Early Mobility Toolkit
Your Work Plan for Translating Research into Practice

ARMSTRONG INSTITUTE
FOR PATIENT SAFETY AND QUALITY

JOHNS HOPKINS MEDICINE
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Introduction

The Importance of Early Mobility in the Intensive Care Unit (ICU)

A high proportion of survivors of critical illness suffer from significant physical, cognitive and psychological disabilities. Profound neuromuscular weakness secondary to critical illness, prolonged bed rest, and immobility leads to impaired physical function. Physical impairment affects approximately 50% of ICU patients, with at least half of discharged patients unable to return to premorbid levels of activity. Cognitive impairment, including impaired executive function, memory, language and attention, is widespread; almost 80% of ICU survivors suffer from cognitive impairment early after discharge, with deficits often lasting for months to years. The prevalence of psychiatric morbidity, including clinically significant depression, anxiety and post-traumatic stress disorder, remains high among ICU survivors.

Evidence suggests that mobilization mitigates the physical, cognitive and psychological complications of critical illness. Mobilization has also been linked to decreased time on the ventilator, decreased hospital length of stay (LOS), and improved functional outcomes. The mobilization of ICU patients is safe and feasible. However, ICU patients are typically perceived as being too sick to tolerate activity. As a result, they have limited exposure to physical rehabilitation. In addition to this culture of immobility, variability in research and published protocols make translating evidence into practice challenging.

The implementation of an early mobilization program requires a multi-disciplinary approach, including collaboration between nurses, rehabilitation therapists, respiratory therapists, physicians and administrators. This toolkit integrates available resources to help you educate and engage all stakeholders, and proposes protocols to standardize the screening and mobilization of your patients, and tools to evaluate your progress.

Early Mobility as a Preventative Intervention

Surveillance for ventilator-associated complications (VACs) in the National Healthcare Safety Network (NHSN) prior to 2013 was limited to ventilator-associated pneumonia (VAP). VAP is a heterogeneous disease and is difficult to diagnose. A major barrier to standardizing prevention and treatment of VAP is that the radiological and microbiological methods of diagnosing VAP are notoriously subjective and difficult to carry out in critically ill patients. This often results in inter-observer variability and inconsistent treatment paradigms. In the United States in particular, problems in diagnosing and treating VAP stem from subjectivity in classification that leads to misdiagnosis.
In January 2013, the Center for Disease Control (CDC) released new surveillance definitions for ventilator-associated events (VAE) and VACs. This new, tiered definition is based on objective, streamlined, and automatable criteria, and more broadly focused on preventable complications of mechanical ventilation, including VAP. The change in the CDC surveillance definition marks a strong first step toward recognizing the short-term preventable complications associated with mechanical ventilation beyond VAP, and improving outcomes for all mechanically ventilated patients. In addition to pneumonia, VAC is most commonly attributable to atelectasis, pulmonary edema and acute respiratory distress syndrome (ARDS), or a combination of these conditions. Recently published data suggests that VAC is associated with prolonged mechanical ventilation, prolonged hospitalization and increased hospital mortality. Thus, preventative interventions must address both VAP and VAC. We are targeting early mobility as a key preventative intervention given the strong emerging evidence linking early mobility to decreased time on the ventilator.

What’s in the Toolkit?

By implementing this toolkit in your care for ICU patients, your team leads the national effort to reduce complications related to mechanical ventilation, and improve physical, cognitive and psychological patient outcomes. However, this toolkit alone is not a prescription for success. While we have developed a model to support your efforts to implement evidence-based practices and improve care for all ICU patients, the authors of this manual do not work in your unit. Only your team understands your obstacles and opportunities for improvement. The materials presented here provide a structure to implement evidence-based practices and improve your patients’ outcomes. Ultimately, success requires creative energy, profound persistence, strong leadership and deliberate teamwork.

Using the TriP Model as a Framework

This toolkit’s structure is based on a model of *Translating Research Into Practice* (TriP), designed to close the gap between evidence-based guidelines and clinical bedside practice.

The TriP model is composed of four phases:

1. Develop an evidence-based intervention
   - Identify interventions associated with improved outcomes
   - Select interventions with the largest benefit and lowest burden
2. Identify barriers to implementation
3. Measure baseline performance

4. Ensure all patients receive the intervention

Implementation of the TriP model has been associated with significant reductions in central line-associated blood stream infections (CLABSIs) and VAP in more than 100 Michigan ICUs.\textsuperscript{21,22,23} The Michigan results were sustained for over three years and were associated with a reduction in mortality among Medicare ICUs with significant cost savings.\textsuperscript{24,25} Implementation of the same program in Rhode Island ICUs demonstrated similar results.\textsuperscript{26} Most recently, implementation of the TriP model has been associated with significant reductions in hospitals in 45 states, from Hawaii to Connecticut.\textsuperscript{27} This framework will help you incorporate evidence-based interventions into your patient care practices.

\textbf{Phase 1. Develop an Evidence-based Intervention}

In Phase 1, you will develop an evidence-based intervention plan for your work area. Your plan will encompass two distinct processes. First, identify the interventions associated with your desired outcome improvements. Next, select those interventions with the largest benefit and lowest burden.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Benefits of Early Mobilization}
\end{figure}

\textit{Identify interventions associated with improved outcomes}

The benefits of early mobilization based on available literature are listed in Figure 1.\textsuperscript{28} But what are the key interventions to achieve early mobilization and the listed benefits for your patients? We assembled a list of interventions based on an extensive review of available literature and guidelines. Note that recommendations vary in the published protocols, and the evidence regarding the most effective exercises and dosing is still in its infancy. Therefore, these interventions were
selected based on input from national experts in sedation and delirium, mechanical ventilation and rehabilitation in addition to current literature. These interventions form the basis for the “CUSB 4 MVP-VAP Daily Early Mobility Form.”

Below is a brief overview of the interventions elaborated on within the toolkit:

- **Multi-disciplinary and coordinated approach.** The joint participation of nurses, physicians, respiratory therapists, rehabilitation therapists, and local hospital administrators is vital throughout the TriP model continuum to create a culture of mobility and consistently achieve mobilization for patients.

- **Structured assessments of sedation level and delirium using sedation and delirium scales.** Routinely assessing the patient’s cognitive function with these scales will help you target lighter sedation levels, treat delirium, and to achieve the requisite level of cognitive function to mobilize your patients.

- **Daily sedation interruption and minimizing sedative use.** Heavily sedated patients cannot participate in a rehabilitation program. Protocols incorporating daily sedative interruptions and targeting light sedation will help your patients remain alert and cooperative to the extent that they may participate in a rehabilitation program and achieve their maximal mobility.

- **Screening for eligibility for mobilization.** An important first step is routinely screening all of your patients using a standard screening algorithm to determine which patients may safely participate in a mobilization program.

- **Employing a nurse-driven protocol to achieve highest level of mobility.** We recognize that not all ICUs have dedicated rehabilitation resources. Traditionally, nurses mobilize critically ill patients only once the patients have recovered from critical illness. It is possible to shift the focus of nurse-driven mobilization to the time of acute illness. Earlier mobility promotes recovery by integrating a systematic protocol into routine nursing care, with the appropriate input and/or use of rehabilitation specialists for select patients.

**Select interventions with the largest benefit and lowest burden**

While there is no formula for how to select interventions, your team will want to consider a few factors:

- How much effort is required to build buy-in for the early mobility intervention?

- Who will champion this effort?
• How is it best to share the evidence supporting the intervention to the different stakeholders?
• Which resources are required to change current local practice?
• What is required to garner the necessary resources?

Consider choosing a few ‘low-hanging fruit’ to gain positive momentum before focusing on the more challenging interventions. A low-hanging fruit is an intervention that is easy to implement while yielding strong rewards. For instance, it would be easier to add a nightlight to bathrooms rather than redesigning floor plan to reduce patient falls.

The Early Mobility Toolkit in practice

It was clear that the majority of our mechanically ventilated patients were too sedated to participate in an early mobility program. There also seemed to be a significant discrepancy between the sedation level that was agreed upon between providers on rounds, and the actual sedation level of patients. In order to demonstrate this, we kept track of the agreed upon sedation level during rounds and the actual sedation level of the patient for all patients in the ICU for three days. We presented the results of this evaluation to physicians and nurses at their respective staff meetings. The staff was stunned by the results, and is motivated to collaboratively monitor sedation levels more closely. Now, the target sedation level is explicitly noted on the Daily Goals rounding sheet in the morning, and re-evaluated on evening rounds to see whether the target is being met, or needs to be changed.

Phase 2. Identify Barriers to Implementation

Clinicians want to achieve the best possible outcomes for their patients. If patients are not receiving the evidence-based intervention your team identified, you will need to understand the barriers to compliance.29 Common barriers to implementation of evidence-based interventions include the three A’s:

• **Awareness**: Are clinicians aware of the evidence-based intervention?
• **Agreement**: Do clinicians agree with the intervention?
• **Access**: Do clinicians have convenient access to the equipment or supplies required to implement the intervention?

Although it may vary, the most commonly encountered barriers to early mobility in the ICU include the following:1,30

• **Lack of leadership.** Strong leadership is necessary both at the institutional level, along with the local level, including the recruitment of a multi-disciplinary project team.
• **Lack of resources.** Adequate professional staffing and equipment are necessary for successful implementation, and institutional leadership must understand the value of an early mobility program to support it.

• **Lack of clinical training to mobilize critically ill patients.** Comprehensive education and training across disciplines is required, especially at ICUs without dedicated rehabilitation therapists.

• **Excessive sedation and delirium.** Patients need to be alert and cooperative to participate in rehabilitation therapy.

• **Lack of consistent screening for safety concerns.** Education followed by careful and consistent screening for physical and medical safety must be performed for all patients and to optimize the timing and progression of therapy.

Through education, engagement and collaboration of multi-disciplinary teams of clinicians, these barriers can be surmounted to create a *culture of mobility* and make mobilization a part of routine care.

**The Barrier Identification and Mitigation (BIM) Tool**
Your team can use the Barrier Identification and Mitigation (BIM) tool to identify and develop a plan to address these barriers. The tool is available in Appendix A. The tool includes a brief user’s guide to walk you through its five-step process.

In addition, the American Association of Critical-Care Nursing (AACN) offers a Unit Gap Analysis tool. It assesses which elements of the ABCDE bundle are in place in your unit and helps identify areas of improvement. This is available in Appendix B.

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**The Early Mobility Toolkit in practice**

We did not have resources to have a dedicated physical therapist in our ICU. ICU patients were usually regarded as a ‘last priority’ by the inpatient physical therapists due to the critical nature of their illness and the high proportion of patients who did not meet their medical screening criteria. Also, when an order for physical therapy was placed on rounds in the late morning or early afternoon, patients’ rehabilitation sessions were usually put off until the next day.

To remedy this, a standing appointment was scheduled between the charge nurse and lead physical therapist at 7:30 every morning. The charge nurse determined which patients were eligible for rehabilitation based on a standard medical screening algorithm applied to all patients in the ICU. She shared the names of the patients who passed the algorithm with the lead therapist, who then scheduled these patients for physical therapy that day. The rehabilitation plan for patients was finalized on rounds with the other staff, and if there were any changes to the plan, the charge nurse called the lead physical therapist after rounds.
Phase 3. Measure Performance

Baseline performance
Collect baseline performance data to highlight at-risk areas, or your team’s improvement opportunities. By sharing your results with both clinicians and hospital leadership, you will provide a catalyst for those improvement efforts. There are several potential strategies to assess baseline performance for early mobility: sedation practices, delirium rates, frequent barriers to mobilization, adverse events, and mobility outcome measures. In addition, you can use implementation information derived from the Exposure Receipt Assessment and Implementation Assessment as part of this project.

Monitor compliance with evidence-based guidelines
It is important to monitor compliance with evidence-based interventions through frequent formal and informal audits. Share the audit results with all involved staff to maintain engagement and spur improvement. Through this monitoring process, you will be able to maintain awareness, establish expectations, create urgency, generate accountability, and reward changes in behavior. Evaluating performance provides an ongoing, real time ‘ground truth’ image of performance and outcomes. Areas of poor compliance can be identified and rectified. Any lingering compliance concerns are immediately recognized, allowing the improvement team to revisit. Walk the process with staff to gain additional insights into barriers to implementation and weak compliance rates.

To collect data and audit compliance, the Daily Early Mobility and Daily Process Measures forms list mechanically-ventilated patient care activities that should happen each day to maximize mobilization including:

- Screen for medical appropriateness for rehabilitation
- Target a sedation level and perform structured assessment of sedation level using a sedation scale
- Perform a structured assessment of sedation level and delirium
- Assist patients to achieve their highest level of mobility
- Minimize sedative use and daily sedation interruption or spontaneous awakening trial (SAT)
- Evaluate readiness for discontinuation of mechanical ventilation with daily spontaneous breathing trial (SBT)
- Link SAT and SBT to facilitate the discontinuation of mechanical ventilation
**Daily Rounding forms**

The Daily Early Mobility and Daily Process Measures forms will be used for collecting data on the patient care activities. These data will be entered into the CUSP 4 MVP-VAP web-based platform. Real time reports track compliance with these interventions and are available on the platform.

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### CUSP 4 MVP-VAP: Daily Early Mobility Measures Form

**Hospital ID#** __________  **Unit ID#** __________  **Date (mm/dd/yyyy)** __________

<table>
<thead>
<tr>
<th>Bed #</th>
<th>Intubated/Tracht &amp; Mech Vent</th>
<th>Date of Intubation (mm/dd/yyyy)</th>
<th>Sedation Scale</th>
<th>Delirium Assessment</th>
<th>Highest Level of Mobility</th>
<th>CHART AREA</th>
<th>PI</th>
<th>DT</th>
<th>Events (Up to 3 events)</th>
<th>0 to 25</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>RASS/ASS/ASU</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 8</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Y/N</td>
<td>/ /</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Y/N</td>
<td>/ /</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Y/N</td>
<td>/ /</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Can be used for patients who are not mechanically ventilated, if your unit wants to collect this information.

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**Figure 2: CUSP 4 MVP-VAP - Mobility Daily Rounding Form**

**CUSP 4 MVP-VAP: Daily Process Measures Form**

**Hospital ID#** __________  **Unit ID#** __________  **Date (mm/dd/yyyy)** __________

<table>
<thead>
<tr>
<th>Bed #</th>
<th>Intubated/Tracht &amp; Mech Vent</th>
<th>Date of Intubation (mm/dd/yyyy)</th>
<th>Sub-G ETT</th>
<th>Reason for ETT Cancel</th>
<th>Location of Intubation</th>
<th>HGB of a3.0</th>
<th>Reason for ETT Cancel</th>
<th>Sedation Scale</th>
<th>Delirium Assessment</th>
<th>Highest Level of Mobility</th>
<th>CHART AREA</th>
<th>PI</th>
<th>DT</th>
<th>Events (Up to 3 events)</th>
<th>0 to 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y/N</td>
<td>/ /</td>
<td>Y/N/C</td>
<td>R/S MU</td>
<td>CAM-ICU/ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Y/N</td>
<td>/ /</td>
<td>Y/N/C</td>
<td>R/S MU</td>
<td>CAM-ICU/ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Y/N</td>
<td>/ /</td>
<td>Y/N/C</td>
<td>R/S MU</td>
<td>CAM-ICU/ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>RASS 1 to 4</td>
<td>CAM-ICU ASU/NG</td>
<td>0 to 15</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td>Y/N/NC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 3: CUSP 4 MVP-VAP Daily Process Measures Form**
Outcomes reported in the Daily Rounding forms
The following reported outcomes help you maximize the mobility of your patients:

- Distribution of activity levels
- Percentage of RASS/SAS actual being {-1, 0, 1} or {4, 5}
- Percentage achieving RASS/SAS target
- Delirium assessment compliance rate
- Percentage of CAM-ICU negative or ASE ≤ 2 (no delirium)
- Percentage of patient days mobilized out of bed
- Distribution of perceived barriers
- Adverse event incidence rate
- Adverse event rate (patient day level)

Information on your team’s progress towards CUSP implementation and early mobilization will be collected during quarterly phone interviews (Implementation Assessment) between the Armstrong Institute team members and participating team leaders for each unit. We will discuss your progress as well as any issues or barriers your group encounters. Information will also be collected directly from your unit providers via the Exposure Receipt Assessment. These interactions will allow all participants to learn from peers and build a network of early mobility advocates.
Phase 4. Ensure All Patients Receive the Intervention

Finally, deliver reliable evidence-based care to 100 percent of your patients. You want to ensure that your interventions become ‘the way things are done around here.’ This phase poses the biggest challenge for unit improvement teams. While your team implements Phases 1 through 3 of the TriP model, Phase 4 requires buy-in and engagement from the your unit’s entire care team and stakeholders. Without their complete awareness, agreement and access to materials, the interventions will not become the norm and sustain.

The Early Mobility Toolkit in practice

Our ICU patients were not being mobilized in a consistent way—mobilization was not discussed at rounds for every patient, orders were not always placed, and patients were not consistently screened for medical stability. In our ICU, we use a Daily Goals rounding tool for every patient during rounds to standardize the care that we provide for our patients, including interventions such as providing deep vein thrombosis prophylaxis, and monitoring whether catheters may be removed. We added fields related to mobility to our Daily Goals tool, including if the patient passed the medical screening level, a target activity level, and whether this could be achieved by nursing alone or if a rehabilitation specialist needed to be consulted. Now, we consistently address mobility for every patient at daily rounds.
The Four E’s

Drawing from the published literature and experience, clinicians at the Johns Hopkins Hospital developed the “Four E’s” implementation model. The model prompts your team to consider staff engagement, local culture, and contextual factors in a phased plan to embed your intervention in existing care processes. The Four E’s represent the four phases of this expansion model:

Operationalize the Four E’s

Safety efforts succeed through the investment of key stakeholders, including senior leaders, improvement team leaders, and frontline staff. Though stakeholders have different perspectives, hopes, and fears, they often have the same questions about their involvement in the quality improvement process.23

Operationalize the Four E’s model by explicitly addressing four associated questions that your key stakeholders are sure to have:

1. **Engage:** How will early mobility make the world a better place?
2. **Educate:** What do we need to mobilize critically ill patients?
3. **Execute:** How will we implement early mobility given local culture and resources?
4. **Evaluate:** How will we know that our efforts to mobilize our patients make a difference?
Engage: How will early mobility of critically ill patients make the world a better place?

Your staff members are likely overwhelmed by the amount of quality improvement initiatives going on at your hospital. You may need to convince them that early mobilization is not just a “flavor of the month.” You will need to convince them of the value of early mobility in patient outcomes. Early mobility is essential to incorporate into routine ICU care to prevent VAC as well as significant short and long-term cognitive, physical and psychological disabilities.

Successful implementation of an early mobility program is predicated on a change in both ICU culture and practice. Methods that have proved useful include recruiting early mobility champions to meet with and educate stakeholders from various ICU disciplines, thereby building support and addressing anticipated barriers. Sharing patient anecdotes, both success stories and struggles, are an especially powerful way to engage clinicians. Also, inviting guest speakers with expertise in the field, visiting a hospital with an experienced early rehabilitation program or attending lectures and related conferences can help close the knowledge and training gap. Additional resources for learning about ICU mobility are provided in the list of resources below.

Engaging senior executives
In addition, designate a medical director for early rehabilitation to advocate for resources and address barriers, whether global, discipline-based or patient-centric. This executive will attend regular multi-disciplinary meetings, help prioritize that all eligible patients receive rehabilitation in timely manner and employ organizational support and resources on behalf of early mobility efforts. You can garner executive support by stressing the positive impacts of early mobilization: decreased duration of ventilation, decreased ICU LOS, and decreased hospital LOS.

To support executive buy-in, share research that supports hospital-level decision-making. A recently published financial model illustrates the significant cost savings with the implementation of an early mobilization program. Based on an analysis of data from prior publications and the early rehabilitation program in the Johns Hopkins Medical ICU, the report authors developed a conservative model for net financial savings and costs. This analysis demonstrated that most ICUs with between 200 and 2000 annual admissions would generate a net savings of up to 3.76 million dollars by reducing patient ICU LOS. For more information, you can find a spreadsheet for this financial model at the URL below: 
Engagement resources
For engaging your staff, we suggest the following tools:

• For patient videos and news about ICU mobility and patient outcomes after critical illness or surgery, visit the Johns Hopkins website at www.hopkinsmedicine.org/OACIS and select “Videos and News”

• For additional patient videos about ICU mobility, visit the Society of Critical Care Medicine (SCCM) ICU Liberation website at http://www.iculiberation.org/Mobility/Pages/default.aspx and select “Video Resources”

• For ICU diaries chronicling the impact of an ICU stay from the perspective of patient’s relatives and ICU staff, visit http://www.icudelirium.org/resources.html

• For patient testimonials regarding the impact of cognitive impairment, depression and post-traumatic stress disorder, visit the Vanderbilt Delirium and Cognitive Dysfunction website at http://www.icudelirium.org/testimonials.html

• To view an international network of ICU mobilization centers and access relevant resources, visit http://www.mobilization-network.org

• For videos focused on the ICU experience of patients, visit the SCCM website on Post-Intensive Care Syndrome (PICS) at http://www.myicucare.org/Adult-Support/Pages/Post-intensive-Care-Syndrome.aspx

• On Twitter, follow @icurehab and @DrDaleNeedham for updates on ICU rehabilitation or contribute to the conversation using #icurehab

Make performance more visible
Quality improvement teams often share process and outcome performance measures with select individuals or improvement groups within their organization. Key stakeholders, including frontline staff and senior leadership, are often unaware of local performance. If you were to ask frontline staff and leadership what your VAE rates are, or the extent to which you are maximally mobilizing your ICU patients, would they know the answer? In most cases, they would not.

Give your invested stakeholders feedback by sharing your performance:

• Post a trend line of percentage of patient days mobilized in your ICUs so nurses and physicians can see how this is changing over time

• Post the percentage of achieving RASS/SAS targets

• Post the percentage of CAM-ICU negative or ASE ≤ 2 (no delirium)

• Benchmark your performance against similar hospitals
• Share your adverse incidence rate and update this regularly
• Review your unit’s early mobility outcome reports

Most importantly, performance feedback will only be meaningful if your providers believe that the data are valid. Be transparent about your data collection techniques, analyses, and any efforts your team has made to address possible biases.

**Recognize staff efforts**
Financial incentives to engage staff and leaders, while attractive, are often not feasible or sustainable. Staff recognition using non-financial strategies can go a long way toward engaging your colleagues. Some examples include:

• Assign a title for key team participants, such as the physician or nurse project leader. Make new designations visible by posting around the unit and by publishing in hospital-wide newsletter or website.

• Encourage team members to present their efforts on a recurring basis at important committee or board meetings within your organization.

• Highlight staff efforts in local newsletters, bulletins or publications.

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**The Early Mobility Toolkit in practice**

We wanted to elicit patient and family stories regarding their experiences in our ICU. We rarely get feedback about these, and as a result, do not have any direct information about the cognitive and physical deficits experienced by our patients who survive critical illness. We surmised that our staff would be more engaged in interventions to minimize sedative use and more aggressively mobilize patients if they were more aware of the outcomes of patients whom they cared for. So our ICU nurse manager called a sample of patients who stayed in our ICU longer than a week about 3 weeks post-discharge from the hospital. She inquired about their memories regarding their experience in their ICU, and their current physical and cognitive state. She posted short testimonials from these patients in our staff room for all staff to read on breaks. These testimonials created a lot of fruitful discussions among staff and motivated them to be more engaged in our early mobility program.
**Educate: What do we need to mobilize critically ill patients?**

Prolonged periods of immobility place critically ill patients at a higher risk for many complications, ranging from short-term impairments (e.g., neuromuscular weakness, increased time on mechanical ventilation and longer ICU stays) to long-term impairments in physical functioning. Such long-term physical impairments, along with impairments in cognition and mental health, are collectively termed Post-Intensive Care Syndrome (PICS). Early rehabilitative interventions, that are begun as soon as critically ill patients are deemed physiologically stable (i.e. their clinical status is no longer declining), are beneficial to reducing patient complications. Such interventions frequently occur while patients are on mechanical ventilation and/or vasopressor infusions.

**Evidence to support early mobility**

Evidence shows early rehabilitation of ICU patients is both safe and feasible. In three independent systematic reviews of 15 studies reporting on early rehabilitation programs for critically ill patients, no serious adverse events resulted in death or near death events. The removal of lines or tubes was rare, and in fact, the most common physiological change was a transient oxygen desaturation. A prospective observational study of routine clinical care of ~1100 patients and >5000 PT treatments reported a 0.6% rate of potential safety events, most of which were transient physiologic changes, and none resulted in additional costs or lengthened ICU stays.

In addition to not suffering severe negative effects, many benefits have been correlated with early mobility. Studies have demonstrated that ICU patients who
participate in early rehabilitation have improved muscle strength. Furthermore, early rehabilitation interventions have also been associated with a significant reduction in the duration of mechanical ventilation. ICUs with an early rehabilitation program had a demonstrable decrease in their patients’ ICU and hospital LOS, as well as total healthcare costs. Patients who underwent early rehabilitation in the ICU were more likely to meet mobility milestones and achieve independent functional outcomes. The benefits of early mobility in the ICU are summarized in the resources provided below.

**Education resources**
For educating your staff, we suggest the following background evidence and education tools:

- A list of relevant studies and articles is available in Appendix C
- For the SCCM 2013 Guidelines for the management of pain, agitation and delirium (PAD), visit the SCCM ICU Liberation website at http://www.iculiberation.org/Guidelines/Pages/default.aspx
- For Prevention, Implementation and Measurement Webcasts to support the SCCM PAD guidelines, visit http://sccmmedia.sccm.org/video/Webcast/Symposium2013/Delirium/
- For the comprehensive AACN ABCDE tool kit, visit http://www.aacn.org/dm/practice/actionpakdetail.aspx?itemid=28328
- For education tools for sedation and delirium, visit the Vanderbilt Delirium and Cognitive Dysfunction web site at http://www.icudelirium.org/resources.html
- For lessons learned from the implementation of an ICU early mobility program at University of California at San Francisco, visit http://www.ucsfcm.com/2013/MAN13002/slides/14.%20Engel-%20Early%20Moblization.pdf

**Getting your message to frontline staff**
Your team will need to educate staff and leadership about the evidence, explain new processes, answer questions and set performance goals. Workshops, hands-on trainings, conferences, slide presentations, and interactive discussions are all effective tools to use for staff education. In fact, multiple teaching modalities can meet diverse learning styles. Local champions and topic experts should be responsible for staff education, that should include both multi-disciplinary and specialty-targeted educational programs. Sessions must be informative and relevant for the learner, providing clear explanation of desired procedures. These sessions provide an explanation of why staff members need to adopt the new practices. Done well, the session should engage and encourage adoption of new practices.
Physician education efforts
While educational sessions should be interdisciplinary, some groups, such as physicians, are likely more receptive to other physicians. The physician champion on your CUSP 4 MVP-VAP team should lead breakout physician education efforts. Several education strategies described in the literature focus on changing physician behavior:

- Provide physicians with educational information packets consisting of research literature, evidence-based reviews, hospital specific data, and national guidelines. Educational information from national physician professional societies are particularly useful (e.g. Society of Critical Care Medicine).
- Introduce educational information at staff meetings or Grand Rounds.
- Utilize informal educational meetings and networks to disseminate information.
- Conduct educational outreach visits involving content experts, such as respiratory therapists, pharmacists, pulmonologists or infection preventionists.
Execute: How will we implement early mobility given local culture and resources?

Frame your intervention in the “Science of Safety”
Without a doubt, clinicians care deeply about their patients. Yet we are all fallible. No matter how hard we try, we will forget to order an important medication and we will make mistakes. Patient safety research has demonstrated consistently that blaming individual doctors or nurses will not prevent patient harm. Organizational-level factors, functional work area-related factors, team-related factors, task-related factors, and patient-related factors all have a role in patient outcomes. We need to ensure our system is designed to deliver these evidence-based interventions for every patient, every time.

Apply principles of safe system design
Every system is perfectly designed to produce the results it delivers. If we want to achieve substantive and sustainable improvements in patient outcomes, we have to change the flawed components of the systems in which clinicians work. We must redesign systems to consistently produce wellness instead of harm. Other critical industries, like airlines and nuclear energy, teach us clear principles of safe system design:

- Standardize care
- Create independent checks

Standardize care
Standardizing care and reducing complexity helps to establish new care processes as “normal behavior” for staff. A way to incorporate standardization into patient care is to use daily multi-disciplinary rounds. Daily rounds should follow a structured format: discuss the patient’s goals for that day, determine what resources and actions are necessary to achieve those goals, and close any communication gaps regarding care. Any potential barriers and/or any safety issues should be identified. Providers want to do the right thing for their patients. However, the care of a patient on mechanical ventilation is complex. It can be difficult to remember and execute everything we should do in real time without clear communication and standardized care procedures.

Create independent checks
Creating independent checks or redundancy along the continuum of care involves developing unique and separate system checks for critical procedures. High reliability industries use independent redundancies to monitor the high-risk procedures most likely to cause harm if not done correctly or not completed at all. The healthcare industry is just beginning to develop independent redundancies. By combining both education and redundancy, we can significantly improve the
processes of care.\textsuperscript{45} Engaging all caregivers in care choices, including respiratory, physical and occupational therapists, provides a powerful independent redundancy.

One powerful strategy to standardize care, reduce complexity and create independent checks such that patients will reliably receive evidence-based interventions is the Daily Goals rounding tool. This form is filled out every day on every patient and has been successfully used in units that house patients receiving mechanical ventilation. Including the SAT, SBT, and mobility targets reminds teams to discuss the provision of these interventions. We will talk more about the Daily Goals rounding tool during this project. We encourage you to explore the use of this tool as part of this project and specifically as we work together to promote early mobility.

In the following sections we provide several strategies for standardizing care, reducing complexity and creating independent checks. Talk to your frontline providers! They likely have many, many other suggestions for creating a safer system design to ensure patients receive the interventions they should.

**Execution resources**

To learn more about how to implement your plan with purposeful team participation, use these early mobility implementation tools:

- A medical screening algorithm to evaluate patient appropriateness for rehabilitation is available in [Appendix D](#).
- An example of a nursing early mobility protocol used in the Weinberg ICU at Johns Hopkins Hospital may be found in [Appendix E](#).
- Examples of range of motion and progressive upward mobility protocols used in the Weinberg ICU at Johns Hopkins Hospital may be found in [Appendix F](#).
- For early mobility assessment and treatment steps, visit the SCCM ICU Liberation website at: [http://www.iculiberation.org/Mobility/Pages/default.aspx](http://www.iculiberation.org/Mobility/Pages/default.aspx)
Strategies for safe system design principles
Strategies to standardize care and create independent checks in implementing an early mobility program:

- Incorporate Daily Goals rounding tool to reliably address sedation and activity targets for every patient on rounds
- Change nursing reporting by:
  - Listing each patient’s level of mobility on the charge nurse report to prioritize physical therapy resources
  - Adding mobility, sedation and delirium reporting to the electronic medical record
- Hold daily brief mobility huddles mid-day with the ICU physician, charge nurse and rehabilitation specialist to ensure patient mobility targets are achieved
- Link SAT and SBT in nurse and respiratory therapist-driven protocols; non-physician protocols facilitate the discontinuation of mechanical ventilation
- Provide pocket cards to facilitate sedation, delirium, mobility readiness screening, and mobility activities
- Inform family members of the daily mobility plan and engage active caregivers in implementing a prescribed exercise plan
- Schedule mobility sessions in the morning to reduce interference with other clinical activities
- Incorporate sedation and mobility outcomes into ICU dashboards

**Check current policies**

Policies can be an effective strategy to improve compliance with evidence-based practice. Historically, unit and hospital policies tend to restrict the mobilization of critically ill patients. Check your hospital or unit policies, protocols or standard order sets which inhibit mobilization: automatic bed rest, no mobilization in the presence of a femoral catheter, etc. We encourage you to review and update your existing policies to promote early mobilization in your ICU.

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**The Early Mobility Toolkit in practice**

By using the Daily Goals tool on rounds, we were prompted to discuss a patient’s level of activity during the previous day, as well as the goal for the coming day. The patient’s bedside nurse revealed that the patient had not moved out of bed for two days. Review of the electronic health record revealed that a ‘strict bed rest’ order had been entered on admission as part of a post-surgical order set. This appeared to be the default order entry setting. It was unclear from the available documentation as to why strict bed rest was necessary. This
The Early Mobility Toolkit in practice

prompted a call to the attending surgeon who said that there was no contra-indication to mobilizing the patient. Following this incident, post-surgical order sets were modified such that 'strict bed rest' was not the default setting.

Evaluate: How will we know that our efforts make a difference?

The final step in the Four E’s model is to evaluate the impact of your interventions. You need to assess whether your efforts are adding value for your staff, your patients and their families.

Conducting frequent formal and informal audits with continuous timely feedback of outcome measures to all staff involved in this quality improvement process is essential. To accomplish this, we recommend that you monitor and report back to your staff each month. Routinely reporting results allows staff to track improvements in performance, serves to remind staff about the new processes and even motivates improvement. Be sure to celebrate your successes!

The Early Mobility Toolkit in practice

About a year ago, our facility had hired a nurse trained in quality and patient safety. This patient safety nurse audits the daily charts to verify specific care requirements or interventions that were completed; she also noted when they were missed. Over time, it was clear that she could do more to improve patient care than audit charts. Now, any issue involving compliance with care procedures or evidence-based interventions, initiates a trigger for her involvement. She sets up hands-on training with the involved staff members. In addition, she aligns her schedule to be available the next time the staff members are working, in order to re-educate and address lingering questions. We have already added the early mobility measures to her audit and education activities.

Data collection

As part of this project, you will collect early mobility intervention data using the Early Mobility Daily Rounding Form. You will then enter these data in to the CECity project database. The project database generates detailed reports according the early mobility outcomes outlined in the ‘Phase 3: Measure Performance’ section of this document. These reports will allow you to assess your progress and compare your results with others participating in this collaborative as the project continues. Sharing your progress with your frontline staff will help your team focus on your work towards mobilizing the patients in your unit.
Figure 4: Distribution of Highest Level of Mobility

<table>
<thead>
<tr>
<th></th>
<th>0</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>
</tr>
</thead>
<tbody>
<tr>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>November</td>
<td>(0/0)</td>
<td>(0/0)</td>
<td>(0/0)</td>
<td>(0/0)</td>
<td>(0/0)</td>
<td>(0/0)</td>
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<td>(0/0)</td>
</tr>
<tr>
<td>December</td>
<td>83.33%</td>
<td>0%</td>
<td>3.33%</td>
<td>3.33%</td>
<td>0%</td>
<td>6.67%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>December</td>
<td>(33/39)</td>
<td>(0/30)</td>
<td>(1/30)</td>
<td>(1/30)</td>
<td>(0/30)</td>
<td>(2/30)</td>
<td>(0/30)</td>
<td>(0/30)</td>
<td>(0/30)</td>
</tr>
<tr>
<td>January</td>
<td>82.22%</td>
<td>4.44%</td>
<td>2.22%</td>
<td>2.22%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>January</td>
<td>(37/45)</td>
<td>(2/45)</td>
<td>(1/45)</td>
<td>(1/45)</td>
<td>(0/45)</td>
<td>(0/45)</td>
<td>(0/45)</td>
<td>(0/45)</td>
<td>(0/45)</td>
</tr>
<tr>
<td>Overall</td>
<td>82.64%</td>
<td>2.64%</td>
<td>3.86%</td>
<td>9.22%</td>
<td>0%</td>
<td>2.64%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Overall</td>
<td>(75/75)</td>
<td>(2/75)</td>
<td>(1/75)</td>
<td>(7/75)</td>
<td>(0/75)</td>
<td>(2/75)</td>
<td>(0/75)</td>
<td>(0/75)</td>
<td>(0/75)</td>
</tr>
</tbody>
</table>

Key:
- 1: Transferring to chair without assistance
- 2: Sitting in bed without help
- 3: Sitting at edge of bed
- 4: Standing
- 5: Transfer from bed to chair with assistance
- 6: Standing in place
- 7: Walking
- 8: Unknown

*Percentages may not sum to 100% due to rounding.*
Getting Help

We recognize that the Early Mobility Toolkit presents a lot of new material. If you have additional questions, please post them at the CUSP 4 MVP-VAP project’s social networking site (MedConcert), or email us at cusp4mvp@jhmi.edu.
References


Appendix A: Barrier Identification and Mitigation (BIM) Tool

Tool Overview

Problem Statement
Guidelines summarizing evidence exist to help ensure that patients receive recommended interventions. In addition, consistent guideline adherence may significantly improve patient safety. However, adherence to these evidence-based guidelines remains highly variable both within and between units, hospitals, and states. Tools to identify factors that hinder guideline adherence (i.e., barriers) and approaches to mitigating these barriers within individual clinical units are also lacking.

What Types of Barriers Exist?
Barriers to achieving consistent adherence to evidence-based guidelines are commonly related to provider, guideline, and system characteristics.

Purpose of Tool
Since particular barriers and the corresponding solutions may differ between individual clinical units, the Barrier Identification and Mitigation (BIM) Tool was designed to help frontline staffs systematically identify and prioritize barriers to guideline or intervention adherence within their own care setting. This tool also provides a framework for developing an action plan targeted at eliminating or mitigating the effects of the identified barriers. By providing both a practical and interdisciplinary approach to recognizing and addressing barriers, the BIM tool may serve as an aid to quality and safety improvement efforts.

Who Should Use this Tool?
Both frontline clinicians (e.g., physicians and nurses) and non-clinicians (e.g., unit administrator, unit support staff, hospital quality officer) within the care setting being targeted by a particular quality improvement initiative, such as CUSP 4 MVP-VAP, may utilize this tool. Frequently, BIM Team members are a subcommittee of the unit’s quality improvement team as identified in the unit’s Background CUSP Team Information Form. In addition, all BIM Team members should be trained in the CUSP Toolkit and have viewed the Science of Safety video.

How to Use this Tool:
The BIM tool is best applied within the context of a comprehensive quality and safety improvement effort, such as CUSP for MVP-VAP. This tool should be used periodically (every three to six months or so) to identify barriers if adherence to a guideline or therapy is poor. This document summarizes the 5-step process and provides more detailed explanations and sample forms for each step.
Summary of BIM Tool Process

Step 1: Assemble the interdisciplinary team
Compose a diverse team with an array of associates from the targeted unit’s Quality Improvement (QI) Team.

BIM Team Information Form (Form 1)
Designated BIM team leader gathers contact information for team members.

Step 2: Identify Barriers
Several different team members should work independently to identify and record barriers to guideline adherence in the targeted clinical area. They should do this by way of observing the process being impacted by the guideline, asking about this process, and actually walking through a simulation of the process or, if appropriate, real clinical practice.

Barrier Identification Form (Form 2)
Provides a framework for identifying and recording barriers, contributing factors to barriers, and potential actions to ameliorate those barriers. Completed by individual team members engaged in observing, asking about, or walking the process impacted by guideline

Step 3: Compile and summarize the barrier data
Upon completion of all data collection, an assigned team member should compile the barrier data recorded by the several investigators. This team member should then summarize this information and record any suggestions provided by observers to improve adherence.

Barrier Summary and Prioritization Table (Form 3)
Complete template during a team meeting by summarizing barriers, specifying each barrier’s relation to the guideline, identifying method of data collection, and rating each barrier with a likelihood, severity, and priority score.

Step 4: Review and prioritize the barriers
The Barrier Identification and Mitigation (BIM) Team should then review and discuss the barrier summary. Next, the BIM Team should rate each barrier on the likelihood of the barrier occurring within the unit and the severity of the barrier’s impact on guideline adherence if it should occur. By multiplying the likelihood and severity scores together to arrive at a priority score, the QI team will have an understanding of how imperative it is to address each barrier.

Step 5: Develop an action plan for each targeted barrier
The BIM team should review all suggested actions to eliminate/mitigate the selected high priority barriers. Then, the BIM team should collectively select individual actions for the next improvement cycle based on the potential impact of each action
on the eliminating or ameliorating the barrier and the *feasibility* of effectively implementing the action based on available resources. Based on these two factors, an *action priority score* is calculated such that the higher the score, the higher the priority.

*Action Plan Development Table (Form 4)*
Framework for compiling high priority barriers, potential actions to eliminate or mitigate barriers, and evaluation measures to assess those actions. Framework also provides mechanism to score potential actions as far as their potential impact, feasibility and priority. This may be completed during a team meeting.

**BIM Tool Process**

**Step 1: Assemble interdisciplinary team**
First, compose a diverse team to examine a specific quality problem. This BIM Team should be a subcommittee of the unit’s Quality Improvement (QI) Team (e.g., CUSP Team). Throughout this BIM process, investigators will be viewing the targeted care setting as the “patient” in order to identify any barriers to providing evidence based care that may be occurring. Thus, make sure the team is interdisciplinary and includes members of differing levels of experience and training to more validly characterize local barriers, develop an action plan to overcome these difficulties, and achieve consistent guideline adherence.

Perhaps provide an open invitation to join the team at a quality improvement staff meeting or through an email to the QI Team for the targeted care setting. Within the QI Team, encourage clinical staff (e.g., physicians, nurses), support staff (e.g., unit administrators, technicians), and content experts (e.g. hospital quality officers) to join the BIM team. Then, by group consensus, assign team members to necessary roles and responsibilities including a chair of the BIM Team.

Brief the BIM team on the types of barriers to guideline adherence (e.g. provider, guideline or system level), the importance of overcoming these barriers, the evidence surrounding the utility of the tool, and on the BIM tool itself.

Additionally, all BIM Team members should be trained on the science of patient safety (e.g., having viewed the Science of Safety video and be familiar with the overall process for improving quality (e.g., reviewed the CUSP Toolkit).

List the team member names and responsibilities on the **Background BIM Team Information Form** (below).
**BIM Team Information Form**

Step 1: Assemble the Interdisciplinary Team and indicate the persons designated as BIM Team Members (fill in as applicable). Your team may not have people in all of these categories.

<table>
<thead>
<tr>
<th>ROLE</th>
<th>NAME &amp; TITLE</th>
<th>RESPONSIBILITIES WITHIN BIM TEAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical director of unit</td>
<td></td>
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<tr>
<td>Additional Physician</td>
<td></td>
<td></td>
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<tr>
<td>Additional Physician</td>
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<tr>
<td>Nurse Practitioner/ Nurse Specialist</td>
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<tr>
<td>Nurse manager for unit</td>
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<td></td>
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<tr>
<td>Additional nurse</td>
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<tr>
<td>Non-clinical administrator for unit</td>
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<tr>
<td>Hospital administrator</td>
<td></td>
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<tr>
<td>Quality improvement specialist</td>
<td></td>
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<tr>
<td>Human factors engineer</td>
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<tr>
<td>Technician for unit</td>
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<tr>
<td>Other unit support staff member</td>
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<tr>
<td>Other content expert</td>
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</tbody>
</table>
**Step 2: Identify Barriers**
Several team members should work independently to identify barriers to consistent guideline adherence in the targeted clinical area. Utilizing different modes of data collection facilitates obtaining an accurate and complete picture of the factors influencing guideline adherence.

**Observe:**
- **Observe** a few clinicians engaged in the tasks related to the guideline.
- As an observer, cause as little distraction as possible.
- Focus more on observing than documentation during the observation period. Jotting a few notes is okay, but wait to complete the Barrier Identification Form until immediately following the observation period.
- Along with recording the barriers to achieving consistent adherence to the guideline that were witnessed, indicate any steps in the process that were skipped and workarounds (i.e., improvised process steps or factors that facilitated guideline adherence)

**Discuss:**
- **Ask** various staff members about the factors influencing guideline adherence.
- This may include informal discussions, interviews, focus groups, and brief surveys.
- Assure the confidentiality of staff responses.
- Also ask staff about the problems they face and any ideas they have regarding potential solutions for improving guideline adherence.
  1. Is staff aware that the guideline exists?
  2. Does staff believe that the guideline is appropriate for their patients?
  3. Does staff have any suggestions to improve guideline adherence?

**Walk the Process:**
- **Consciously follow** the guideline during a simulation, or if appropriate, during real clinical practice.
- Investigators should continue collecting data until no new barriers are identified upon new data collection, and a comprehensive understanding of good practices and barriers to guideline adherence is achieved. This process should take approximately 3 to 6 hours.

The investigators should record all potential reasons that clinicians were experiencing difficulties with adhering to the guideline (i.e. barriers), and factors encouraging guideline adherence (i.e. facilitators) in the **Barrier Identification Form**. Additionally, within the Barrier Identification Form, investigators should indicate the method of data collection (e.g. observation, survey, focus group, informal discussion, interview, or walking the process), the associate who collected the data, and the clinical unit from which the data was collected.
**BIM Tool**

Step 2: Identify barriers to guideline adherence by observing, questioning and walking the process.

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>BARRIER(S)</th>
<th>POTENTIAL ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROVIDER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of the guideline</td>
<td>What are the elements of the guideline?</td>
<td></td>
</tr>
<tr>
<td>Attitude regarding the guideline</td>
<td>What do you think about the guideline?</td>
<td></td>
</tr>
<tr>
<td>Current practice habits</td>
<td>What do you currently do (or not do)?</td>
<td></td>
</tr>
<tr>
<td>Perceived guideline adherence</td>
<td>How often do you do everything right?</td>
<td></td>
</tr>
<tr>
<td><strong>GUIDELINE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence supporting the guideline</td>
<td>How “good” is the supporting evidence?</td>
<td></td>
</tr>
<tr>
<td>Applicability to unit patients</td>
<td>Does the guideline apply to the unit’s patients?</td>
<td></td>
</tr>
<tr>
<td>Ease of complying with guideline</td>
<td>How does adherence affect the workload?</td>
<td></td>
</tr>
<tr>
<td><strong>SYSTEM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Who is responsible for following the guideline?</td>
<td></td>
</tr>
<tr>
<td>Tools &amp; technologies</td>
<td>What supplies &amp; equipment are available/used?</td>
<td></td>
</tr>
<tr>
<td>FACTORS</td>
<td>BARRIER(S)</td>
<td>POTENTIAL ACTIONS</td>
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<td>---------------------------------</td>
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<tr>
<td>Decision support</td>
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<tr>
<td>How often are aids available and used?</td>
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<tr>
<td>Physical environment</td>
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<tr>
<td>How does the unit layout affect adherence?</td>
<td></td>
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<tr>
<td>Organizational structure</td>
<td></td>
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<tr>
<td>How does the organizational structure (e.g. staffing) affect adherence?</td>
<td></td>
<td></td>
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<tr>
<td>Administrative support</td>
<td></td>
<td></td>
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<tr>
<td>How does the administration affect adherence?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance monitoring/feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How does the unit know it is following the guideline?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How does the unit culture affect adherence?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
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<td></td>
</tr>
</tbody>
</table>
Step 3: Compile and summarize the barrier data
Once data collection is complete, a team member should compile all of the data from the various investigators in the above Barrier Identification Form. The information should then be summarized in columns 1, 2, and 3 of the **Barrier Summary and Prioritization Table**. In column 1, briefly summarize each barrier; in column 2, provide a brief description of the part of the guideline to which the particular barrier pertains; then in column 3, provide the source of data collection (i.e. observation, survey, interview, informal discussion, focus group, walking the process).

Finally, this team member records any suggestions provided by observers to improve guideline adherence in the **Framework for the Development of an Action Plan**.

Step 4: Review and prioritize the barriers
As a team, review and discuss the barrier summary. Then, in columns 4, 5, & 6 of the Barrier Summary and Prioritization Table, rate each barrier on the likelihood of the barrier occurring in the unit (likelihood score) and the probability that it, if encountered, would lead to guideline non-adherence (severity score). Each barrier is scored from 1, indicating a low likelihood or severity, to 4, indicating a high likelihood or severity. The priority score for each barrier is then calculated by multiplying the likelihood and severity scores.

The higher the priority score for a barrier, the more critical it is to eliminate or mitigate the effects of that barrier. As a team, develop your own criteria for determining which barriers to target during this Quality Improvement cycle. For instance, you could set a priority score threshold to decide which barriers to target (e.g. barriers with a priority score ≥ 9) or target the top 3 barriers.
**Barrier Summary and Prioritization Table**

Step 3 & 4: Compile, summarize, review as a team, and prioritize the barrier data collected from the investigators.

<table>
<thead>
<tr>
<th>BARRIER</th>
<th>RELATION TO GUIDELINE</th>
<th>SOURCE</th>
<th>LIKELIHOOD Score*</th>
<th>SEVERITY Score**</th>
<th>BARRIER Priority Score***</th>
<th>TARGET FOR THIS QI CYCLE?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

*Likelihood score*
How likely is it that a clinician will experience this barrier?


**Severity score**
How likely is it that experiencing this particular barrier will lead to non-adherence with the guideline?


***Barrier priority score***
(likelihood score) x (severity score) = barrier priority score
**Step 5: Develop an action plan for each targeted barrier**

As a team, list and review the potential actions to eliminate/mitigate the selected high priority barriers in the Framework for the Development of an Action Plan - as suggested by the observers in Step 2. Next, identify any additional potential actions using brainstorming techniques and record these in the Framework for the Development of an Action Plan as well.

Then, collectively select individual actions for the next improvement cycle based on the potential impact of each action on the barrier as far as improving guideline adherence (if the action is successfully implemented) and the feasibility of effectively implementing the action based on the resources currently available. Thus, rate each suggested action with a *potential impact score* and a *feasibility score*. As in Step 4, each action is scored from 1, indicating a low impact or feasibility, to 4, indicating a high impact or feasibility. The *action priority score* for each potential action is then calculated by multiplying the *potential impact score* and the *feasibility score* together. Teams should consider setting a threshold *action priority score* for which actions to pursue during the upcoming quality improvement (QI) cycle.

It is critical to closely examine the feasibility of implementing an action. For example, placing a sink within each patient’s room may increase the frequency of clinicians washing their hands, but may not be as cost effective as placing a dispenser for hand sanitizer within each patient’s room. For each action, the group should assign an appropriate leader, performance measures, and follow-up dates to evaluate progress. This information should be recorded in the Framework for the Development of an Action Plan as well.
### Framework for the development of an action plan

Step 5: Develop an action plan for each targeted barrier.

<table>
<thead>
<tr>
<th>Prioritized Barriers</th>
<th>Potential Actions</th>
<th>Source</th>
<th>Potential Impact Score*</th>
<th>Feasibility Score**</th>
<th>Action Priority Score***</th>
<th>Select for this QI Cycle?</th>
<th>Action Leader</th>
<th>Performance Measure (Method)</th>
<th>Follow-Up Date</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

* **Potential impact score**
What is the potential impact of the intervention on improving guideline adherence?

1. Low  
2. Moderate  
3. High  
4. Very high

** **Feasibility score**
How feasible is it to take the suggested action?

1. Low  
2. Moderate  
3. High  
4. Very high

*** **Action priority score**
(Potential impact score) x (feasibility score) = Action priority score
# Appendix B: Unit Gap Analysis – ABCDE Bundle

This Unit Gap Analysis is a tool designed to help determine what elements of the ABCDE bundle may already be in place in your unit. As with the Change Readiness Assessment tool, you will gain the most value by having more than one person complete the assessment, then meeting to discuss results. The goal here is to identify areas where your unit is strong, as well as areas where improvement is needed. Once the gaps are identified, it is important to select and prioritize areas for improvement rather than tackling everything at once.

## Communication and Collaboration

<table>
<thead>
<tr>
<th>Communication and Collaboration</th>
<th>Yes/A</th>
<th>Occasionally</th>
<th>No/Never</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every team member on our unit embraces true collaboration as an ongoing process and invests in its development to ensure a sustained culture of collaboration.¹</td>
<td></td>
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</tr>
<tr>
<td>Every team member contributes to the achievement of common unit goals.</td>
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</tr>
<tr>
<td>All team members are informed and knowledgeable about patient outcomes and performance improvement data for our unit.</td>
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</tr>
</tbody>
</table>

## Sedation Awakening Trial / Spontaneous Breathing Trial / Coordination and Choice of Sedation

<table>
<thead>
<tr>
<th>Sedation Awakening Trial / Spontaneous Breathing Trial / Coordination and Choice of Sedation</th>
<th>Yes/A</th>
<th>Occasionally</th>
<th>No/Never</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our unit has a sedation and analgesia protocol in place.</td>
<td></td>
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<tr>
<td>We routinely perform both a pain and sedation assessment on patients using a validated tool.</td>
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<tr>
<td>We currently perform Spontaneous Awakening Trials (SATs, aka “sedation vacations”) daily on all patients receiving sedation.</td>
<td></td>
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</tr>
<tr>
<td>We have a standardized protocol for performing SATs.</td>
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</tr>
</tbody>
</table>
### Delirium Assessment and Management

<table>
<thead>
<tr>
<th></th>
<th>Yes/Always</th>
<th>Occasionally</th>
<th>No/Never</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients are assessed daily for the presence of delirium.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We use a validated tool to assess for the presence of delirium (CAM-ICU, ICESC, pCAM-ICU).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our unit has a standardized delirium management protocol.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delirium monitoring is included in our daily rounds for ALL patients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Early Exercise and Progressive Mobility

<table>
<thead>
<tr>
<th></th>
<th>Yes/Always</th>
<th>Occasionally</th>
<th>No/Never</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our unit has a protocol for early exercise and progressive mobility for ALL patients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immobile patients on our unit receive passive range of motion regularly, if tolerated.</td>
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<td></td>
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</tr>
<tr>
<td>Our unit has the necessary support equipment to safely assist with patients' increased mobility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory therapists and physical therapists are available to assist with implementing early exercise and progressive mobility protocols.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility is addressed during daily rounds.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Appendix C: Literature List


Appendix D: Medical Screening Algorithm

Medical screening algorithm to evaluate patient appropriateness for rehabilitation
# Appendix E: Nursing Early Mobility Protocol

<table>
<thead>
<tr>
<th>START HERE</th>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
<th>LEVEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Activity Screening</td>
<td>No / Low Cooperation (RASS ≤ -3)</td>
<td>Moderate Cooperation (RASS &gt; -3 to ≤ -1)</td>
<td>Close to Full Cooperation (RASS &gt; -2 to ≤ -1)</td>
<td>Full Cooperation (RASS &gt; 0)</td>
</tr>
<tr>
<td>Fails</td>
<td>Basic Assessment</td>
<td>Passes</td>
<td>Passes</td>
<td>Passes</td>
</tr>
</tbody>
</table>

## BASIC ASSESSMENT

**Neurologic:**
- RASS > 3
- Follows 3-4 commands

**Respiratory:**
- PEEP < 10 / FiO2 < 70
- SpO2 > 90%
- RR < 40 bpm

**Cardiovascular:**
- HR > 50 < 140
- MAP > 55 < 140
- SBP > 90 < 200
- No new or increasing vasoressor infusion
- No new arrhythmia

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>ACTIVITY</th>
<th>ACTIVITY</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive ROM 2 x d</td>
<td>Passive/active ROM 2 x d</td>
<td>Passive/active ROM 2 x d</td>
<td>Passive/active ROM 2 x d</td>
</tr>
<tr>
<td>Passive bed cycling (Lotto)</td>
<td>Resistance training (PT)</td>
<td>Resistance training (PT)</td>
<td>Resistance training (PT)</td>
</tr>
<tr>
<td>NMES</td>
<td>Passive leg &amp;/or arm cycling in bed (Lotto) or chair</td>
<td>Active leg &amp;/or arm cycling in bed (Lotto) or chair</td>
<td>Active leg &amp;/or arm cycling in bed (Lotto) or chair</td>
</tr>
<tr>
<td>Tolerates level 1 activities</td>
<td>Tolerates level 2 activities</td>
<td>Tolerates level 3 activities</td>
<td>Ambulate progressively longer distances</td>
</tr>
<tr>
<td>OT: PROM / Splinting</td>
<td>PT: If deconditioned</td>
<td>PT: If deconditioned</td>
<td>PT: If deconditioned</td>
</tr>
<tr>
<td>OT: PROM / Splinting</td>
<td>OT: ADL’s / PROM</td>
<td>SLP: Cognitive</td>
<td>SLP: Cognitive</td>
</tr>
</tbody>
</table>
Appendix F: Range of Motion and Progressive Upward Mobility Protocols

Step 1: HOB elevated to 45°
Step 2: HOB elevated to 45° and legs in dependant position (Reverse Trendelenburg)
Step 3: HOB elevated to 60° and legs in dependant position (Reverse Trendelenburg)
Step 4: Dangle legs with assist, feet touching floor, support torso but encourage independence
Step 5: Stand patient at bedside with assist.
Step 6: Walk using walker if necessary, then walk independently

Courtesy of the Weinberg ICU
Appendix G: TriP Model
Appendix H: 4E’s

<table>
<thead>
<tr>
<th></th>
<th>Executive Leaders</th>
<th>Team Leaders</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage</td>
<td><strong>How Do I Make the World a Better Place?</strong></td>
<td><strong>How Do I Make the World a Better Place?</strong></td>
<td><strong>How Do I Make the World a Better Place?</strong></td>
</tr>
<tr>
<td></td>
<td>- How do I create an organization that is safe for patients and rewarding for staff?</td>
<td>- How do I create a unit that is safe for patients and rewarding for staff?</td>
<td>- Do I believe I can change the world, starting with my unit?</td>
</tr>
<tr>
<td></td>
<td>- How does this strategy fit our mission?</td>
<td>- How do I touch their hearts?</td>
<td>- Can I help make my unit safer for patients and a better place to work?</td>
</tr>
<tr>
<td>Educate</td>
<td><strong>What Do I Need to Know?</strong></td>
<td><strong>What Do I Need to Know?</strong></td>
<td><strong>What Do I Need to Know?</strong></td>
</tr>
<tr>
<td></td>
<td>- What is the business case?</td>
<td>- What is the evidence?</td>
<td>- Why is this change important?</td>
</tr>
<tr>
<td></td>
<td>- How do I engage the Board and Medical Staff?</td>
<td>- Do I have executive and medical staff support?</td>
<td>- How are patient outcomes likely to improve?</td>
</tr>
<tr>
<td></td>
<td>- How can I monitor progress?</td>
<td>- Are there tools to help me develop a plan?</td>
<td>- How does my daily work need to change?</td>
</tr>
<tr>
<td></td>
<td><strong>What Do I Need to Do?</strong></td>
<td></td>
<td>- Where do I go for support?</td>
</tr>
<tr>
<td></td>
<td>- Do the Board and Medical Staff support the plan and have the skills and vision to implement?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- How do I know the team has sufficient resources, incentives and organizational support?</td>
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<td></td>
</tr>
<tr>
<td>Execute</td>
<td><strong>How Will I Know I Made a Difference?</strong></td>
<td><strong>How Will I Know I Made a Difference?</strong></td>
<td><strong>How Will I Know I Made a Difference?</strong></td>
</tr>
<tr>
<td></td>
<td>- Have resources been allocated to collect and use safety data?</td>
<td>- Have I created a system for data collection, unit level reporting, and using data to improve?</td>
<td>- What is our unit level report card?</td>
</tr>
<tr>
<td></td>
<td>- Is the work climate better?</td>
<td>- Is the work climate better?</td>
<td>- Is the unit a better place to work?</td>
</tr>
<tr>
<td></td>
<td>- Are patients safer?</td>
<td>- Are patients safer?</td>
<td>- Is teamwork better?</td>
</tr>
<tr>
<td></td>
<td>- How do I know?</td>
<td>- How do I know?</td>
<td>- Are patients safer?</td>
</tr>
</tbody>
</table>

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