PROMOTING HIGHEST LEVEL OF SAFE MOBILITY IN ALL CARE ENVIRONMENTS

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Key Questions

- How do we know what our patients can do?
- How do we choose the right solution for safe Mobility?
- What does Highest Level of Mobility mean, and why is it Important?

OBJECTIVES

By the end of this presentation, learners will:
1. Be able to describe levels of patient mobility
2. Be able to discuss the meaning and importance of achieving highest level of mobility for every patient
3. Be able to discuss 2-3 mobility interventions using SPHM technologies for patients in each stage of mobility
QUALITY OF LIFE THROUGH MOVEMENT!

- IADL, ADL, declining mobility across the continuum of care
- Functional Reconciliation across the care continuum

CYCLE OF CARE

WHAT? MOBILITY THE 6\textsuperscript{TH} VITAL SIGN

"A patient should no more be able to refuse their mobility medicine, than their antibiotics or other essential prescriptions for their recovery"
**WHAT? DEFINITION OF MOBILITY**

- "Mobility" is a person's ability to move in their environment.
- Highest mobility goal is independent ability to move at will, to perform desired function in desired environment.

**HIGHEST LEVEL OF MOBILITY**

- What we do in hospital matters.
- 75% of patients ≥ age 75 are functionally independent at admission and not functionally independent at discharge.
- 15% of patients ≥ 75 are discharged to skilled nursing facilities (Merck Manual online, 2019).
- Functional Reconciliation.
- HLM (fictitious study showing difference in patients who are DC at higher level).
- Time of intervention matters.
- Verticalization matters.

Unassisted, unaided movement in any environment.

Unassisted, unaided movement in certain environments.

Assisted: subject devices or suitable independent movement in certain environments.

Assisted: movement requiring dependence on environment (partial/full dependence).

Movement of limbs with or without assistance.

Stimulation of physiological foundation for movement.
FUNCTIONAL LEVEL MATTERS!

- Functional level at discharge more predictive of readmissions than co-morbidities (Shih et al., 2015)
- Higher function at discharge decreased readmission risk. Strongest correlation in Med/Surg population
- Higher functional level achieved at DC had higher QOL after DC
- FIM scores strongly associated with discharge disposition in in-patient facilities and acute care (Black et al., 1999, Jette et al., 2014)
- Functional status predictive of outcomes in stroke patients (Denti, 2008)
- Johns Hopkins Highest Level of Mobility score (HLM) strongly associates shorter LOS with higher the functional level. (Hoyer, 2016)
- Clinically, patients’ ability to transfer from bed to chair to toilet and perform basic activities of daily living are key determinants in their ability to go home or to an extended care facility.

HIGHEST LEVEL MOBILITY MATTERS

FIG. 1. Proportion of patients readmitted by FIM score and diagnostic category. Unadjusted proportion of inpatient rehabilitation patients readmitted to acute care hospital by diagnostic category and FIM score category. Abbreviations: FIM, Functional Independence Measure.

THREE THINGS TO REMEMBER WITH MOBILITY

1. As humans, we function in upright position. Everything we do, from the minute we are born is to get standing and moving upright.
2. To be able to go home, patients need to be able to stand up and get out of bed, and transfer to a chair or toilet. Activities that do not include weight bearing miss an important functional component of recovery.
3. When someone is very sick, they fatigue very quickly. A little activity, done several times per day is much better than one forty-five minute exercise session.
VERTICAL EARLY OFTEN

VERTICALIZATION

• All of our systems work best in "vertical" position.
• Tolerance to vertical posture vital to restoring normal function.
• Mechanical stimulation is implicated in ICU-acquired weakness. (Fan et al, 2014)
• Brain needs sensory input to form motor output.

EARLY

• Study early lower limb neuroplasticity with healthy neonates in bed during EC ec CEZ (Fan et al, 2014)
• Study progresses with early intervention (Fan, 2017)

OFTEN

• Positive effects of upright position on pulmonary function only lasts 15-20 mins. after returning to lying so need to repeat often (Richard et al, 2011)
• Study on patients with stroke in 2016 showed that a 45 minute therapy session in first 24 hours was actually harmful, but when short bouts of activity were done 10 times a day, this improved outcomes (Bernhardt et al, 2016)
• Upright positioning is the only way to combat sequelae of loss of gravitational forces (Dean, 1993)

WEIGHT BEARING MATTERS!

• Calcium homeostasis important in ICU-AW and all cellular function.
• Bone homeostasis involved endocrine functions such as insulin resistance.
• Fluid shifting and axial loading in an oscillating bed (Gx to Gx) during bed rest reduced hypercalciuria by 51% (Wheldon, 1949).
• Upright positioning is the only way to combat sequelae of loss of gravitational forces (Dean, 1993)

BENEFITS OF PASSIVE STANDING

• Improved bladder emptying
• Increased muscle activation
• Improved bone mineralization
• Improved psychological wellbeing
• Improved glycemic control
• Improved sleep patterns
• Decreased work of breathing
• Increased alveolar recruitment (lower lobes)
• Increased brain activity and function
• Improved mobility of get
**BENEFITS OF PASSIVE SITTING**

- Upright posture, increased CNS stimulation
- Core work if support is lessened or removed
- Improved fluid redistribution
- Improved alveolar recruitment
- Psychological benefits of being out of bed or in chair mode
- Challenges baroreceptors, venous return, lymphatic return mechanisms

**CURRENT MOBILITY LEVELS**

Mobility around the world continues to be low especially for intubated patients. Even if patients are intubated, typically it is once per day. What about “the other 23” hours? Very few studies document the level of mobility achieved (In bed, edge of bed, up to chair, standing and walking).

**HIGHEST LEVEL OF MOBILITY: CHALLENGES**

- Documented barriers to higher levels of mobility (resulting in in-bed or edge of bed activities)
- Safety (patient and caregiver)
- Not enough staff, difficulty coordinating schedules, tests
- Lack of time
- Patient acuity (lack of clear protocols for activity termination criteria)
- Lack of knowledge about safety to push patient activity
- Lack of knowledge about difference in outcomes if higher levels of mobility are achieved
- Fear of line dislodgement, patient falls
- Differences in patient assessment
- Lack of knowledge about equipment solutions
### ICU Mobility Scale

<table>
<thead>
<tr>
<th>Activity</th>
<th>AM-PAC Total Assist</th>
<th>AM-PAC Total Assist (Bedside tsp to drg)</th>
<th>AM-PAC Total Assist (Bedside tsp to drg)</th>
<th>AM-PAC Total Assist (Bedside tsp to drg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning over in bed</td>
<td>1 (A lot of assistance)</td>
<td>1 (A lot of assistance)</td>
<td>1 (A lot of assistance)</td>
<td>1 (A lot of assistance)</td>
</tr>
<tr>
<td>Stand up</td>
<td>2 (A little bit of assistance)</td>
<td>2 (A little bit of assistance)</td>
<td>2 (A little bit of assistance)</td>
<td>2 (A little bit of assistance)</td>
</tr>
<tr>
<td>Sit to stand</td>
<td>3 (No assistance)</td>
<td>3 (No assistance)</td>
<td>3 (No assistance)</td>
<td>3 (No assistance)</td>
</tr>
<tr>
<td>Supine to sit</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
</tr>
<tr>
<td>Bed to chair</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
</tr>
<tr>
<td>Walk in room</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
</tr>
<tr>
<td>3-5 stairs with rail</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
<td>4 (No assistance)</td>
</tr>
</tbody>
</table>

Functional Status Score for the ICU

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unable to attempt or complete task due to weakness</td>
</tr>
<tr>
<td>1</td>
<td>Complete dependence</td>
</tr>
<tr>
<td>2</td>
<td>Maximal assistance (patient performing ≤ 25% of task)</td>
</tr>
<tr>
<td>3</td>
<td>Moderate assistance (patient performing 25% - 75% of task)</td>
</tr>
<tr>
<td>4</td>
<td>Minimal assistance (patient performing ≥ 75% of task)</td>
</tr>
<tr>
<td>5</td>
<td>Supervision only</td>
</tr>
<tr>
<td>6</td>
<td>Modified independence</td>
</tr>
<tr>
<td>7</td>
<td>Complete independence</td>
</tr>
</tbody>
</table>

Evaluate 5 activities:
• Rolling
• Supine to sit
• Sitting at edge of bed
• Sit to stand
• Ambulating

MOBILITY SCREEN LEVEL

BMAT LEVEL 1
Patient unable to sit up from semi-recumbent position, and shake hand across midline.
THIS PATIENT CANNOT SIT UP WITHOUT HELP

BMAT LEVEL 2
Patient passes test 1: Sit up, balance and shake your hand
But Cannot stand up: Either cannot stretch legs or cannot clear buttocks
THIS PATIENT CAN SIT BUT NOT STAND WITHOUT HELP

BMAT LEVEL 3
Clear buttocks from bed 5 seconds but not able to walk without aid or help.
Can pull self to stand with a non-powered stand aid, or uses an ambulation aid such as cane, crutches, walker
THIS PATIENT CAN STAND UP BUT NEEDS HELP WITH TAKING STEPS OR USES AN ASSISTIVE DEVICE FOR AMBULATION

BMAT LEVEL 4
Able to step forward with one foot, then the other alternating without loss of balance.
THIS PATIENT CAN GET UP AND WALK ON THEIR OWN

Mobility Is Medicine! Matching Mobility level with Functional Goals
With permission from EarlyMobility.com
**BMAT LEVEL 1 Patients**

Patient unable to sit up from semi-recumbent position, and shake hand across midline.

**THIS PATIENT CANNOT SIT UP WITHOUT HELP**

**BMAT LEVEL 2 Patients**

Patient passes test 1: Sit up, balance and shake your hand

But Cannot stand up: Either cannot stretch legs or cannot clear buttocks

**THIS PATIENT CAN SIT BUT NOT STAND WITHOUT HELP**

**BMAT LEVEL 3**

Clear buttocks from bed 5 seconds but not able to walk without aid or help.

Can pull self to stand without a non-powered stand aid, or uses an ambulation aid such as cane, crutches, walker.

**THIS PATIENT CAN STAND UP BUT NEEDS HELP WITH TAKING STEPS, OR USES AN ASSISTIVE DEVICE FOR AMBULATION**

**BMAT LEVEL 4**

Able to step forward with one foot, then the other alternating without loss of balance.

**THIS PATIENT CAN GET UP AND WALK ON THEIR OWN**

**BMAT LEVEL 1 Patients**

Patient unable to sit up from semi-recumbent position, and shake hand across midline.

**THIS PATIENT CANNOT SIT UP WITHOUT HELP**

Bed Rest 1

Turn over in Bed 2

**BMAT LEVEL 2 Patients**

Patient passes test 1: Sit up, balance and shake your hand

But Cannot stand up: Either cannot stretch legs or cannot clear buttocks

**THIS PATIENT CAN SIT BUT NOT STAND WITHOUT HELP**

Supine to sit 3

Bed to Chair (If not able to clear buttocks) 4*

**BMAT LEVEL 3**

Clear buttocks from bed 5 seconds but not able to walk without aid or help.

Can pull self to stand without a non-powered stand aid, or uses an ambulation aid such as cane, crutches, walker.

**THIS PATIENT CAN STAND UP BUT NEEDS HELP WITH TAKING STEPS, OR USES AN ASSISTIVE DEVICE FOR AMBULATION**

Bed to chair (Partial stand with Pivot or sit to sit transfer) 4*

Sit to full stand 5

Locomotion in room (WC or Walk) 6*

Locomotion 25 feet (WC or Walk) 7*

Locomotion 250 feet (WC or Walk) 8*

**BMAT LEVEL 4**

Able to step forward with one foot, then the other alternating, without loss of balance.

**THIS PATIENT CAN GET UP AND WALK ON THEIR OWN**

Locomotion in room (WC or Walk) 6*

Locomotion 25 feet (WC or Walk) 7*

Locomotion 250 feet (WC or Walk) 8*

* Scores marked can fall into either BMAT category depending on whether patient can perform the task independently or needs help. BMAT Level guides equipment solutions, whereas HLM is score of task completed.
### BMAT AND ICU MOBILITY SCORE COMBINED

<table>
<thead>
<tr>
<th>MOBILITY SCREEN LEVEL</th>
<th>ICU Mobility Score Tasks</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMAT LEVEL 1 Patients</strong></td>
<td>Patient unable to sit up from semi-recumbent position, and shake hand across midline. <strong>THIS PATIENT CANNOT SIT UP WITHOUT HELP</strong></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BMAT LEVEL 2 Patients</strong></td>
<td>Patient passes test 1: Sit up, balance and shake your hand. But cannot stand up: Either cannot stretch legs or cannot clear buttocks. <strong>THIS PATIENT CAN SIT BUT NOT STAND WITHOUT HELP</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sitting over edge of bed</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sitting in bed, bed level exercises</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Passively moved to chair (no standing)</td>
<td>2</td>
</tr>
<tr>
<td><strong>BMAT LEVEL 3</strong></td>
<td>Clear buttocks from bed 5 seconds but not able to walk without aid or help. Can pull self to stand with a non-powered stand aid or uses an ambulation aid such as cane, crutches, walker. <strong>THIS PATIENT CAN STAND UP BUT NEEDS HELP WITH TAKING STEPS, OR USES AN ASSISTIVE DEVICE FOR AMBULATION</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standing</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Transfer to chair with standing/half step</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Standing on open bed with</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Stand with assistance (2 or more and/or device)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Stand with assistance (1 person and/or device)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Stand independently without aid</td>
<td>9</td>
</tr>
<tr>
<td><strong>BMAT LEVEL 4</strong></td>
<td>Able to step forward with one foot, then the other alternating without loss of balance. <strong>THIS PATIENT CAN GET UP AND WALK ON THEIR OWN</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walk independently without aid</td>
<td>10</td>
</tr>
</tbody>
</table>

### QUESTIONS

- Can BMAT/MISST (Mobility Intervention Screening and Solutions Tool) levels be validated to show progress in functional levels?
- Can AMPAC scores be correlated with BMAT/MISST scores consistently enough that BMAT/MISST would be sufficient, or do we need an additional score that is more sensitive to change in patient condition over time?
- Would BMAT/MISST suffice for nursing and non-therapy personnel, and therapy add the additional level of depth?
- Can decisions be made about DC destination, recommended personnel to mobilize etc with MISST?