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Implementation of the Pediatric ICU Move! Early Mobility Scale: A Tool for Maximizing Mobility

Aimee Miguel, PT, DPT, PCS, CPST; Christopher J Babbitt, MD, FCCP; Paulina Zale, MSN, RN, PNP, CCRN

Objectives
To develop a reliable tool that can be utilized to track and promote optimal early mobility (EM) and minimize atrogenic complications in the Pediatric Intensive Care Unit (PICU).

Methods
The implementation involved revising a prior version of the PICU Early Mobility Scale. In response to audit findings, the EM team identified scoring methodology errors and implementation discrepancies, and a new tool was developed.

Figure 1. The initial Early Mobility Scale engaged a model where scoring was completed first, followed mobilizing a patient based on the score.

Figure 2. The new Early Mobility Scale prioritizes mobilizing and progressing the patient first, followed by providing a score.

Pediatric ICU Move! Early Mobility Scale

MOBILITY PROGRESSION
Does your patient meet any of the following? If yes.

- Adult Necessary Respiratory Setting
- Tidal Volume < 8
- Respiratory Rate > 25
- PEEP > 10
- Invasive BiPAP
- PAD
- NIV
- NIPPV

- Mechanical Ventilation
- O2 at 4L/min or higher
- Invasive BiPAP or NIV

- ECG, 5-lead or more
- Mean Arterial Pressure > 90
- SBP > 90
- MAP > 90
- Invasive or Noninvasive

- Anorexia/Cachexia
- Hormonal Perturbations
- Immobility
- Lethargy
- Weakness

MOBILITY IDEAS

1. Early Mobility helps reduce complications in the PICU and beyond.
2. Early Mobility helps with patients transitioning from PICU to intermediate care and home.
3. Early Mobility helps with patients’ psychological well-being.
4. Early Mobility helps with patients’ physical well-being.

MOBILITY SCORE

1. Mobility Score 1
   - Early Mobility helps with patients transitioning from PICU to intermediate care and home.
   - Early Mobility helps with patients’ psychological well-being.
   - Early Mobility helps with patients’ physical well-being.

2. Mobility Score 2
   - Early Mobility helps with patients transitioning from PICU to intermediate care and home.
   - Early Mobility helps with patients’ psychological well-being.
   - Early Mobility helps with patients’ physical well-being.

3. Mobility Score 3
   - Early Mobility helps with patients transitioning from PICU to intermediate care and home.
   - Early Mobility helps with patients’ psychological well-being.
   - Early Mobility helps with patients’ physical well-being.

4. Mobility Score 4
   - Early Mobility helps with patients transitioning from PICU to intermediate care and home.
   - Early Mobility helps with patients’ psychological well-being.
   - Early Mobility helps with patients’ physical well-being.

Figure 2. This pilot study involved a total of 32 patients that were randomly selected for chart review, including 13 intubated patients. The average age of the patients was 80 ± 69 months and PICU LOS was 5.8 ± 8.1 days. Overall, the correct EM score was given 84% of the time. The observed EM activity equaled the expected activity 81% of the time audited. Patients with the most severe disease achieved the expected EM 100% of the time compared to those with less severe disease that achieved 63 - 88% of the time.

Conclusions

- The Pediatric ICU Move Early Mobility Scale enhances RN decision making and patient optimal mobility by following an algorithm and involving rehabilitation therapists as needed for patient progression.
- The implementation of the Early Mobility Scale was associated with a high-rate of correct scoring and observed activity nearly equal to the expected activity.
- The staff believed that the tool was easier to follow than the prior iteration.
- Future research directions include prospectively collecting data to assist in identifying missed opportunities with EM and potentially revising the tool to help the PICU best care for patients.

Methods (Continued)

This new tool focuses on the spectrum of disease progression/regression and recommends activities for mobility throughout the severity of illness from most severe to least severe (1 - 4) encouraging scoring based on a flowchart progression of mobility. After staff education, the new tool was implemented, and a retrospective chart review was undertaken.
Background

- NEXIS is an NIH-funded (R01HL132887, NCT03021902) multicenter phase II RCT in ICU patients with acute respiratory failure.
- NEXIS FLAME is an ancillary study to measure mechanistic outcomes.

Objectives

- The aim of the parent NEXIS intervention is to evaluate the efficacy of intravenous amino acid supplementation in combination with early exercise intervention (via cycle ergometry) vs usual care to improve critically ill patients' physical outcomes.
- NEXIS FLAME aims to determine if the NEXIS intervention reduces inflammation at local (skeletal muscle), lung, and systemic (cytokine) levels and explore the effect of the NEXIS intervention on body composition and protein synthesis.

Methods

Assessments listed below are conducted as a part of the sub-study.
- Body composition analysis via 350cc of deuterium water (D₂O) administered enterally on day 1 with serial blood draws from study day 1 to day 8
- Whole body DXA scan before hospital discharge
- Quadriceps muscle ultrasound: Day 1, at ICU discharge, and hospital discharge
- Bronchoalveolar lavage: Day 1 and 5
- Percutaneous Muscle Biopsy: Day 1 and 5 ± 2
- Blood samples: Day 1, 3, 5 and 8

Results

<table>
<thead>
<tr>
<th>Participants enrolled in NEXIS RCT</th>
<th>106</th>
</tr>
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<tbody>
<tr>
<td>Survived until hosp. d/c</td>
<td>90 (85%)</td>
</tr>
<tr>
<td>Enrolled into any NEXIS FLAME component</td>
<td>52 (49%)</td>
</tr>
<tr>
<td>Had at least 1 muscle ultrasound of the upper thigh</td>
<td>90 (88%)</td>
</tr>
<tr>
<td>Had a whole-body DXA scan before hosp. d/c</td>
<td>17 (16%)</td>
</tr>
</tbody>
</table>

Muscle Biopsy

| Total pts. consented for biopsy | 15 (28%) |
| Total pts. underwent biopsy    | 11 (21%) |
| Pts. underwent 1 biopsy        | 3 (6%) |
| Pts. underwent both biopsies   | 8 (15%) |

Bronchoalveolar Lavage

| Total pts. consented for BAL | 27 (52%) |
| Underwent one BAL            | 13 (25%) |
| Underwent both BALs          | 14 (27%) |

*One patient withdrew consent for BAL

Blood Samples

| Pt. consented for blood draws | 51 (98%) |
| ≥ 2 blood samples collected  | 46 (88%) |
| Consented to receive enteral heavy water (D₂O water) | 43 (83%) |
| ≥ 2 blood samples collected after D₂O administration | 37 (71%) |

Conclusion

- The NEXIS RCT and NEXIS FLAME ancillary studies collect body composition and biological samples to systematically understand the NEXIS intervention's mechanisms.
- The NEXIS studies include participants broadly from nine study sites in the United States, with results anticipated in 2025. These results will help expand scientific knowledge about how combined early exercise and protein supplementation affects patient outcomes and related mechanisms.
Weaning in the Face of Adversity – A Case Study

Gen Conquest, Jude Fewings, Kate Tantam, Jonny Scott and Susie Wolsstenholme, ICU and Neurosurgery Rehabilitation Team

Day 0
6 weeks in a non-UK hospital
09/22 Subarachnoid Haemorrhage (SAH) from Right vertebral artery aneurysm
Extra-ventricular Drain (EVD)
Coiled aneurysm
Antibiotic resistant infections
Tracheostomy
No rehabilitation

Day 49
7 weeks in a UK ICU
Commenced MDT rehab
Decannulated after 4/52
Re-cannulated 2/7 later – sepsis
Failed ward discharge
Percutaneous Endoscopic Gastrostomy

Day 98
Transfer to neurosurgical ward
Issues with agitation
Multiple sedatives
1:1 care
Rehab challenges – environment/staffing/IPC restrictions
Nerve Conduction Studies

Day 128
Drop in GCS return to ICU
Increased issues with agitation
Multiple sedatives
MDT with pharmacy
2:1 care
Garden rehab
Decannulated day 152

Day 160
Awaiting a level 1 regional neuro-rehab unit
Engaging well with rehab
Garden/plinth rehab sessions
Eating and drinking
1:1 care

Day 0
2 weeks following increased sedative agents
2 weeks following increased sedative agents

MDT Interventions
- Regular Multidisciplinary Teams (MDT) meetings
- Total communication approach for capacity and mood support
- Qualified nursing 2:1/1:1 vs non-qualified
- Night vs day – natural light in ICU
- Fiberoptic Endoscopic Evaluation of Swallowing (FEES) guided weaning and laryngeal rehab
- Joint sessions with Speech and Language Therapy/Physiotherapy/Occupational Therapy (OT) and Nursing
- ICU rehab garden therapy sessions
- Engagement with family (online)
- Wider MDT engagement from pharmacy and psychiatric liaison

Day 0
Non-UK admissions bring new and complex challenges to rehabilitation – lack of rehab provision, family centred care, infection, mood and behaviourally
- MDT teams are fundamental to rehabilitation of the “unwearable”
- Behavioural management and pharmacological management of acquired brain injury needs a holistic and broad MDT approach
- Fresh air spaces away from clinical stimulus are a useful intervention to assess behavioural challenges and treat delirium.

References:
Rehabilitation Considerations for a Pediatric Patient with a Total Artificial Heart

Atara Shoinson, OTR/L, BCP
Kathleen Riley PT, DPT, Schrot Therapist
Morgan Stanley Children’s Hospital

Abstract
Discuss rehabilitation considerations with the pediatric population recovering from Total Artificial Heart Implantation (TAH), bridge to transplant, and recovery from transplant. This case study will focus on a recent transplant recipient who returned for inpatient medical care. Common team approach optimized rehabilitation potential and was critical to successful transplant. This was the first TAH on the northeast at a neonate and toddler level at our facility. There is limited research regarding pediatric TAH. Therapists were prepped on progress mobility and functional skills as well as address (CI). Results include patient to progress mobility, motor/vocal skills, and assist with provider training.

Introduction
Overview of the pediatric population with a total artificial heart (TAH), the challenges they face, and rehabilitation potential. Background information will be provided with a focus on the TAH patient and their end-of-life care.

Methodology
Case study discussion of a patient with a total artificial heart (TAH) who presented for rehabilitation and post-Heart Transplant recovery. Therapists provided CI and TAH care. Heart failure team meetings, and closely communicated with extensive inter-disciplinary teams to develop plans and personalized care.

Results
Early therapy consultation is essential and beneficial to improve rehabilitation outcomes. Early therapy consultation is essential and beneficial to achieve optimal outcomes. Early therapy consultation is essential and beneficial to achieve optimal outcomes. Early therapy consultation is essential and beneficial to achieve optimal outcomes.

Recommendations
Incorporating interdisciplinary input into all stages of the rehabilitation process is crucial. Therapists must stay current on emerging therapeutic strategies to improve patient outcomes. Early intervention is critical to optimize outcomes.

Conclusion
Medical management for pediatric heart failure is constantly evolving, and improving therapy support networks are essential to ensure improved outcomes. Early intervention is critical to optimize outcomes. Early intervention is critical to optimize outcomes. Early intervention is critical to optimize outcomes.
To identify barriers and facilitators of the completion of outcome measures (OM) by Occupational Therapists within critical care (single site)  

Heidi Bendall, Marianne Clayton and Niall McDermott

**Introduction / Background**

- There continues to be no validated evidence based outcome measure specific to the role of occupational therapy (OT) practice within critical care.

**Aim**

- To identify barriers that inhibit the use, and enabling factors to support the use of OT outcome measures within critical care Occupational Therapy.

**Methodology**

**Qualitative prospective approach**

- Designed a 9 item questionnaire (peer reviewed by non participants).
- Responses collected anonymously over 8 weeks
- Participants: Band 5 to 8 critical care OT’s.
- 85% response rate. 6 out of 7 responses returned.
- Answers were analysed in a thematic approach to identify themes and sub themes.

**Findings**

- 100% of participants were familiar with and valued the use of OT outcome measures in practice generically.
- 47 outcome measures identified from a background of 7 clinical specialties in OT. 49% of these outcome measures were identified as commonly used within their current critical care OT practice at Kings.
- 6.7/10 was the mean average confidence score (on 0-10 confidence rating scale (CRS)) with outcome measure use in general in critical care.

**Barriers**

- 4 main barriers with 15 sub themes were captured.
- This highlighted complex critical care specific factors such as significant medical instability which impact on the appropriateness, validity and reliability of non critical care specific Occupational Therapy outcome measures.

- Small and varied sample size + staffing/participants.

**Limitations**

**Conclusion**

- Complex but unavoidable critical care features e.g. the environment, attachments etc. impacted on the appropriateness and reliability of non critical care specific OT outcome measures.

- Further work and feasibility trials are required to ascertain the best measurement of functional performance for critically ill patients holistically.

- OT must continue to overcome barriers of the critical care service provision and validation of outcome measure, whilst considering the barriers as components only. Almost 50% of Kings OT used OM in current practice but 5/6 agreed they should use them more, if OM’s were ‘sensitive’, ‘reliable’ and ‘relevant’ to the CCU patient cohort.
BACKGROUND: Ambulation in intensive care unit (ICU) is an important mobility milestone to be achieved by critically ill patients. Its execution is associated with better outcomes such as shorter duration of mechanical ventilation, ICU and hospital length of stay.

OBJECTIVE: The aim of this study was to increase the ambulation rate in ICU, reaching organization’s goal of 80%.

METHODOLOGY AND RESULTS:

ICU Ambulation Rate

<table>
<thead>
<tr>
<th>Month</th>
<th>Goal</th>
<th>Actual</th>
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<tbody>
<tr>
<td>NOV/21</td>
<td>80,00%</td>
<td>57,7%</td>
</tr>
<tr>
<td>DEC/21</td>
<td>89,61%</td>
<td>89,29%</td>
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<tr>
<td>JAN/22</td>
<td>90,77%</td>
<td>90,30%</td>
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<tr>
<td>FEB/22</td>
<td>96,15%</td>
<td>96,15%</td>
</tr>
<tr>
<td>MAR/22</td>
<td>95,71%</td>
<td>95,71%</td>
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<tr>
<td>APR/22</td>
<td>92,60%</td>
<td>92,60%</td>
</tr>
<tr>
<td>MAY/22</td>
<td>92,70%</td>
<td>92,70%</td>
</tr>
<tr>
<td>JUN/22</td>
<td>92,06%</td>
<td>92,06%</td>
</tr>
</tbody>
</table>

MEAN AGE (SD) 65.9±18.9y

CONCLUSIONS

PDSA is a simple and effective approach to improving processes. Its emphasis on continuous learning and adaptation makes it a valuable tool for achieving operational excellence and improving performance.

REFERENCES