Comparison of a Nurse-Driven Mobility Protocol to Multidisciplinary Mobility Protocol for Subarachnoid Hemorrhage Patients

Megan Moyer, MSN, RN, ACNP-BC, CNRN
Penn Presbyterian Medical Center

Bethany Young, MSN, RN, AGCNS-BC, CCRN
Hospital of the University of Pennsylvania

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Introduction

- No disclosures
Objectives

1. The learner will be able to explain implementation of a nurse-driven approach for safely mobilizing patients with external ventricular devices (EVDs).

2. The learner will be able to describe implementation of a progressive mobility algorithm for patients with external ventricular devices (EVDs).

3. The learner will be able to compare the outcomes of patients pre-early mobility (Phase 0) versus those who were mobilized with nursing and/or PT/OT and were allowed to sit in a chair (Phase II).
Emerging evidence suggests that mobilization of patients may be beneficial and result in:

- Decreased length of stay, costs
- Decreased incidence of delirium
- Improved quality of life, better functional outcomes

However, mobilization in neuro-critically ill has specific challenges:

- High fall risk
- Impulsivity

Specifically, patients with subarachnoid hemorrhage (SAH) may be at particular risk:

- Concerns about exacerbating delayed cerebral ischemia
- Potential complications of mobilizing patients with an EVD (catheter dislodgement, over-drainage of CSF, infection)
- Historical conservative approach to activity for patients with an EVD
External Ventriculostomy Drains

- Manometer
- Drainage bag
- Tunnel under the scalp
### Methods

#### Phase 0: No mobilization until EVD removal

<table>
<thead>
<tr>
<th>Phase I</th>
<th>(11/2014 − 11/2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT/OT (therapy)-driven mobility</td>
<td></td>
</tr>
<tr>
<td>Activity only during PT/OT sessions</td>
<td></td>
</tr>
<tr>
<td>Continuous RN and therapist observation</td>
<td></td>
</tr>
<tr>
<td>Average duration of activity: 32 minutes</td>
<td></td>
</tr>
<tr>
<td>Bedside activity:</td>
<td></td>
</tr>
<tr>
<td>• Sit at edge of bed</td>
<td></td>
</tr>
<tr>
<td>• Stand at bedside</td>
<td></td>
</tr>
<tr>
<td>• March in place</td>
<td></td>
</tr>
</tbody>
</table>
Hypotheses

- Mobilization of SAH patients with EVDs is safe and feasible.

- Mobilization of patients using a nurse-driven protocol leads to earlier and more frequent mobilization.

- Mobilization of patients is associated with improved outcomes (better discharge disposition, hospital LOS, etc.) in SAH patients with EVDs.
Methods

- **Inclusion Criteria**
  - Subarachnoid hemorrhage
    - Standard protocol was maintained for the duration of study period
  - External Ventricular Drain
  - Able to tolerate 30 minutes of drain clamping

- **Strict Exclusion Criteria**
  - Unable to tolerate 30 minutes of drain clamping
  - Sustained intracranial hypertension (ICP >20)
  - Comfort measures/hospice care

- **Relative Exclusion Criteria**
  - Fluctuating neurologic exam
  - Pulmonary or cardiovascular instability, as determined by the nursing and medical team
  - Patient refusal
## Results: Demographics

<table>
<thead>
<tr>
<th></th>
<th>Phase 0 (12 Months) No mobility</th>
<th>Phase 1 (12 Months) Therapy-Driven</th>
<th>Phase 2 (8 Months) Nurse-Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>15</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Aneurysmal SAH</td>
<td>13 (86.7%)</td>
<td>23 (95.8%)</td>
<td>15 (88.2%)</td>
</tr>
<tr>
<td>Mean Age</td>
<td>58.3 (33-78)</td>
<td>57.1 (27-84)</td>
<td>54.8 (19-90)</td>
</tr>
<tr>
<td>Sex (Woman)</td>
<td>13 (86.7%)</td>
<td>14 (58.3%)</td>
<td>8 (47.1%)</td>
</tr>
<tr>
<td>Hunt Hess Grade 4-5</td>
<td>4 (26.7%)</td>
<td>6 (25%)</td>
<td>2 (11.8%)</td>
</tr>
<tr>
<td>Modified Fisher 3-4</td>
<td>13 (86.7%)</td>
<td>24 (100%)</td>
<td>14 (82.4%)</td>
</tr>
<tr>
<td>GCS IQR</td>
<td>13 (8-15)</td>
<td>14 (12-15)</td>
<td>14 (13-15)</td>
</tr>
</tbody>
</table>
*Results*

<table>
<thead>
<tr>
<th>Phase 0 (N = 15) No mobility</th>
<th>Phase 1 (N = 24) Therapy-Driven</th>
<th>Phase 2 (N = 17) Nurse-Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Mobilization</strong></td>
<td>20.1 days (± 7.02)</td>
<td>6.0 days (± 3.16)</td>
</tr>
<tr>
<td><strong>No. Sessions</strong></td>
<td>0</td>
<td>3.0 (± 1.33)</td>
</tr>
<tr>
<td><strong>Hospital LOS</strong></td>
<td>28.2 (± 10.08)</td>
<td>24.6 (± 8.29)</td>
</tr>
<tr>
<td><strong>ICU LOS</strong></td>
<td>21.4 (± 8.74)</td>
<td>18.7 (± 6.00)</td>
</tr>
<tr>
<td><strong>Ventilator Days</strong></td>
<td>12.3 (± 13.89)</td>
<td>6.3 (± 10.47)</td>
</tr>
<tr>
<td><strong>Tracheostomy</strong></td>
<td>40%</td>
<td>16.7%</td>
</tr>
<tr>
<td><strong>Discharge Disposition</strong></td>
<td>Home = 6.7%</td>
<td>Home = 33.3%</td>
</tr>
<tr>
<td></td>
<td>Rehab = 53.3%</td>
<td>Rehab = 54.2%</td>
</tr>
<tr>
<td></td>
<td>LTACH = 33.3%</td>
<td>LTACH = 8.3%</td>
</tr>
<tr>
<td></td>
<td>Acute Care Hospital = 6.7%</td>
<td>SNF = 4.2 %</td>
</tr>
</tbody>
</table>

*Nurse-Driven mobilization was associated with more frequent mobility sessions (p<0.0001), but not earlier mobilization (p=0.15)*
## Results: Univariate Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Phase 0 (N = 15) No mobility</th>
<th>Phase 2 (N = 17) Nurse-Driven</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Mobilization</td>
<td>20.1 days (± 7.02)</td>
<td>4.9 days (± 3.46)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hospital LOS</td>
<td>28.2 (± 10.08)</td>
<td>20.9 (± 7.56)</td>
<td>0.031</td>
</tr>
<tr>
<td>ICU LOS</td>
<td>21.4 (± 8.74)</td>
<td>16.1 (± 7.53)</td>
<td>0.078</td>
</tr>
<tr>
<td>Ventilator Days</td>
<td>12.3 (± 13.89)</td>
<td>3.1 (± 3.84)</td>
<td>0.024</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>40%</td>
<td>0</td>
<td>0.004</td>
</tr>
<tr>
<td>No. Sessions</td>
<td>0</td>
<td>7.1 (± 4.37)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
| Discharge Disposition | Home = 6.7%  
Rehab = 53.3%  
LTACH = 33.3%  
Acute Care Hospital = 6.7% | Home = 29.4%  
Rehab = 70.6%  
LTACH = 0  
SNF = 0 | 0.004 |
The odds of discharge to home/rehab were 3.83 for mobilized patients, independent of age, GCS at first mobility session, and high Hunt Hess grade.
Results: Multivariate Outcomes

- Mobilization of patients was not significantly associated with hospital length of stay, tracheostomy placement, or ventilator days.
Limitations

- Small sample size
- Historical controls
- Quality Improvement initiative versus rigorous scientific study
- Failed to capture total time of mobilization (minutes)
- Unable to exclude Hawthorne Effect
Conclusion

- Nurse-driven mobilization with EVDs:
  - is safe.
  - leads to more frequent ambulation.
  - may be associated with improved discharge disposition, although causation cannot be determined by these data.
  - may allow for PT/OT to engage in more complex therapy techniques.

- Although these preliminary data are encouraging, further study is warranted.
Thanks

- Neuro ICU Nurses
- Physical and Occupational Therapists
- Unit based clinical leadership (UBCL)
- Neuro ICU Advanced Practice Providers
- Neurosurgeons
References


