

# Moving Early, Healing Faster: Interdisciplinary Early Mobility Strategies for Pediatric Traumatic Brain Injuries

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## BACKGROUND

Recent increases in pediatric traumatic brain injuries (TBIs) associated with electric bike and scooter use have highlighted the critical importance of early, interdisciplinary rehabilitation. Early mobility is defined as passive/active activity within 72 hours of PICU admission or as soon as possible in the absence of any contraindication. It includes any increasing activity levels from repositioning to sitting up, out-of-bed, or ambulation. The PICU Up! early mobility program, launched in 2014 at Johns Hopkins Children's Center, is a structured, tiered approach designed to safely promote physical activity and developmental engagement for critically ill children in the pediatric ICU (Wieczorek et al., 2016). UMC has developed a similar pediatric ICU early mobility protocol to PICU Up! that focuses on coordinated interventions between OT, PT, SLP, RT, and RN disciplines to optimize clinical recovery and improve functional outcomes.

## PURPOSE

To promote the clinical application and outcomes of early mobility interventions across the continuum of medical complexity, including intubated patients, those with tracheostomy and mechanical ventilation, and individuals transitioning to room air.

## REFERENCES

Scan QR code for full reference list.  
Pictographs by Word and Copilot



### Step 1: Daily Safety Screener

- Airway stability – secure ETT/trach, FiO<sub>2</sub> ≤ 60%, PEEP ≤ 10
- Hemodynamic stability – no escalating vasoactive support
- Neuro stability – ICP controlled, no acute neuro deterioration
- Account for all lines and tubes
- Physician approval from all specialties
- Team readiness – Nursing, therapy, respiratory, and patient are ready and available

If any red flags or concerns, stay at LEVEL 0.

| LEVEL | MOBILITY STAGE                                         | CRITERIA / SAFETY FOR PROGRESSION                                                                             | KEY ACTIVITIES                                                                                                                                                                                                                                                                                                                                                                |
|-------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | PASSIVE CARE<br>(Unstable / Deeply Sedated)            | Unstable or deeply sedated; focus on preventing deconditioning.                                               | <ul style="list-style-type: none"><li>• Passive ROM</li><li>• Position changes q2h</li><li>• Head-of-bed elevation</li><li>• Splinting &amp; contracture prevention devices</li><li>• Family Education</li><li>• Environmental Awareness</li><li>• Chest physiotherapy</li><li>• Airway management</li></ul>                                                                  |
| 1     | ACTIVITIES IN BED<br>(Stable but limited in tolerance) | Stable vitals, minimal sedation, able to participate.                                                         | <ul style="list-style-type: none"><li>• Active-assist ROM</li><li>• Bed-level play/therapy</li><li>• Sitting with maximum support</li><li>• Reaching, rolling, simple tasks</li><li>• Vestibular Stimulation</li><li>• In bed ADL retraining</li><li>• Delirium Prevention</li><li>• Assessment of communication modalities</li></ul>                                         |
| 2     | SITTING & EDGE-OF-BED (EOB) ACTIVITIES                 | Tolerates upright positioning.                                                                                | <ul style="list-style-type: none"><li>• EOB sitting with support</li><li>• Trunk control activities</li><li>• Transfer training (stand pivot, slide board)</li><li>• Supported standing if tolerated</li><li>• Seated ADL retraining</li><li>• Early assessment of cognition</li><li>• Speaking Valve (PMV) for tracheostomy</li><li>• Dysphagia/swallow assessment</li></ul> |
| 3     | STANDING & SUPPORTED AMBULATION                        | Advance from Level 2 when there is no desaturation, tachyarrhythmia, or acute distress during EOB activities. | <ul style="list-style-type: none"><li>• Standing with assist</li><li>• Marching in place</li><li>• Short-distance ambulation with 2-3 staff</li><li>• Portable vent/monitoring system</li><li>• Muscular strengthening</li><li>• Endurance Training</li><li>• Standing ADL retraining</li></ul>                                                                               |
| 4     | INDEPENDENT MOBILITY<br>(As tolerated)                 | Minimal support and stable vitals with all activities.                                                        | <ul style="list-style-type: none"><li>• Independent walking</li><li>• Play-based mobility</li><li>• Stair practice (if appropriate)</li><li>• Car Transfers</li><li>• Community Mobility</li><li>• School-based activities</li><li>• Return to baseline activity</li></ul>                                                                                                    |

## EVIDENCE-BASED

- **Early mobilization reduces delirium and shortens hospital stay** in critically ill pediatric patients (Kaur et al., 2025).
- **Early mobility improves muscle strength, physical performance, and post-discharge quality of life**, while also **reducing the duration of mechanical ventilation** (Kaur et al., 2025).
- **Early mobility programs such as PICU Up! significantly increase out-of-bed activity**, reduce immobility-related complications (Wieczorek et al., 2016), **increase therapy participation** and improve functional status at discharge (Zebuhr et al., 2023).
- **Quality-improvement initiatives show early mobility is safe, feasible, and leads to more mobility activities** even in mechanically ventilated children (Herbsman et al., 2020).
- **Early rehabilitation in severe traumatic brain injury patients led to better 12-month functional outcomes and lower disability** compared to delayed rehabilitation (Andelic et al., 2012).
- **Early mobility programs are consistently associated with less sedation exposure.** Patients mobilized early require **fewer continuous sedatives**, spend **fewer days under deep sedation**, and show **lower cumulative benzodiazepine and opioid doses**. This is often explained by **reduced delirium and agitation**, which decreases the need for pharmacologic restraint (Noreña-Buitrón et al., 2025).

