• Respiratory Therapists
• Nurses
• Clinical Technicians

Hoyer et al. Am J PM&R 2014
RESULTS
## Respondents

<table>
<thead>
<tr>
<th></th>
<th>Clinical Tech</th>
<th>Nurse</th>
<th>Respiratory Therapist</th>
<th>Attending Physician</th>
<th>Fellow</th>
<th>NP/PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invited, #</td>
<td>7</td>
<td>93</td>
<td>14</td>
<td>13</td>
<td>28</td>
<td>7</td>
</tr>
<tr>
<td>Response rate, %</td>
<td>100</td>
<td>92</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Years of experience</td>
<td>2 (1-2)</td>
<td>5 (2-10)</td>
<td>14 (8-17)</td>
<td>16 (15-20)</td>
<td>6 (4-7)</td>
<td>6 (3-11)</td>
</tr>
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</table>
## Survey Results

<table>
<thead>
<tr>
<th></th>
<th>Clinical Tech (7)</th>
<th>Nurse (86)</th>
<th>Respiratory Therapist (14)</th>
<th>Attending Physician (13)</th>
<th>Fellow (28)</th>
<th>NP/PA (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes</td>
<td>33 (29-44)</td>
<td>38 (29-44)</td>
<td>36 (31-40)</td>
<td>30 (23-36)</td>
<td>33 (28-36)</td>
<td>36 (31-49)</td>
</tr>
<tr>
<td>Overall</td>
<td><strong>32 (25-37)</strong></td>
<td><strong>37 (31-40)</strong></td>
<td><strong>32 (31-37)</strong></td>
<td><strong>30 (28-34)</strong></td>
<td><strong>31 (26-37)</strong></td>
<td><strong>36 (29-39)</strong></td>
</tr>
</tbody>
</table>
Effect of experience

[Graph showing a scatter plot with "Total barriers score" on the y-axis and "Years of ICU experience" on the x-axis. The plot includes a trend line indicating an increase in barriers score with more years of ICU experience.]
## Linear Regression Model

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>p</th>
<th>Knowledge</th>
<th>p</th>
<th>Attitudes</th>
<th>p</th>
<th>Behaviors</th>
<th>p</th>
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<tr>
<td>MD/NP/PA</td>
<td>[reference]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN/Clinical Tech</td>
<td>3.1</td>
<td>0.026</td>
<td>-4.7</td>
<td>0.031</td>
<td>3.7</td>
<td>0.040</td>
<td>5.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>2.9</td>
<td>0.206</td>
<td>-2.9</td>
<td>0.426</td>
<td>4.6</td>
<td>0.119</td>
<td>3.5</td>
<td>0.167</td>
</tr>
<tr>
<td>Experience &lt; 10 yr, /yr</td>
<td>-0.8</td>
<td>&lt;0.001</td>
<td>-0.8</td>
<td>0.020</td>
<td>-0.9</td>
<td>0.002</td>
<td>-0.7</td>
<td>0.008</td>
</tr>
<tr>
<td>Experience &gt; 10 yr, /yr</td>
<td>1.0</td>
<td>0.001</td>
<td>1.3</td>
<td>0.009</td>
<td>1.1</td>
<td>0.004</td>
<td>0.8</td>
<td>0.015</td>
</tr>
</tbody>
</table>
Conclusions

• Large multi-D sample, response ≥ 92%
• Low barriers to mobility
  – Attitudes & behaviors are highest barriers
• Effect of experience:
  – Decreases barriers in 1st 10 years
  – Increases barriers after 10 years
• Nurses/Clinical Technicians ≠ MD/PA/NP
Acknowledgments

Lisa A. Friedman, ScM  Michael Velaetis, PA-C MS
Earl Mantheiy, BA       Mary Glover, MSN RN CCRN
Kevin Heckle, BS        Caroline Outten, BSN RN CCRN
Annette Lavezza, OTR/L   Kit Schwartz, BS RRT MHA
Amy Toonstra, PT DPT CCS  Antionette Jones, PCT
Ann Parker, MD          Sarah Coggins, OTR/L
Jason Seltzer, PT DPT    Dale M. Needham, FCPA MD PhD
Questions?

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cgoodso1@jhmi.edu
Creating a Protocol for the Mobilization of Patients with Critical Lines

A Physical Therapist Driven Multidisciplinary Initiative

Sara Krasney, PT, DPT  Janelle Jablonski, PT, DPT  Allison Kras PT, DPT
Introduction

• **Tufts Medical Center**
  • Located in Boston, MA

• **Academic Medical Center**

• **Level I Trauma Center**
  • 415 beds
  • 5 adult ICUs
Objectives

• Utilize research to create an evidence-based protocol for mobilizing patients with critical lines
• Evaluate, modify, and finalize above protocol using a physical therapist (PT) driven multidisciplinary team approach
• Standardize mobility expectations for health care providers at Tufts Medical Center
Introduction

- Different units, nurses, therapists, and physicians demonstrated **varying expectations and comfort levels regarding patient mobility**
  - No uniform policy to guide the safe mobilization of patients, particularly in the ICUs, with various critical lines
Introduction

• *Questions we asked ourselves...*
  • What is the hospital-wide expectation for mobility?
  • What if the patient has a critical line? Or multiple critical lines?
  • What is safe?
Methods

• **Step #1: Identifying the problem**
  • Inconsistent mobility practices were observed for patients with:
    o *Temporary pacemakers*
    o *Femoral access*
    o *Pulmonary artery catheters (PACs)*
    o *Hemodialysis (HD)*
    o *Continuous renal replacement therapy (CRRT)*
    o *Intra-aortic balloon pumps (IABPs)*
    o *Impella devices*
    o *CentriMag Ventricular Assist Devices (VADs)*
    o *Extracorporeal membrane oxygenation (ECMO)*
Methods

• **Step #2: Systematic literature review**
  • Examined mobility practices for patients requiring critical lines

• **Step #3: Drafting a protocol**
  • Findings from 35+ articles were incorporated into an evidence-based protocol for mobilizing patients with “problem” lines/devices
Methods

• **Step #4: Building an expert panel to evaluate and modify the protocol**
  • We asked for input from other clinicians at our institution
    o Intensivists and attending physicians, nursing leadership, and rehabilitation department staff
  • We facilitated discussion between multidisciplinary team members via emails and live meetings
Methods

• **Step #5: Creating a final product**
  • Feedback from expert panel incorporated into a final product and “approved” by all involved
    o Compromises were made to ensure the 3 tenets of evidence-based practice were considered:
      o Clinician expertise
      o Scientific research
      o Patient/caregiver values
  • Protocol was presented at the hospital’s Critical Care Committee meeting and submitted as a hospital-wide policy
Results

- Hospital staff involved in patient care have access to a comprehensive, evidence-based protocol for mobilizing patients who meet inclusion criteria
- Multidisciplinary team approach found to be feasible and advantageous for making changes in hospital policy
- Buy-in from more than one discipline is imperative to changing hospital culture!
Conclusion

• It is essential that acute care PTs who encounter critical lines know the implications of such lines on patient mobility.

• A protocol for mobilizing patients with critical lines promotes a culture of safe mobility in the acute care setting.

• The process used to create this protocol is feasible and can be applied to other challenges encountered in patient care.
What’s next?

• We’re not done!
  • Educating clinicians to use the protocol
  • Data collection
Thank you to the clinicians who were involved in the creation of this protocol:

- Adel Ghuloom, MD
- Erik Garpestad, MD
- Ronald Perrone, MD
- Klemens Meyer, MD
- Haval Chweich, MD
- Eric Ursprung, MD
- Navin Kapur, MD
- Michele Esposito MD
- Dorothy Didomenico, RN
- Jamie Corral, RN
- Ken Shanahan, RN
- Donna Hernandez, RN
- Diandra Deblasio, RN
- Maria Ippolito
- Linda Courtemanche
- Michael Foley
- Abbey Boudouvas, PT, DPT
- Kristine Tang OTR/L
- Kristin Boyd, PT, DPT
Questions?

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Janelle Jablonski
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Allison Kras
akras@tuftsmedicalcenter.org
Intensive Care Physiotherapy during Extracorporeal Membrane Oxygenation for Acute Respiratory Distress Syndrome

Laveena Munshi\textsuperscript{1}, Tadahiro Kobayashi\textsuperscript{2}, Julian DeBacker\textsuperscript{1}, Ravi Doobay\textsuperscript{3}, Teagan Telesnicki\textsuperscript{1}, Vincent Lo\textsuperscript{4}, Nathalie Cote\textsuperscript{4}, Marcelo Cypel\textsuperscript{5}, Shaf Keshavjee\textsuperscript{5}, Niall D. Ferguson\textsuperscript{1,6}, and Eddy Fan\textsuperscript{1}

Presented by: Nathalie Cote
Nathalie.Cote@uhn.ca
ICU physiotherapy has been associated with reduction in ICU acquired weakness and shorter duration of mechanical ventilation and hospital stay.

Recent technological advances in ECMO devices have made early physiotherapy feasible for this population.

Increase survival of the critically ill is also associated with increased risk of functional impairments.
Objectives

* Characterize physiotherapy delivered to patients with ARDS supported with ECMO

* Exploratory Analysis: Evaluate the association of this therapeutic modality with mortality
Methods

* A retrospective cohort study of all adults who underwent veno-venous (VV) ECMO at the Toronto General Hospital for severe ARDS between 2010-2015.

* Physiotherapy scores were determined by the ICU Mobility Scale (IMS), which is a detailed activity scoring system ranging from 0 (lying in bed) to 10 (walking independently without gait aid)
107 patients underwent ECMO, 61 (57%) for ARDS

82% of patients underwent consultation with physiotherapy

39% of patients best IMS scores on ECMO were 2 or higher (sitting in bed/exercises in bed)

17% of patients best IMS scores were 4 or higher (actively sitting at edge of bed)
Maximum Activity based on Sedation Agitation Scale
ARDS Cannulation

- Patients with ARDS, on average, require higher ECMO support, paralysis and possibly high ventilator settings.
- Cannulae more suited for mobilization have limitations in their maximal attainable flows; multiple cannulae may be required to match oxygen demand.
- Cannula options are: Bicaval dual lumen, IJ-femoral and mixed.
Extracorporeal Membrane Oxygenation for ARDS in Adults
Daniel Brodie, M.D., and Matthew Bacchetta, M.D.
Activity Based on Cannulation Site

<table>
<thead>
<tr>
<th>Position</th>
<th>Bicaval Dual Lumen</th>
<th>IJ-Fem</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive ROM</td>
<td>45</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Active ROM</td>
<td>35</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Sitting</td>
<td>90</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>Standing</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent of Patients
Tilt Table R IJ and R fem
82% of patients received physiotherapy

ICU and hospital mortality: 22% among those who received physiotherapy compared to 64% who did not
Overall Mortality & Mortality By Physiotherapy Status
Ambulation Bicaval dual-lumen
Up in chair with Bicaval dual-lumen
Ambulation R IJ and R Fem
Conclusion

* Early ICU physiotherapy while on ECMO is feasible and is associated with improved ICU mortality

* Physiotherapy is safe when performed by experienced team

* Future research:
  * identifying specific barriers to rehabilitation
  * the role of dedicated physiotherapy teams
  * optimal timing of initiation
  * enhancing the safety profile in patients without bicaval dual lumen cannula
Thank You
## Feasibility and inter-rater reliability of the ICU Mobility Scale

Author links open overlay panel Carol Hodgson, Dale Needham, Kimberley Haines, Michael Bailey, Alison Ward, Megan Harrold, Paul Young, Jennifer Zanni, Heidi Buhr, Alisa Higgins, Jeff Presneill, Sue Berney

<table>
<thead>
<tr>
<th>Classification</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Nothing (lying in bed)</td>
<td>Passively rolled or passively exercised by staff, but not actively moving</td>
</tr>
<tr>
<td>1 Sitting in bed, exercises in bed</td>
<td>Any activity in bed, including rolling, bridging, active exercises, cycle ergometry and active assisted exercises; not moving out of bed or over the edge of the bed</td>
</tr>
<tr>
<td>2 Passively moved to chair (no standing)</td>
<td>Hoist, passive lift or slide transfer to the chair, with no standing or sitting on the edge of the bed. May be assisted by staff, but involves actively sitting over the side of the bed with some trunk control</td>
</tr>
<tr>
<td>3 Sitting over edge of bed</td>
<td>Weight bearing through the feet in the standing position, with or without assistance. This may include use of a standing lifter device or tilt table</td>
</tr>
<tr>
<td>4 Standing</td>
<td>Able to step or shuffle through standing to the chair. This involves actively transferring weight from one leg to another to move to the chair. If the patient has been stood with the assistance of a medical device, they must step to the chair (not included if the patient is wheeled in a standing lifter device)</td>
</tr>
<tr>
<td>5 Transferring bed to chair</td>
<td>Able to walk on the spot by lifting alternate feet (must be able to step at least 4 times, twice on each foot), with or without assistance</td>
</tr>
<tr>
<td>6 Marching on spot (at bedside)</td>
<td>Walking away from the bed/chair by at least 5 m (5 yards) assisted by 2 or more people</td>
</tr>
<tr>
<td>7 Walking with assistance of 2 or more people</td>
<td>Walking away from the bed/chair by at least 5 m (5 yards) assisted by 1 person</td>
</tr>
<tr>
<td>8 Walking with assistance of 1 person</td>
<td>Walking away from the bed/chair by at least 5 m (5 yards) with a gait aid, but no assistance from another person. In a wheelchair bound person, this activity level includes wheeling the chair independently 5 m (5 years) away from the bed/chair</td>
</tr>
<tr>
<td>9 Walking independently with a gait aid</td>
<td>Walking away from the bed/chair by at least 5 m (5 yards) without a gait aid or assistance from another person</td>
</tr>
<tr>
<td>10 Walking independently without a gait aid</td>
<td>Walking away from the bed/chair by at least 5 m (5 yards) without a gait aid or assistance from another person</td>
</tr>
</tbody>
</table>
### Riker Sedation-Agitation Scale (SAS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Term</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Dangerous Agitation</td>
<td>Pulling at ET tube, trying to remove catheters, climbing over bedrail, striking at staff, thrashing side-to-side</td>
</tr>
<tr>
<td>6</td>
<td>Very Agitated</td>
<td>Requiring restraint and frequent verbal reminding of limits, biting ETT</td>
</tr>
<tr>
<td>5</td>
<td>Agitated</td>
<td>Anxious or physically agitated, calms to verbal instructions</td>
</tr>
<tr>
<td>4</td>
<td>Calm and Cooperative</td>
<td>Calm, easily arousable, follows commands</td>
</tr>
<tr>
<td>3</td>
<td>Sedated</td>
<td>Difficult to arouse butawakens to verbal stimuli or gentle shaking, follows simple commands but drifts off again</td>
</tr>
<tr>
<td>2</td>
<td>Very Sedated</td>
<td>Arouses to physical stimuli but does not communicate or follow commands, may move spontaneously</td>
</tr>
<tr>
<td>1</td>
<td>Unarousable</td>
<td>Minimal or no response to noxious stimuli, does not communicate or follow commands</td>
</tr>
</tbody>
</table>

### Guidelines for SAS Assessment

1. Agitated patients are scored by their most severe degree of agitation as described.

2. If patient is awake or awakens easily to voice (“awaken” means responds with voice or head shaking to a question or follows commands), that’s a SAS 4 (same as calm and appropriate—might even be napping).

3. If more stimuli such as shaking is required but patient eventually does awaken, that’s SAS 3.

4. If patient arouses to stronger physical stimuli (may be noxious) but never awakens to the point of responding yes/no or following commands, that’s a SAS 2.

5. Little or no response to noxious physical stimuli represents a SAS 1.

This helps separate sedated patients into those you can eventually wake up (SAS 3), those you can’t awaken but can arouse (SAS 2), and those you can’t arouse (SAS 1).

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Poster Presentations

6th Annual Johns Hopkins Critical Care Rehabilitation Conference
Baltimore, MD
The Power of Networking:
NYC Occupational Therapy ICU Discussion Group
Lauren Cohen, MS, OTR/L

Learning Objectives
This project demonstrates to occupational therapists and other interdisciplinary team members, the importance of working together to share ideas and develop the knowledge and skills to perform best practice in critical care. Occupational therapists represent a smaller percentage of this interdisciplinary care team and networking with clinicians in similar institutions is crucial to share ideas, evaluation and treatment strategies, and projects in order to promote early patient access to occupational therapy services.

Abstract Summary
Occupational therapists play a vital role in this early stage of rehabilitation to maximize the patient’s functional recovery. As the ICU emerges as a common treatment arena for OTs in the acute care setting, it is necessary to develop clinical resources to help further the practice of beginning therapists. Practicing in the ICU requires a more advanced skill set than is typically covered in an OT masters entry-level program.

Background
The clinical importance and potential significance of these findings are invaluable to practicing in the ICU. This special interest group in New York City began in 2014 and is now made up of over 50 occupational therapists. Therapists involved come from New York Presbyterian Hospital at Columbia, New York Presbyterian Hospital at Cornell, Mount Sinai Hospital, Montefiore, NYU Langone, NYU Bellevue, Westchester Medical Center, and Mount Sinai Roosevelt Hospital.

We meet quarterly in person, but have constant contact through email and Facebook.

How The Group Was Formed
The “NYC OT ICU Discussion Group” began with initial contact to occupational therapy supervisors in acute care in the tristate area. Group facilitators maintained contact via email, social media, and quarterly face-to-face meetings. Participants were polled for agenda items and trending topics in order to prepare for each meeting.

Topics and Themes Discussed
- safe patient handling techniques
- education resources for educating team members on OT’s role in the ICU
- ways to involve patient family into treatment sessions
- cognitive assessment screens
- delirium management-non pharmacological techniques
- CAM ICU training
- practical cognitive activities to use in ICU setting
- communication-written adaptations, IPAD apps, and picture boards
- challenges interacting with other team members
- Ways to train your staff to treat patients in the ICU
- student education guidelines and training in the ICU

References


***Edits Made By: Megan Evangelist, MS/OTR/L***
Patient and Family-Centered Occupational Therapy in Patient with Bilateral Subarachnoid Hemorrhage and Right Middle Cerebral Artery Bifurcation Aneurysm

Sela Han, MS Neuroscience, MS, OTR/L
St. Jude Medical Center - Fullerton, CA

Background

- 67 year-old male, married, father of 3 (daughter and twin sons), 6 grandchildren, owner of an insurance company, soccer coach, avid distance runner (70-100 races), avid cyclist (4 times across the state of Iowa – 440 miles in 7 days)
- Mx: HTN, HLD, presenting to the Emergency Department with a sudden-onset headache
- While lifting weights on a lunch break from work
- Celebrated where a patient could progress in
- Helps
- Remaining
- Feed and groom with supervision
- Close
- Perform upper/lower body dressing, upper/lower body sponge
- Flashing
- Identify a stress management strategy
- Provides patient
- g
- continued journey of recovery through acute rehabilitation and

Method

Based on the day-to-day status and needs of patient and family, OT provided appropriate interventions:

1) Validation of patient’s frustrations and confusion
2) Orientation and redirection
3) Family education about:
   i. Functional and cognitive impairments as they relate to medical diagnosis
   ii. Availability of therapies throughout the continuum of care
   iii. Benefits of journaling patient’s course of recovery similar to ICU diaries
4) Use of simple familiar activities of daily living to optimize functional independence
5) Grading activities while monitoring hemodynamic stability and patient’s cognitive and emotional status
6) Patient-directed activities
7) Reassurance and encouragement based on concrete examples of progress
8) Facilitation of patient-centered and family-centered stress management and coping strategies

Results

At discharge from CCU to acute rehabilitation unit, patient was able to:

a) Identify a stress management strategy
b) Feed and groom with supervision
c) Perform upper/lower body dressing, upper/lower body sponge-bathing with minimal assistance
d) Sustain attention despite some distractions of multiple visitors being present during the OT session
e) Engage in simple problem solving

Family participated during the sessions, asked appropriate questions, and verbalized understanding of all the education provided.

Conclusion

OT can help provide:

- a safe and supportive environment for patient and family
- where a patient could progress in functional cognition, self-care, and functional transfers, through “just-right” challenges

- Patient was contacted for consent to this poster, and patient and family have benefited from meeting with therapists to casually talk about:
  - patient’s experiences while in the ICU
  - continued journey of recovery through acute rehabilitation and outpatient therapies
  - remaining challenges

Updates:

“Five months after my aneurysm, I ran the Brea 8k race, and finished 7th out of 20 runners in my age bracket. I will be running the Surf City 10 Miler on October 15th. I currently run approximately 80-100 miles a month and am a member of a running club.”

“I am currently about halfway through the 100 greatest novels ever written”

Acknowledgements

I would like to thank St. Jude Medical Center for supporting this poster presentation.
I would like to thank the patient and family for agreeing to have the case presented, for sharing their experiences candidly, and providing additional personal input.

Contact information: Sela Han, MS Neuroscience, MS, OTR/L Sela.Han@stjude.org
Clinical Case Description

The patient is a 37-year-old male with end-stage (EF=10-15%) cardiomyopathy, transferred to UF Health for a heart transplant evaluation. A 1:1 right femoral IABP was initially placed upon arrival secondary to severe hemodynamic derangements. After 14 days with a femoral IABP, the patient was transitioned to a 1:1 right axillary IABP with the sole intention of improving patient mobility and ambulation while listed as status 1A for heart transplant. The axillary IABP remained in place for 20 days prior to undergoing heart transplant. The patient remained in the hospital for an additional 31 days before being discharged to an inpatient rehabilitation facility.

Case Description

Obtaining the highest level of mobility in the ICU setting provides a means of measuring a patient's mobility in the ICU setting. It signifies ambulation level of mobility. The values left of the vertical dashed green line represent a higher level of functional mobility.

The patient had the right axillary IABP for 20 days and received a total of 15 skilled therapy sessions, varying from standing mobility, out of bed to chair activity, all the way to standing without upper extremity support, therapeutic exercises and gait training with hand-held assist over varying distances. On the day of transplant (March 27, 2017), the patient ambulated a total of $530$ feet with minimal assistance (score of 10). The patient was transferred to an inpatient rehabilitation facility in the ICU setting.

Table 1. The JH-HLM is a scale utilized as a regular means of measuring patient mobility, with scores ranging from 1 to 10, based on the observed activity the patient actually performs. This is a brief measure for assessing the patient's ability to perform daily activities. It is used as a temporary measure until the patient is stable enough to develop a performance measure for quality improvement projects. The higher number on both scales indicates a higher level of functional mobility.

Table 2. The JH-HLM provides an 11-point ordinal scale, ranging from nothing (i.e., lying in bed, score of 0) to independent ambulation (score of 10).

Table 3. IABP - intra-aortic balloon pump placement as a means for safe ambulation of a patient with severe hemodynamic instability.

Table 4. IMS - Intraaortic balloon pump as a means for safe ambulation of a patient with severe hemodynamic instability.

Patient Progression

Physical therapy interventions, including functional out of bed mobility and gait training, were utilized in a patient with an axillary IABP. There were no significant adverse events while ambulating a patient with axillary IABP. Adverse events include but are not limited to significant bleeding, ischemic events, or IABP malfunction/position.

The JH-HLM and the IMS were utilized as outcomes measures within the study. These measures were utilized in our case report as our goal was to identify the benefits of the axillary IABP with regards to patient mobility and ambulation. The higher number on both scales indicates a higher level of functional mobility.

The JH-HLM was developed based on input from multiple disciplines. The goals, as described by the developers of the scale, were to record the mobility that a hospital patient actually does, to standardize the description of patient mobility, to set individual patient mobility goals, and to develop a performance measure for quality improvement projects. Additionally, it is a useful tool to measure and advance patient mobility, further studies are needed to evaluate the reliability and validity of the scale.

The JH-HLM provides a quick and simple bedside method of measuring mobility milestones in critically ill patients. Tipping et al. noted a significant difference between the IMS at ICU discharge in patients with acquired weakness compared to those without. The construct and predictive validity properties of the IMS support the use of the IMS in the ICU to measure patients' daily mobility level.

Our conclusion is limited to events related to one patient within the cardiac ICU who was mobilized almost daily with an axillary IABP. Regardless of the scale utilized, the patient benefitted from ambulation prior to heart transplant. Scores between the two scales varied based on the amount of physical activity provided during mobility (IMS) and/or distance ambulated (JH-HLM). It is unclear whether these results could be generalized to a population of patients who had poor mobility before ICU admission. Furthermore, future research should compare the safety and efficacy of mobility with varying IABP types.

Conclusion

The patient was transferred to an inpatient rehabilitation facility in the ICU setting.

The patient received a total of 15 skilled therapy sessions, varying from standing mobility, out of bed to chair activity, all the way to standing without upper extremity support, therapeutic exercises and gait training with hand-held assist over varying distances. On the day of transplant (March 27, 2017), the patient ambulated a total of 530 feet with minimal assistance (score of 10). The patient was transferred to an inpatient rehabilitation facility in the ICU setting. The patient benefitted from ambulation prior to heart transplant. Scores between the two scales varied based on the amount of physical activity provided during mobility (IMS) and/or distance ambulated (JH-HLM). It is unclear whether these results could be generalized to a population of patients who had poor mobility before ICU admission. Furthermore, future research should compare the safety and efficacy of mobility with varying IABP types.

Discussion

References


Acute and critical care in the classroom
Designing realistic and effective teaching tools throughout the curriculum

Andrea Attorri PT, DPT
Stephen Bailey PT, PhD, FACSM

OBJECTIVES
Teaching higher level critical thinking, therapeutic interactions with acutely ill or vulnerable patients, and management of complex critical care clinical environments is challenging within the entry-level classroom. Effective learning environments must provide repeated realistic practice of increasing difficulty with opportunities for feedback and reflection. Standardized patients activities have been successfully implemented in entry-level DPT education. Aspects unique to standardized patients (real time, realistic/living person, individualized feedback) lend themselves to the teaching of higher level critical care skills. Standardized patient use alone, however, does not guarantee desired outcomes. The development of case scenarios and the nature of feedback and delivery, for example, are critical to the quality of the learning process. In this poster, we will share educational materials and methods of integrating clinicians into academics, progression of clinical decision making throughout the curriculum, reducing the fear of critical and acute care settings, as well as guiding participants in developing their own effective teaching tools. With the growing frequency of critical care physical therapist practice, it will become essential for DPT education to include successful management of critically ill patients.

METHODS
The majority of acute and critical care content is structured into the cardiopulmonary dysfunction course, and taught via the following:

- Strong cardiopulmonary physiology and vital sign interpretation
- Emphasis on clinical decision making
- Case scenarios with group polling answers

Instructors incorporate the perspective of the collective thought process of the class. Incorporated in this activity is concepts from simulations, disease and pathology, all of which influence clinical decision making in the acute care setting with medically vulnerable patients.

CATHERCULAR DECISION MAKING
Using an audience polling software as another teaching tool, each student has a ‘clicker’ which allows them to answer questions (such as the ones below), and after all entries are received, a graph shows the distribution of answers. This forces students to commit to an answer and also gives them and the instructors the perspective of the collective thought process of the class. Incorporating feedback and learning objectives, case scenarios and the nature of feedback and delivery, for example, are critical to the quality of the learning process. In this poster, we will share educational materials and methods of integrating clinicians into academics, progression of clinical decision making throughout the curriculum, reducing the fear of critical and acute care settings, as well as guiding participants in developing their own effective teaching tools. With the growing frequency of critical care physical therapist practice, it will become essential for DPT education to include successful management of critically ill patients.

Results
Students demonstrated a statistically significant improvement in all categories of a confidence and skills survey, as seen in the graph below. This positive preliminary data on student improvement in decision making, vital sign interpretation, self-assurance with unstable patients, and various safety skills could be correlated with better prepared entry-level physical therapist practice in the acute and critical care settings. Students identified the following topics as concepts that should be introduced in the classroom prior to any acute care clinical experience: line management, vital sign interpretation, and common acute care diagnoses, procedures, and basic pharmacology.

Data are presented as mean ±standard error (M±SE). Bonferroni corrections were made in an effort to minimize the possibility of inflation of alpha. Significance was set a priori at p=0.05.

CONCLUSION & DISCUSSION
It is imperative that DPT programs prepare students to successfully manage critically ill patients in the acute and critical care settings. Crucial decision making cannot be taught exclusively from a textbook, nor can it be tested via multiple choice questions. Students must learn how to be safely assertive and take risks for the benefit of the critical care patient. Historically, the extent of clinical decision making for acute and critical care has stopped at “don’t hurt the patient” or “do no harm.” This approach greatly limits the potential in which physical therapists can intervene for patients’ benefits. By teaching safe assertiveness and a strong base of functional cardiopulmonary physiology, students learn to take calculated risks in order to make the most optimal functional gains. With strong didactic content and lab activities to teach physiology, at rest, and especially with activity and in the setting of various disease processes, students become less fearful of treating medically fragile patients. Students who are fearful turn into therapists who are fearful, and therapists working in a critical care setting who are fearful can do more harm than good.

Since questionnaires were collected anonymously, pre and post responses could not be matched for each subject. As a result questionnaire responses were assessed using unpaired t-tests. Bonferroni corrections were made in an effort to minimize the possibility of inflation of alpha. Significance was set a priori at p=0.05.

Data are presented as mean ±standard error (M±SE).
Training the Next Generation of Early Mobilization ICU Therapists

Carly Goldberg, MS, OTR/L, Lauren Cohen, MS, OTR/L

Learning Objectives
- Identify the skills required for OTs to begin ICU evaluation and treatment.
- Implement a training protocol as therapists begin treatment in the ICU.
- Establish interdisciplinary relationships and educate staff on the role of OT in the ICU.

Abstract Summary
Occupational therapists play a vital role in this early stages of rehabilitation to maximize the patient’s functional recovery. As the ICU emerges as a common treatment arena for OTs in the acute care setting, it is necessary to develop clinical resources to help further the practice of beginning therapists. Practicing in the ICU requires a more advanced skill set than is typically covered in an OT masters entry-level program.

Key Elements for Success
- Ability to synthesize information from the chart, RN, medical team, and patient’s current status
- Critical analysis of the patient’s status at the time of session
- Development of an appropriate treatment plan given the above
- Understanding of critical vitals in order to provide “just right” challenge within safe parameters

Training Methods
- Self-study and research
- Shadowing a senior therapist to observe handling techniques, patient interaction, and interdisciplinary communication
- Co-treating with a senior therapist and having clinical reasoning discussions for topics such as triage strategies, treatment ideas, and appropriate ways to grade activity up and down at the ICU level
- Demonstrating ability to treat independently
- Participating in AM Interdisciplinary rounding and triaging appropriately
- Passing a competency exam

References
UTILITY OF MOBILITY IN POST OPEN HEART SURGERY PATIENTS
Alan M. Beck, PhD & Dalton Morgan, BS
Southern Illinois Healthcare, Carbondale IL
6th Annual Johns Hopkins Critical Care Rehabilitation Conference, Baltimore MD

Introduction
Early mobility in Intensive Care Units (ICU) has gained traction in the recent past. Early mobility has been deemed safe and effective for improvement in functional outcomes. In health systems with limited resources, the mobility specialist may be tasked out depending upon patient need and allocated resources. Therefore, other responsibilities outside of the conventional mobility literature may be deemed necessary.

Purpose
The purpose of the study was to determine the utility of a mobility specialist’s impact on post open heart surgery patient's ambulation distance and frequency.

Methods
Data were collected retrospectively for one month on ambulation distance and frequency of post open heart surgery patients from a mid-western rural hospital's cardiovascular intensive care unit. Ambulation was grouped dichotomously based upon personnel present (i.e., Mobility vs. non-Mobility). Independent sample’s t-tests were completed on distance and frequency of ambulation.

Measures
- Ambulation distance, frequency, and personnel present were measured.
- Each ambulation was dichotomously grouped into personnel present during the ambulation
  - Mobility specialist present
  - Mobility specialist not present.

Results
- Ambulation distance was significantly greater when the Mobility specialist was present (M = 260.10ft, SD = 271.10ft) compared to non-Mobility personnel (M = 179.10ft, SD = 237.83ft), (t(170) = 2.10 [4.32, 157.60], p = .039).
- Ambulation frequency was significantly greater when the Mobility specialist was present (M = 2.52, SD = 1.57) compared to non-Mobility personnel (M = 1.60, SD = 1.26), (t(41) = 2.16 [.06, 1.81], p = .037).

Conclusion
Findings suggest a mobility specialist increased the frequency and distance of ambulation in post open heart surgery patients. The Mobility specialist provided the impetus for more frequent and distant ambulation. Perhaps yet another novel use of a Mobility specialist in cardiovascular intensive care units.

Reference
ICU Rehab in a Small Community Hospital: A Quality Improvement Project
Samantha Bates, MOTR/L, Shannon Farley, PT, DPT, & Laura Riley, M.S., CCC-SLP

OBJECTIVES
- Increase percentage of referrals for Physical Therapy, Occupational Therapy, and Speech Therapy.
- Decrease average number of ventilator days.
- Decrease average number of days until referral received for Physical Therapy, Occupational Therapy, and Speech Therapy.
- Reduce cost of care.

SETTING
- Camden Clark Medical Center – 327 bed nonprofit acute care hospital in Parkersburg, WV.
- 18 bed Intensive Care Unit.
- Average 3.9 ventilated patients per day.

METHODS
This QI project took place January – September 2016. Baseline data was collected for three months (January – March). Counter measures were implemented between the months of April – September. Focus was to increase the critical care staff’s knowledge of the importance of Physical Therapy, Occupational Therapy, and Speech Therapy through education. Daily rounds were completed between interdisciplinary members of the QI team to determine appropriate patients. Education was provided to the critical care staff, including an update of research on early mobility in the ICU. As therapy was being performed in the room, bedside education was provided if the RNMM was present. Exclusions in the QI project were those patients who expired in the ICU, or were re-intubated on the same admission.

RESULTS
- **Physical Therapy**
  - Percentage of referrals increased from 68% to 91%.
  - Days until referral received declined from 1.7 days to ≤ 1 day.
- **Occupational Therapy**
  - Percentage of referrals increased from 67% to 84%.
  - Days until referral received declined from 2.1 days to 1.0 days.
- **Speech Therapy**
  - Percentage of referrals increased from 63% to 85%.
  - Days until referral declined from 5.4 days to 1.5 days.

IMPACT
- Ventilator days decreased from 3.8 days during baseline period to 3.1 days during implementation of rehab services.
- Additional per patient costs associated with ventilator dependence at Camden Clark Medical Center averages $1866.00 daily.
- Reducing our number of ventilator days by 0.8 days translated to an annual cost savings of approximately $560,000.

- Cultural Change -
  - Nursing staff and physicians are now aware of the unique differences between each discipline.
  - Occupational Therapy and Speech Therapy are increasingly recognized as a standard of care in the critical care setting.
  - Each discipline is now initiating therapy earlier with the ventilated patients, helping to reduce ICU acquired weakness, improve communication needs, and begin simple ADLs.
  - During this QI project, ICU HCAHPS scores steadily increased from 40.0% to 81.3% by the end of the project.

References:
In recent years, staff education has become an increasingly important factor as early mobilization (EM) has spread to many hospitals. Against this background, it is necessary for medical staff to receive education regarding not only basic knowledge of critical care but also clinical skills. The Japanese Society for Early Mobilization (JSEM) has been systematically providing education and training regarding this kind of knowledge for the past 12 years.

The JSEM is an organization that disseminates information, carries out educational activities, and undertakes academic research with regard to patient mobilization. The JSEM has educated more than 110,000 medical staff, and currently has 4,400 registered members.

5 Factors that have enabled the JSEM to provide education on a continues basis.

1. Organization
The membership system started since 2010. (Required payment 45 dollars/year)
The Great East Japan Earthquake occurred on 2011, but the number of attendances increased after the membership system started.

2. High-quality Presentation
All lecturer have to fulfill JSEM's standard regarding presentation. The contents of presentation for educational lecture are examined strictly by reviewer.
All lecturer have to improve their presentation based on the result of questionnaire evaluation after lecture.

3. Development of Human Resources
The JSEM has established an early mobilization instructor/early mobilization advisor qualification system since 2013.

4. Publishing
JSEM was published 7 books regarding EM. The Early Mobilization Journal has been published every year.

5. Promotion of team collaboration
The JSEM began the E-MAT (Early Mobilization Assistance Team) system as activity of improvement team collaboration.

We think a bundle of those measures is effective for attracting interest of medical staffs.

Conclusion
Those factors for continuous education of early mobilization are considered to be critical. I hope making discussion regarding a effective measure for education of early mobilization today.
RESULTS
• Families of thirteen patients (n=25 parents/guardians) were enrolled in the initial pilot phase of the study.
• Diary entries were written primarily by bedside nurses with additional contributions by pediatric residents, PICU fellows, PICU attending physicians, and family members.
• All families consented for inclusion of photographs in the diaries.
• Challenges included incorporation of diary writing into a busy PICU clinical workflow, however, the diary experience was well received by families and PICU staff members.

CONCLUSION
• The use of ICU diaries in the PICU setting is feasible and may be a helpful and important tool in improving psychological outcomes of family members of pediatric survivors of critical illness.
**Objectives**
The purpose of this poster is to outline the differences in the NICU population in regards to early mobilization. New standards and parameters specific to the neurologic population were established for this unit’s early mobilization effort. Cognitive therapy as a means of preparation for early mobilization readiness is an important factor in this population.

**Background**
In addition to the parameters for in-bed and out-of-bed exercises established by the expert consensus (Hodgson et al, 2014), mobilization in the NICU also hinges upon a patient’s cognitive abilities and readiness. In order to address those patients who might not be ready for the exercise components of the program, the team identifies those patients appropriate to begin working on cognition in preparation for mobilization.

**Alternate interventions in the Neurologic ICU**
- Arousal
- Attention
- Following commands
- Bedlevel self care
- Calendar activities
- Guided imagery
- Mental practice

These interventions are equally as important for those patients who have central nervous system involvement. The premotor planning areas of the brain have been shown to be active with the thought of movement, therefore patients can participate in preparatory cognitive exercises even if deemed not yet ready for out-of-bed exercises.

**Conclusions**
Although the NICU was the last of the ICUs to have a formal mobilization program, the culture has long been to promote activity and mobilization. Guidelines have been modified for the neurologic population, and cognitive interventions have been recognized as alternatives for those patients who are not yet safe for out-of-bed therapy.

**Resources**


The Mobilization of Multiple Patients Requiring Biventricular Support via CentriMag: A Retrospective Case Study

Allison Kras PT, DPT and Janelle Jablonski PT, DPT

Background & Purpose

Short-term ventricular assist devices (VADs) may be used for emergent intervention to assist in managing patients with cardiogenic shock (CS) (1). The CentriMag pump is an extracorporeal circulatory support device that utilizes a centrifugal pump and has capabilities to be used as a short term right VAD (RVAD), left VAD (LVAD), or bilateral VAD (BiVAD) (2). CentriMag has been approved for use up to 30 days as an RVAD and being evaluated in the United States for use in patients as a bridge to recovery, transplant, and other short and long-term VADs. Currently, the manufacturer recommends against out of bed mobility for patients. However, limited research has been published about mobility, including ambulation, for patients who require CentriMag support (3,4,5,6). The purpose of this report is to describe the safety and progression of functional mobility achieved by three patients with BiVAD CentriMag in situ.

Case Description

- Three male patients with an average age of 49±4 years required BiVAD CentriMag support.
- Patients 1 and 2 were diagnosed with CS and BiVAD CentriMag was utilized as bridge to orthotopic heart transplant (OHT).
- Patient 3 underwent an OHT which was complicated by acute rejection that required BiVAD CentriMag support.
- Patients 2 and 3 initially required support from veno-arterial extracorporeal membrane oxygenation (VA-ECMO) central configuration with oxygenator on right CentriMag, mechanical ventilator, and continuous veno-venous hemodialysis (CVVHD).
- Patients 1 and 2 had no major adverse events while requiring CentriMag support.
- Patient 3 was diagnosed with 2 cerebrovascular accidents, resulting in residual strength and visual impairments. He also experienced seizures while requiring BiVAD CentriMag support.

Table 1

<table>
<thead>
<tr>
<th>CentriMag Days</th>
<th>PT Sessions</th>
<th>In Bed</th>
<th>Edge of Bed</th>
<th>Transfers</th>
<th>Gait Training</th>
<th>Average Distance (feet)</th>
<th>AM-PAC 6-clicks (lowest)</th>
<th>AM-PAC 6-clicks (highest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>94</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>135</td>
<td>14</td>
</tr>
<tr>
<td>Patient 2</td>
<td>82</td>
<td>42</td>
<td>42</td>
<td>38</td>
<td>38</td>
<td>28</td>
<td>252</td>
<td>6</td>
</tr>
<tr>
<td>Patient 3</td>
<td>206*</td>
<td>82</td>
<td>82</td>
<td>64</td>
<td>63</td>
<td>46</td>
<td>78</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>382</td>
<td>130</td>
<td>130</td>
<td>108</td>
<td>107</td>
<td>75</td>
<td>143</td>
<td></td>
</tr>
</tbody>
</table>

*Patient still required BiVAD CentriMag support at the time of data collection

Outcomes

- Refer to Table 1 for mobility results
- Multidisciplinary input from intensivist, transplant team, physical therapist (PT), and nursing staff was utilized to create an individualized progressive mobility and safety plan for each patient.
- All three patients increased mobility and improved Activity Measure for Acute Care (AM-PAC) 6-click score.
- Outside of PT patients also mobilized with other staff.
- No major adverse events were a result of mobility or PT.
- In all three cases there were notes of CentriMag alarming due to low flow rates; however, in each case alarms were quickly resolved with change in patient position.

Discussion

- With input from a multidisciplinary team, multiple patients who required support from BiVAD CentriMag were able to participate in progressive mobility, including ambulation, without adverse effects.
- All patients in this report were able to make functional gains with PT.
- Patients 1 and 2 discharged home after receiving OHT. However, they likely would have required further inpatient rehabilitation had they been unable to participate in mobility while requiring BiVAD Centrimag support.
- Patient 3 currently requires BiVAD CentriMag support and is actively participating in PT.
- Further research is indicated on mobility and it’s implications for patients who require BiVAD CentriMag support.

References


Contact Information

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**The authors would like to acknowledge the support and assistance provided by the Tufts Medical Center CTU staff while mobilizing patients who require CentriMag support.**
Safety of Chest Physiotherapy for Acute Respiratory Distress Syndrome during Venovenous Extracorporeal Membrane Oxygenation: A Case Report

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Introduction

There are few data on chest physiotherapy during venovenous extracorporeal membrane oxygenation (VV ECMO) for acute respiratory distress syndrome (ARDS).

Purpose

In this case report, we evaluated safety of chest physiotherapy (CPT) for an adult patient with acute respiratory distress syndrome (ARDS) during venovenous extracorporeal membrane oxygenation (VV ECMO).

Case description

A male 58 y/o presented with pneumonia (Figure 1.) and septic shock. Initially, the patient experienced abdominal distension and had a bout of diarrhea. He went to bed that night and extreme weakness was noted after waking up next morning but with clear conscious. Therefore, he was send to emergency room at LandSeed Hospital by his family for help.

Duration of ECMO days: 7
Duration of MV days: 14

CPT intervention

CPT consisted of chest wall mobilization, rib cage compression, abdominal muscle tension facilitation, ventilator hyperinflation and suctioning (Figure 2). The parameters used to evaluate safety of CPT while the case was on VV ECMO included occurrences of adverse events (i.e., arrhythmia, ventricular tachycardia, cardiac arrest, bleeding, and removal of endotracheal tube or unplanned decannulation) and abnormal vital sign changes.

Treatment

- Chest wall mobilization
- Rib cage compression
- Abdominal muscle tension facilitation

Physiological Effects

- Improved muscle contraction efficiency, ventilation and gas exchange through lengthening of the intercostal muscles (teelanGunrayub, 2012)
- Increasing and redirecting airflow for pulmonary re-expansion and airway clearance (Santos, 2014)
- To facilitate more effective ventilation (Perren, 2013)

Results

The reported case received a total of six CPT sessions with no adverse events occurred. The greatest magnitude of systolic blood pressure, diastolic blood pressure, oxygen saturation, heart rate and respiratory rate changes (post-pre CPT) were 6 mmHg, 4 mmHg, 3%, 5 bpm, and 4 breaths/min, respectively (Figure 3).

Conclusions

In this case report we demonstrated that routine CPT is safe for patient with VV ECMO. CPT helped to achieve optimal airway hygiene and facilitated cough function recovery in this case. There was no significant adverse event in this case. Thus, we believe it is safe and feasible to perform CPT for patient during VV ECMO.

Future research with larger sample size is needed to confirm the safety of CPT on patients with VV ECMO and further study to assess the impact of CPT on patient recovery after weaning from VV ECMO support is warranted.

References

Importance of Early Mobilization in Mechanically Ventilated Oncology Patient Receiving Chemotherapy and Radiation

Author: Lindsay Riggs, PT, DPT
Institution: The Ohio State University Comprehensive Cancer Center - The James Cancer Hospital and Solove Research Institute

Conclusion

• Limited current evidence that examines the importance of early mobilization in oncology ICUs.
• Highlight the importance of mobilizing mechanically ventilated patients with cancer.
• Demonstrate how early mobilization helps prevent deconditioning so that patients may safely return home after hospitalization.

Prolonged hospitalization can cause deconditioning, muscle weakness, and lead to secondary complications, particularly in mechanically ventilated patients. Chemotherapy and radiation treatments can also contribute to these complications and negatively affect physical function. Performance status for cancer patients can also determine a patient’s fitness for tolerating and continuing cancer treatments. Many of these discussions occur in an oncology ICU due to patients’ critical illness and co-morbidities. Early mobilization in an oncology ICU can help combat negative effects of bedrest during hospitalization, in addition to improving functional status during cancer treatment. By optimizing rehabilitation during prolonged ICU course, this patient was able to avoid many of the secondary complications of bedrest and return to home to continue with further cancer treatments.

Objectives

• Limited current evidence that examines the importance of early mobilization in oncology ICUs.
• Highlight the importance of mobilizing mechanically ventilated patients with cancer.
• Demonstrate how early mobilization helps prevent deconditioning so that patients may safely return home after hospitalization.

Methods

Patient is a 67 year old female newly diagnosed with small cell lung cancer. This required her to be mechanically ventilated greater than 10 days. Physical Therapy was initiated during ICU stay to assist with mobility and prevent deconditioning caused by prolonged hospital course. While intubated, patient progressed from sitting at edge of bed on evaluation to ambulating with a walker. As patient’s tumor burden reduced, she was extubated and transferred out of the ICU.

Case Description

• Previously healthy, independent 67 year old female
• Past medical history: 100 pack year smoking history, likely underlying COPD
• Hospitalized 19 days, 14 days in the medical ICU
• Mediastinal mass obstructing trachea, which led to acute hypoxic respiratory failure
• Diagnosis: small cell lung cancer with bone metastases to L1
• Bronchoscopy to attempt stent and open up airway. Unable to ventilate and oxygenate during procedure, patient required intubation.
• Inpatient treatment: Chemotherapy, radiation, PT, OT
• PT and OT initiated ICU day 4 and continued throughout ICU stay
• Tumor burden reduced, patient extubated on ICU day 13
• Patient discharged to home without supplemental oxygen. Additional radiation treatments planned.

Therapy Interventions/Results

• Throughout course of physical therapy, the patient, while intubated was able to progress from two-person assist for bed mobility to standing by ambulating with walker.
• Evaluation day: two person assist for bed mobility and sitting at EOB
• Therapy Progression while ventilated: EOB → bedside chair → ambulating with walker
• Pt ambulated on ICU days 11, 12, and 13
• ICU day 14: patient extubated, ambulated with walker, then hand-held assist 400ft
• Transferred to regular nursing floor: supervision with walker, contact guard assist with hand-held assist
• Initiating an early mobilization program allowed the patient to continue to remain active during cancer treatment and prevented deconditioning that occurs with prolonged bedrest during ICU stay.
• Anecdotally, mobilization provided patient with engagement and interaction with staff and family and allowed the patient to actively participate in one aspect of her care.

AMPAC Basic Mobility Score During Hospitalization by Physical Therapy Session

AMPAC Score

References:

A Quality Improvement Initiative to Optimize Goal-Directed Sedation in the Pediatric Intensive Care Unit

Meghan Shackelford MSN, CRNP-AC, Sapna R. Kudchadkar MD, Judy Ascenzi DNP, RN

Anesthesia Critical Care Medicine, Johns Hopkins University School of Medicine, Pediatric Intensive Care Unit, Baltimore, MD

Introduction

Inconsistent use and evaluation of sedation practices in mechanically ventilated patients in the PICU despite a validated sedation evaluation tool (SBS) which can lead to decreased mortality, increased delirium, ventilator days, increased LOS. The State Behavioral Scale (SBS) is a validated tool in pediatrics and yields an objective measure for a mechanically ventilated patients’ level of sedation. Goal-directed sedation could improve clinician satisfaction as well as decrease morbidity and mortality by allowing for early mobility, decreased delirium and fewer ventilator days.

Objectives

• The objective of this quality improvement initiative was to implement a streamlined process for daily sedation goal-setting during PICU rounds and evaluate the percentage of time that intubated patients are maintained within the ideal sedation range after implementation.

Materials and Methods

Pre-Intervention:
• Chart review of prescriber notes, RN notes and SBS documentation.
• Data collection via PICU Daily Goals Checklist on patients correctly and incorrectly given a goal SBS score on Rounds.
• Survey sent to MD’s, NP’s, RN’s to assess SBS perceptions and utilization.

Interventions/Next Steps
• SBS Goal added to PICU Daily Goal Sheet.
• Data collection via safety checklist on patients correctly and incorrectly given a goal SBS score on Rounds.
• Small group in-person education of SBS scoring and utilization. The groups included: Resident PICU orientation, Nurse Leadership Meeting, Nursing staff meetings, NP meeting, PICU Fellow Meeting, PICU Faculty Meeting
• Power Point Education of SBS scoring (with voice over) to roll out in synchrony with meetings and was also sent to IT staff
• Continue Every Day Card/Every Day Card (reference card) distribution.
• Continue work with ICU Liberation and PICU UPI working groups.

Post-Intervention:
• Pre/Post SBS perceptions Survey of Provider and Nursing Staff.
• Identifying goal SBS on rounds Pre/Post checklist implementation (%).
• Documentation of SBS in Nursing and Provider notes.
• Establish % time spent at goal SBS.

Results

Goal Directed Sedation: Pre & Post Intervention

<table>
<thead>
<tr>
<th>SBS Pre-Intervention</th>
<th>SBS Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>36</td>
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<tr>
<td>29</td>
<td>33</td>
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<tr>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>55</td>
<td>18</td>
</tr>
<tr>
<td>167</td>
<td>97</td>
</tr>
<tr>
<td>Jun-16</td>
<td>Nov-16</td>
</tr>
<tr>
<td># of intubated &amp; sedated</td>
<td># of possible SBS scores</td>
</tr>
</tbody>
</table>

Data

• During the baseline period, 20 patients were intubated and sedated, and only 3 (15%) had an SBS goal documented in a prescriber note. Thirteen (65%) patients had SBS scores consistently (SBS charted at least 50% of time) by the nurse, with documentation rate at all eligible time points of 79% (12/16) scores. The pre-implementation survey revealed that there was a lack of knowledge among all interdisciplinary teams about use of SBS for daily sedation management.

• After implementation of targeted education about the SBS use for intubated children, 100% of intubated patients had SBS documentation, with 80% of all eligible SBS scores (16/164) being completed. Additionally, 100% of intubated and sedated patients received a goal SBS via the ICU checklist. Patients spent an average of 57% of time within the goal SBS range. Post-implementation survey revealed that goals are now consistently set and understood by the interdisciplinary team.

Conclusion

Goal-directed sedation is a critical component of ICU liberation initiatives including early mobilization, and a targeted educational intervention to facilitate sedation goal-setting and consistent interdisciplinary communication was effective.
The incidence, characteristics and side effects of chronic pain in ICU survivors

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Introduction
- Post intensive care syndrome (PICS) is now a widely used term to describe the collection of physical and psychological problems reported by ICU survivors
- Physical problems can include chronic pain which can have a negative effect on quality of life and return to employment [1, 2, 3]
- Chronic pain post ICU can also increase the use of healthcare resources required long after discharge to include pain medication and specialist pain services [3, 4]
- Intensive Care Syndrome: Promoting Independence and Return to Employment (InS:PIRE) is an ICU discharge programme which explored the incidence and effect of this chronic pain

Aims
Data from InS:PIRE was used to:
- Observe the incidence, anatomical sites, intensity, and interference of chronic pain in ICU survivors over a 12-month period
- Investigate analgesic use for chronic pain management
- Identify predictors of chronic pain and management of symptoms

Method
- InS:PIRE is a post-ICU multidisciplinary rehabilitation programme which follows up patients up to one year post discharge
- Inclusion criteria: Patients that have been ventilated >72 hours and/or have had a high dependency unit stay >2 weeks
- Participants had interventions with an ICU physiotherapist, consultant and nurse, pharmacist, group psychology sessions and a social prescription session
- Participants attended a weekly exercise class, a one-one musculoskeletal (MSK) assessment and completed the Brief Pain Inventory (BPI) questionnaire
- Quantitative data collected using the Brief Pain Inventory (BPI) and MSK assessment during the programme was extracted and analysed
- Descriptive statistics and paired t-tests provided information regarding intensity and interference
- Logistic regression was used to identify predictors of chronic pain
- Ethics approval was waived as the programme was part of a quality improvement initiative

Results
- Two-thirds (n=31) of InS:PIRE ICU survivors (n=47) complained of a ‘new chronic pain’ since their ICU admission (Figure 1)
- No pain = 13%; No new chronic pain = 21%; Chronic pain = 66%
- New chronic pain group demographics included: median age 51 (IQR 44-56); 55% of patients were men; median ICU length of stay 12 (7-27); 58% had sepsis
- The shoulder was the single most frequently affected joint (39%; n=12), especially on the right side and lower limb (LL) pain was high (42%, n=13) (Figure 2)
- Pain severity was ‘moderate’ and did not improve significantly over the year (p=0.05)
- Pain interference with life improved over the 12-month period (p<0.05) with enjoyment of life and work remaining the most severely compromised
- Prior to admission 43% of patients were taking analgesics and this increased to 81% at the time of their clinic visit
- No significant predictors of chronic pain were found post-ICU

Discussion
- Many contributing factors exist for shoulder pain. Further research could investigate the impact of a prophylactic post-ICU rehabilitation programme
- The bilateral presentation of LL pain may indicate a systemic cause or the body’s overall privation of movement for those excluded from mobilisation
- Patients pain at one year was reported to still be ‘moderate’ however interfered less with their life showing possible better coping strategies and pacing
- Work and enjoyment of life were most severely affected at one year reflecting the need for vocational rehabilitation and specialist pain management services
- Further research should include: a mixed-method; larger sample size; age matched controls from the community and hospital that do not require ICU care

Conclusions
- Chronic pain remains a problem for ICU survivors and future studies should focus on chronic pain as a primary outcome.
- Chronic pain interference does improve significantly over time but patients need appropriate specialist support post ICU
- The BPI can be used in the assessment of chronic pain in ICU survivors

References

Acknowledgements
- Louise McCallum (dissertation advisor) and Catherine Stewart (statistician)
Background

Patients who survive critical illness and treatment in an Intensive Care Unit (ICU) worldwide often suffer from Post Intensive Care Syndrome (PICS). The syndrome affects the patient’s recovery process and at present there is no gold standard for post-ICU follow-up.

In an ICU in a University Hospital in Denmark, patients are offered a nurse-led consultation three months post ICU-admission to help them cope with PICS and identify opportunities for further multidisciplinary intervention.

Aims of the study

• To explore the benefits of the consultation with regards to the individual patient’s symptoms of PICS.
• To describe former intensive care patients’ experiences of the consultation, specifically regarding content and setting.

Methods

• An observational study of the current follow-up consultation.
• A semi-structured interview based upon observations and statements arising from the initial consultation.

Ten adult patients participated in the study.

Results

Four related themes arose regarding benefits of the consultation in relation to the patients’ symptoms of PICS:

Confronting the demons:
“Since I revisited the unit and heard the sounds my nightmares have stopped. I guess I closed that chapter in my life” (Female patient, aged 32)

Coming to terms with the reality of having been critically ill:
“When I revisited the unit it dawned on me: I could have been dead. It made me happy to be alive” (Female patient, aged 55)

Making sense of the symptoms:
“The clarity about my hallucinations and taste disturbances, and the fact that I wasn’t the only one having these experiences after critical illness. That was the biggest eye-opener for me” (Male patient, aged 67)

Regaining a sense of normality:
“It was a relief to know that I wasn’t the only fool having these awful nightmares” (Female patient, aged 55)

Revisiting the ICU and experiencing the setting in person played a huge role in coping after surviving critical illness. Seeing the unit with all its technical equipment and hearing the sounds confronted the patients with their stay in ICU.

During the consultation, problems related to PICS were identified and many patients were referred for further multidisciplinary intervention. A secondary finding was the importance of involving the relatives. They were the primary source of information for the patients during the time between discharge from ICU and the consultation, and they were an important part of the patient’s rehabilitation.

Conclusions

The consultation helped the patients cope with the traumatic event. The consultation also helped patients understand their symptoms and make sense of what happened during their stay in ICU. An important benefit for many patients was a sense of relief knowing that other patients had experienced the same symptoms.

The consultation should be seen as one part of a multidisciplinary approach to help ICU patients’ recoveries.

References

CORRELATION OF PRE-SURGERY FRAILTY-RELATED MEASUREMENTS WITH POST-TRANSPLANT OUTCOMES IN PATIENTS AFTER LUNG TRANSPLANT


INTRODUCTION

Background: Frailty is increasingly recognized as a risk factor for poor outcomes in solid organ transplantation. As much as 10% of the population in need of lung transplantation is frail. Frailty in this population correlates with lung allocation score, disability, removal from the anticipated transplant list and death. The optimal stratification of patient risk for poor transplant outcome by use of formal frailty measures, surgical risk stratification tools, and other benchmark indices, remains unknown. Gait speed, one key frailty measure, is predictive of fall risk, frailty, institutionalization, risk of adverse events (morbidity, mortality, hospital readmission), ambulation level, and functional dependence in geriatric populations.

PURPOSE OF STUDY

The purpose of this study was to determine whether a relationship exists between pre-listing assessment measures, and post-transplant outcomes in patients who underwent a lung transplant. Consensus was achieved among researchers to first examine gait speed with a common ICU metric. We hypothesized that pre-transplant gait speed correlates with post-transplant ventilator days.

METHODS

A retrospective chart review of the medical records of 25 consecutive transplanted patients (17 male, 8 female, aged 57 +/- 13.44SD) from the University of Kentucky Chandler Medical Center was performed to examine characteristics related to frailty before and related to outcomes after lung transplant. Data not normally distributed were log-transformed. Pearson’s correlation coefficients were determined for pre- and post-transplant variables with statistical significance assumed at p<0.05 and clinical significance assumed at p<0.10.

RESULTS

Relationship of Pre-transplant Gait Speed to Ventilator Days

<table>
<thead>
<tr>
<th>DEMOGRAPHICS</th>
<th>Mean</th>
<th>Standard dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.92</td>
<td>13.44</td>
</tr>
<tr>
<td>Gait speed pre-transplant</td>
<td>.64m/s</td>
<td>.28m/s</td>
</tr>
<tr>
<td>Percent age predicted gait speed pre-transplant</td>
<td>48</td>
<td>26</td>
</tr>
<tr>
<td>Ventilator Days</td>
<td>10.58</td>
<td>19.10</td>
</tr>
<tr>
<td>Lung Allocation Score</td>
<td>45.24</td>
<td>13.55</td>
</tr>
</tbody>
</table>

SUMMARY OF RESULTS

Percent of age predicted 6 minute walk gait speed before transplant was correlated with days on the ventilator post-transplant (r = -0.36, p = 0.076).

DISCUSSION

Patients undergoing lung transplant are thoroughly assessed to prioritize considering waitlist urgency and post-transplant survival. In the studied cohort, gait speed was associated with ventilator days post-transplant with clinical significance. This finding is consistent with the hypothesis that pre-transplant gait speed is correlated with post-transplant ventilator days. Decreased ventilator days could lead to cost-savings for the institution, decreased functional impairments, and decreased functional decline during hospitalization.

FUTURE STUDIES

• Discuss functional findings
• Compare transplanted to non-listed patients
• Measure muscle loss after transplant
• Evaluating status of all listed patients
• Examine frailty measures, comorbidities, and psychosocial factors of all patients who underwent workup specifically details of those listed vs not listed
• Build frailty prediction model for lung transplant listing

ACKNOWLEDGMENTS

Jennifer Watkins
Mobility Level as an Indicator of Survival for Patients Requiring Acute Mechanical Circulatory Support via Axillary Impella 5.0

Allison Kras, PT, DPT, Janelle Jablonski, PT, DPT, Sara Krasney PT, DPT, Michele L. Esposito, MD, Navin K. Kapur, MD, Shiva Annamalai, MD, Sundeep Kuchibhotla, MD

Background & Objective

Early mobility allows for optimizing the general condition of patients in cardiogenic shock (CS) (1). Several studies have supported the benefits of early mobility, including ambulation, for patients while they require acute mechanical circulatory support (AMCS) via axillary Impella 5.0 (1,2,3,4,5). However, these studies have not quantified the mobility levels achieved by patients with CS who require Impella 5.0 support. The purpose of this study is to retrospectively evaluate the mobility levels achieved during physical therapy (PT) among patients with CS requiring an axillary Impella 5.0.

Methods

A retrospective analysis of 19 patients who received an axillary Impella 5.0 device for CS at our institution from 2015-2017 was completed. Beyond medical analysis, mobility was categorized by utilizing the Johns Hopkins Highest Level of Mobility (JH-HLM) Scale to quantify mobility during PT with an axillary Impella 5.0 in situ. Higher scores on a scale of 1 to 8 indicate a higher level of mobility, with 1 indicating lying in bed and 8 indicating ambulation of at least 250 feet. The Activity Measure for Post Acute Care (AM-PAC) 6-Clicks score was collected for each patient to assess their functional status, with a maximum score of 24. “Worsening heart failure” was defined as worsening heart failure/cardiacogenic shock with or without device escalation.

Results

- Baseline clinical characteristics were similar between groups (Table 1).
- Compared to non-survivors, survivors achieved a higher maximum JH-HLM score (Figure 1).
- Overall, 10 patients survived and 9 died (Figure 2).
- There were no documented major adverse events as a result of PT or mobilization.

Table 1. Baseline Clinical Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Survivors (n=10)</th>
<th>Non-survivors (n=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>55.4±14.5</td>
<td>66.3±6.5</td>
</tr>
<tr>
<td>Admission Ejection Fraction (%)</td>
<td>14.5±5.5</td>
<td>15.8±5.6</td>
</tr>
<tr>
<td>Duration of Impella Placement (days)</td>
<td>8.1±6.6</td>
<td>12±7.2</td>
</tr>
<tr>
<td>Lactate (mEq/L)</td>
<td>2.7±3.2</td>
<td>1±0.6</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.8±0.7</td>
<td>1.8±0.8</td>
</tr>
<tr>
<td>Number of Vasopressors/Inotropes</td>
<td>1.6±0.5</td>
<td>1.4±0.5</td>
</tr>
<tr>
<td>Right Atrial Pressure (mmHg)</td>
<td>13.9±6</td>
<td>14.3±7.1</td>
</tr>
<tr>
<td>PA Systolic Pressure (mmHg)</td>
<td>49±2±7.7</td>
<td>51.3±17.1</td>
</tr>
<tr>
<td>PA Diastolic Pressure (mmHg)</td>
<td>26.5±7</td>
<td>29.5±11.2</td>
</tr>
<tr>
<td>Pulmonary Capillary Wedge Pressure (mmHg)</td>
<td>24.1±3.8</td>
<td>26±7.2</td>
</tr>
<tr>
<td>Cardiac Output (L/min)</td>
<td>4.6±2.6</td>
<td>4.3±1.2</td>
</tr>
<tr>
<td>Cardiac Index (L/min/m²)</td>
<td>2.2±1.1</td>
<td>2.3±0.4</td>
</tr>
<tr>
<td>Mixed Venous O₂ Saturation (%)</td>
<td>53±12</td>
<td>48.6±7.2</td>
</tr>
</tbody>
</table>

Figure 1. Difference between Survivors and Non-survivors in the JH-HLM and AM-PAC Score

Figure 2. Patient Clinical Outcomes

Conclusions

- The highest level of mobility achieved after Impella 5.0 implantation using the JH-HLM Score was associated with improved survival.
- Participation in PT alone with an axillary Impella 5.0 in situ did not have an association with improved survival.
- Further study is indicated to investigate the clinical use of mobilization, including exercise, as a therapeutic intervention for patients requiring prolonged AMCS.
- No major adverse events were documented as a result of PT or mobility, thus supporting mobility with axillary Impella 5.0 in situ.

References