**Solution Title:** Multidisciplinary Approach to Reduce Delirium in the ICU

**Program/Project Description, including Goals**

**What was the problem to be solved? How was it identified?**
Delirium leads to a three-fold increase of death in ICU patients and predisposes ICU survivors to prolonged neuropsychological deficits and/or long-term cognitive impairment. Assessing for delirium on admission and throughout a patient’s stay in the ICU, along with establishing standard interventions to reduce and/or eliminate delirium, greatly improves patient safety by reducing ICU and total hospital length stay, decreasing time on ventilator support and reducing the incidence of delirium diagnoses overall.

Prior to July 2014, delirium was inconsistently recognized and assessed in the ICU at Upper Chesapeake Medical Center and the importance in the utilization of the Confusion Assessment Method for the ICU (CAM-ICU) by team members was poorly understood. Thereby, concern was present that delirium may be affecting our patients’ length of stays (LOS) and therefore be at an increased risk of developing the above mentioned deficits as well as other medical complications such as hospital acquired infections, pneumonia, and deep vein thromboses.

**What baseline data existed?**
In the baseline year of FY 2014 the UCMC saw 779 total ICU cases with an average length of stay of 68 hours. Of the total cases, 7% (n=52) of patients had a recorded delirium diagnosis. Patients with a delirium diagnosis had an average LOS of 146 hours.

**What were the goals—how would you know if you were successful?**
To determine if the workgroup was successful with the development and implementation of a program to reduce delirium the following goals were established:

1. Have an increase in the team member buy-in to the process of reducing delirium.
2. Have an increase in the team member understanding of the importance of the CAM-ICU.
3. Have consistent documentation of CAM-ICU scores/presence of delirium.
4. Have a decrease in delirium diagnoses.
5. Have a decrease in patient mortality, adverse outcomes, length of hospital stay, cost, falls and self-extubation.

**Process & Solution**

**What methodology or process was used to develop the solution?**
The Delirium workgroup leveraged an in-house performance improvement strategy called IMPRV Methodology. IMPRV (Identify, Measure, Process, Re-Think and Validate) is a best-in-
class methodology founded upon the key tenets of Lean, Six Sigma, project management and change leadership theories. IMPRV provides a structured way for UM UCH teams to develop new processes and programs or re-design existing processes.

The workgroup began in February 2014 and leveraged IMPRV Methodology as follows:

**Identify:** The team first met with the Process Owner to completely understand the problem at hand. Following the meeting, the workgroup met to develop the Project Charter and a high-level process map called SIPOC (Supplier, Input, Process, Output, Customer). The key objective of the Identify Phase is to clearly define the problem state and develop a solid business justification for executive and organizational sponsorship. Once the team felt that they had a keen understanding of the problem to be solved, they moved on to Measure Phase.

**Measure:** The key objective in Measure Phase is to thoroughly understand the current state of the process and collect sound data on process performance. In this phase, the IMPRV Facilitator led the workgroup through development of a process flowchart. The team used swim lanes on the flowcharts to designate tasks completed by various members of the care team. Data was collected on all delirium cases to identify trends.

**Process:** After collecting all pertinent data, the workgroup moved into the Process Phase. In this phase, the key objective is to assess and analyze process data for root cause identification of waste and inefficiency. During the flowchart session, the team identified potential problems using a red dot sticker. These “red dot problems” were then analyzed using a tool called the 5 Whys Analysis. Some of the problems identified were: lack of provider support, nurses over-sedating patients, no interventions for negative CAM, and CAM missing from plan of care.

**Re-Think:** The key objective of the Re-Think Phase is to architect a more efficient process and draft a full-scale implementation plan of improvement solutions. In this phase, warmly referred to as “solution mode”, the workgroup started to develop solutions to solve the root causes of the afore mentioned issues. The team developed a future state value stream map to incorporate solutions including adding delirium interventions to plan of care, consistent use of patient/family brochure, changing RASS (Richmond Agitation Assessment Scale) assessment time, adding RASS and full CAM assessment to the same screen in Meditech V6, and CAM score added to patient communication board.

Prevention and early detection of ICU delirium by addressing physical, emotional, and cognitive needs are vital components of the solution. Modifiable factors contributing to delirium were identified and include disruption in sleep patterns, immobility, unfamiliar environment, sensory deprivation, stress, pain management, and pharmacological regimens.

The team focused on implementation of multifaceted interventions aimed directly at these factors to decrease the occurrence of delirium. Patients are reoriented to person, time, place, and situation during each face to face interaction with the multidisciplinary team. Assistive devices such as glasses, hearing aids, and writing boards are employed to facilitate communication. Family interaction is greatly encouraged with open visiting hours and participation in daily Interdisciplinary ICU Rounds. Family members are provided education about delirium by nursing staff so they will be able to assist in preventing delirium or detect it through subtle changes that they notice in their family member. Staff members question family members about patients’ preferences regarding television programs, music, reading materials, or other activities such as working on cross word puzzles to guide the care team in keeping the patient stimulated.
during daytime hours. Shades are open during the day and lights are dimmed at night in an effort to maintain normal sleep cycles. Uninterrupted sleep is encouraged and patients are not disturbed from 12 a.m. to 5 a.m. as their condition warrants. Routine tests, treatments, and baths are avoided during those hours to facilitate restful sleep. A calm and quiet environment is maintained.

Patients reliant on ventilator support have daily sedation weaning and a spontaneous breathing trial in an effort to extubate them as soon as safely possible. Shift to shift and provider results of trials are conveyed frequently to the health care team, patient, and family members. Early mobility decreases the development of delirium. Daily activity goals are determined by the patient, their family, and the care team. Charge nurses round on patients to ensure activity goals are met. Use of restraints and other restrictive medical devices is evaluated hourly and discontinued as soon as feasible. The ICU point-of-care pharmacist reviews medication lists each day.

Early detection is achieved as CAM status is relayed via various tools. CAM was integrated into the ICU Standard of Care in Meditech V6 as were RASS assessments to be performed every 4 hours. These additions made for uniform documentation by the nursing staff. Goals of care were expanded to include achieving the provider prescribed goal for the individual’s target RASS (Richmond Agitation Sedation Scale). CAM results are documented at 0500 and 1700 in the electronic health record. A white board located in the patient’s room readily alerts anyone who comes into contact with the patient of their current CAM status. CAM status is noted during Interdisciplinary rounds and during nurse to nurse bedside report. The nursing staff is held accountable for reporting CAM positive status as a critical value to the Physician, PA, or CRNP. Compliance reports are generated and reviewed. Interventions to prevent or combat delirium are documented at least every 12 hours in the nursing computerized flowsheet.

Validate: In the final phase of IMPRV methodology, the workgroup will start to transfer ownership from the lead facilitators to the process owners and team members. The key objective is to complete solution implementation, ensure process accuracy and provide comprehensive training for improvement, sustainment and ownership. At 30, 60 and 90 days, the IMPRV Facilitator will follow-up with an internal process audit to measure compliance.

Some of the actions implemented and monitored for sustainability include:
- Assessment screen built into Meditech V6
- Added new delirium interventions to RN worklist to address and document
- CAM+ is now a critical value reported to provider
- Nursing education module in HealthStream
- Patient & family education brochure
- Verbal education and support in morning briefs by Clinical Nurse Manager
- Leadership rounding by Clinical Nurse Manager
- Provider champion (Medical Director of ICU)

**Measurable Outcomes**

After the implementation of the above standardized solutions, the number of delirium cases dropped to 5% (n=40) and the LOS for delirium patients dropped to 80 hours (55% reduction in LOS). Another noteworthy outcome is a 50% reduction in self-extubations (n=18 in first 6
months of 2014; n=17 in 12 months post implementation). It is noteworthy to mention that although the delirium population saw a reduction in LOS, there was no change in the remaining ICU population’s LOS. The decrease in LOS also decreases the risk for other adverse outcomes, including pneumonia, clots, and other hospital acquired infections. On average, the approximate cost per day at UM UCH for an ICU patient is $1,000 per day. The decrease in LOS of 2.75 days for the delirium population achieves a cost savings of $2,750 per patient, or $110,000 for the year (n=40, ICU only).

**Sustainability**

What measures are being taken to ensure that results can be sustained and spread?

Using IMPRV Methodology, the team developed standard interventions and protocols. This initiative was a top priority for the ICU team, which resulted in increased awareness and buy-in from the entire multidisciplinary care team. Standard interventions include: CAM-ICU and RASS scores documented both within hospital documentation system as well as on patient communication boards, a unit-based pharmacist who reviews medications and participates in ICU Rounds, a unit-based physical therapist who assesses functional limitations and participates in ICU Rounds to advocate for patient mobility and other rehabilitation needs including ambulation on the ventilator when deemed appropriate, a designated quiet time to allow for patients to rest, and inclusion of family in all interventions. All interventions were added to the nursing worklist to ensure review and action. The ICU care team has fully adopted the standard interventions and protocols and taken ownership in reducing delirium. In addition, they create solutions to improve patient experiences such as taking patients to the healing garden and orienting patients to time of day. Delirium continues to be monitored through the ICU’s IMPRV DASHboard for daily review. Not only have these solutions proven to be sustainable over the last year, they are replicable for the HMH ICU.

**Role of Collaboration and Leadership**

Upper Chesapeake Medical Center’s leadership was and remains engaged in making patient safety a priority. This has been clearly demonstrated through the restructured Performance Improvement Department and intense training of leaders on the IMPRV methodology as a standardized project management tool using principles from Lean Six Sigma and this department’s partnership with Nursing and other clinical departments establishing patient safety as a priority. There was Executive and physician support from Dr. Jason Birnbaum, Medical Director of the Intensive Care Unit and Chairman of the Department of Medicine and Terrence Moody, MS, RN, Director of Acute Care. Progress on the project was reported monthly at the ICU Operations Committee meeting.

The vision for success in decreasing the number of patients who test positive for delirium in the ICU was shared by the multidisciplinary Kaizen team that was established to quickly address the issue, produce solutions and develop strategies for gathering data to measure progress. The team consisted of bedside critical care nurses, critical care techs, providers (MD, CRNP), ancillary team members from Respiratory Therapy, Rehabilitation, and Pharmacy, the Clinical Nurse...
Manager, Director of Nursing and project facilitators from the Performance Improvement Department. All members have been and remain engaged from the redesign of the process, to implementation of solutions, to sustainability.

Senior leadership demonstrates support of this project as evidenced by funding the application for the American Association of Critical Care Nurses’ Beacon Award for Excellence which was awarded to the ICU in 2013 and the reapplication process has begun for 2016. Outcome measurement, one of five categories scored, is worth 450 out of 1000 points. This category focuses on results achieved from objective evaluation and measuring progress so you can assess and improve processes related to patient outcomes.

**Innovation**

University of Maryland, Upper Chesapeake Medical Center (UM UCMC) is the first hospital in the University of Maryland Medical System to embark upon the issue of delirium, and the importance of delirium reduction in the Intensive Care Unit. Understanding the importance of early detection, and implementation of evidence-based treatments, has been at the forefront of the unit’s awareness. Research has consistently supported the multiple adverse outcomes of delirium in critically ill patients, including those creating both clinical and fiscal consequences.

Daily interdisciplinary rounds in the unit are innovative, including a unit-based physical therapist and pharmacist. The unit-based physical therapist has been invaluable to patient care. The non-pharmacological intervention of early mobilization has been shown to be a consistent approach to decrease delirium in critically ill patients.

Upper Chesapeake Medical Center’s family presence policy, of 24 hour visiting, is beneficial to the patient and the health care team. Families are invited to attend daily rounds. Family presence can be a tremendous comfort to the patient, and also be invaluable to the health care team. The family has the opportunity to share awareness of any behaviors or cultures related to the patient that may impede success.

The unit is committed to a period of uninterrupted rest for patients (if their condition allows) from 12 AM to 5 AM. Lights are dimmed, noise kept to a minimum, overhead pages are rare. Staff has been educated on the effects of a continuous rest period for patients, as well as numerous additional interventions. In the morning, lights are turned on, shades are raised, and glasses and hearing aids are given to the patient if applicable. Patients are also mobilized, whether it is ambulating, assisting the patient out of bed to a chair, or range of motion. Each patient has a large white board, which aids in patient orientation. The board is updated twice a day and includes the name of staff, day of the week, date, and daily patient goals.

Finally, the unit’s providers, both physicians and nurse practitioners have been committed to the project’s workgroup with invaluable support and contributions for solutions.
Identify: Project Charter

**IMPRV Toolkit**

**Project Title: Reducing Delirium in the ICU**

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**Process Opportunity**

Delirium is a disturbance of consciousness marked by acute onset of fluctuating course of inattention, change in cognition or a perceptual disturbance and impaired ability to receive, process, store, or recall information. It is also characterized by alterations in sleep-wake cycles, restlessness, and agitation. Delirium is a predictor of increased mortality, length of stay, time on ventilator, re-admission, and prolonged hospitalization.

**Scope Definition**

- **Inputs:**
  - Observe report from ED, PACU, or Unit
  - Patient assessment
  - Knowledge/Stanley report

- **Outputs:**
  - Patient identified
  - Knowledge/Stanley report

- **Process:**
  - Plan of Care

- **Customer:**
  - ICU

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**Objectives & Benefits**

- Decrease patient mortality, adverse outcomes, hospital stay, cost, falls and self-extrication
- Increase team member buy-in to process to reduce delirium
- Increase team member understanding of importance of CAM
- Reduce variability in CAM tool utilization

**Constraints & Dependencies**

- FTE
- Team member engagement
- Time
- Limitations of current EMR system

---

**Key Milestones/Gates**

<table>
<thead>
<tr>
<th>BPR Phases/Activities</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Improvement charter</td>
<td>Complete</td>
</tr>
<tr>
<td>SIPOC</td>
<td>Complete</td>
</tr>
<tr>
<td>Process Flowchart</td>
<td>Complete</td>
</tr>
<tr>
<td>6 wks analyses</td>
<td>Complete</td>
</tr>
<tr>
<td>Future state VSM</td>
<td>Complete</td>
</tr>
<tr>
<td>Implementation plan</td>
<td>Complete</td>
</tr>
<tr>
<td>Visual sbry board</td>
<td>Pending</td>
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<tr>
<td>Internal Audit</td>
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</table>

**Project Team**

- Executive Sponsor: Terrence Moody
- Provider Sponsor: Jason Birmbaum MD
- Process Owner: Suzanne McHugh
- Project Facilitator(s): Teneille Ramsey, Sherry Thorpe, Jessica Doversie-Wheeler
- Project Team: Judy Billing, Alva Helmman, Cindy Grassies, Donna Herney, Jennifer King, Jessica Ross, Christina Savage, Meg Schnitzlein

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Identify: SIPOC

**SIPOC Diagram (Process Map)**

<table>
<thead>
<tr>
<th>S</th>
<th>I</th>
<th>P</th>
<th>O</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppliers</td>
<td>Inputs</td>
<td>Process</td>
<td>Outputs</td>
<td>Customer</td>
</tr>
<tr>
<td>RN</td>
<td>Patient</td>
<td>Obtained report from ED, PACU, or Unit</td>
<td>Patient</td>
<td>ICU</td>
</tr>
<tr>
<td>RN/PET</td>
<td>Test</td>
<td>Patient admitted</td>
<td>Patient</td>
<td>ICU</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>Respiratory Assessment/ intervention screens</td>
<td>Initial assessment (CAM included)</td>
<td>Information</td>
<td>Care Team, Patient, Family</td>
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<tr>
<td>Provider</td>
<td>Provider's report</td>
<td>Initial assessment (CAM included)</td>
<td>Information</td>
<td>Care Team, Patient, Family</td>
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<tr>
<td>Care Team</td>
<td>Patient monitoring</td>
<td>Plan of Care</td>
<td>Plan of Care</td>
<td>Care Team, Patient, Family</td>
</tr>
<tr>
<td>Care Team</td>
<td>CAM Positive</td>
<td>Information</td>
<td>Information</td>
<td>Care Team, Patient, Family</td>
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<tr>
<td>RN</td>
<td>Patient, risk &amp; CAM tools</td>
<td>Re-evaluation of medications/ interventions?</td>
<td>Information</td>
<td>Care Team, Patient, Family</td>
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<tr>
<td>Care Team</td>
<td>Transfer/ Discharge process &amp; information</td>
<td>Patient leaves</td>
<td>Patient leaves</td>
<td>Patient, Family</td>
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</tbody>
</table>

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Addendums
Measure: Process Flowchart

Decreasing Delirium in the ICU

Call from OR, ED or Provider/RRT call

Patient Assessment

Admission assessment

Medication and vital signs

Institute treatment orders

Orders correspond with plan of care

Start Procedures

Rounding every 12 hours

Investigate causes of patient delirium

Notified of admission

Room Preparation

Pre-Admission Assessment

Vitals, height/weight and check orders

Initiate Standard of care

Admission Assessment

Review Plan of care

CAM Assessment

Assist with procedures

Respiratory notified of admission

Assessment

Order Sets & Vent management, intubations, weaning protocol

Begin Patient/Family education

CAM Assessment at 0500 & 1700

OT consulted as needed

Speech Therapy Consult

Daily round with care team

Regular neurologic assessment

Negative

Positive

CAM assessment at 0800

Physical and dietary restriction

Speech Therapy swallow study and other

Speech Therapy feeding study and diet
### Process: 5 Whys Analysis

#### Why #1 – Problem
Lack of provider support
No interventions for negative CAM

#### Why #2 – Symptom
Disconnect among provider groups
Patients require less and currently not addressing positive CAMs

#### Why #3 – Symptom
Lack of prioritization
Not in standard of care or perceived as issue

#### Why #4 – Symptom
Not a part of the rounding discussion
Knowledge deficit of importance of CAM interventions and comfort level with interventions

#### Why #5 – Root Cause
Lack of provider championship

### Solution
Consistent initiation and discussion of CAM in rounds by RN
Add to standard of care, Education and accountability among care team and family (Hands on training)

---

### Re-Think: Future State Value Stream Map

![VALUE STREAM MAP (Future State) Reducing Delirium in the ICU](image)

---

8
# Re-Think: Implementation Plan

## Future State Process Improvement Plan

<table>
<thead>
<tr>
<th>Process Area</th>
<th>Priority (LR/MH)</th>
<th>Improvement Initiative</th>
<th>Benefit / Operational Impact</th>
<th>IMPRV Lead</th>
<th>Estimated Implementation Schedule (Weeks)</th>
<th>コスト</th>
<th>Completion Date</th>
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<tbody>
<tr>
<td>Standard of Care</td>
<td>H</td>
<td>Add delirium interventions to standard of care</td>
<td>Consistency in nursing care and expectations</td>
<td>Christina Savage (CRNP), Karen Campbell</td>
<td>X</td>
<td>Complete</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>H</td>
<td>Consistent use of brochure</td>
<td>Family understanding, compliance and empowerment</td>
<td>Donna Homney and Judy Billing</td>
<td>X</td>
<td>Complete</td>
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<tr>
<td>Standard of Care</td>
<td>H</td>
<td>Change RASS assessment to 0000, 1300, 1700, 2100 and 0500</td>
<td>Perform operation at same time as CAM</td>
<td>Suzie McHugh</td>
<td>X</td>
<td>Complete</td>
<td></td>
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<tr>
<td>Documentation</td>
<td>H</td>
<td>Add full CAM/RASS assessment in V8 on same screen with critical value report on screen</td>
<td>Accurate assessment and ability to measure</td>
<td>Christina Savage (CRNP), Meg Schnitzlein, Karen Campbell</td>
<td>X</td>
<td>Complete</td>
<td></td>
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<tr>
<td>Education</td>
<td>M</td>
<td>CAM negative education of care team, family (hands on training for interventions) Training/class including patient perspective</td>
<td>Consistent standard education</td>
<td>Meg Schnitzlein</td>
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<tr>
<td>Education</td>
<td>M</td>
<td>Set expectations for family and patient</td>
<td>Clear expectations</td>
<td>Suzie McHugh</td>
<td>X</td>
<td>Complete</td>
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<tr>
<td>Standard of Care</td>
<td>M</td>
<td>Ability to update RASS goal in V8</td>
<td>Useable, updated scoring for RASS communication</td>
<td>Christina Savage (CRNP)</td>
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<td>Communication</td>
<td>H</td>
<td>CAM positive result reported as critical value; Consistent Communication's handoff of vent settings and CAM status by provider</td>
<td>Provider buy in and communication of delirium status</td>
<td>Dr. Jason Birnbaum and Christina Savage</td>
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<tr>
<td>Standard of Care</td>
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<td>CAM handoff and added to the whiteboard</td>
<td>Team member buy in and communication to team</td>
<td>Suzie McHugh</td>
<td>X</td>
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### Implementation Approvals

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<tr>
<th>Physician Sponsor</th>
<th>Business Process Owner(s)</th>
<th>IMPRV Facilitator</th>
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<tbody>
<tr>
<td>Dr. Jason Birnbaum</td>
<td>Terry Moody</td>
<td>Tennille Ramsay</td>
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9
Validate: Process Assessment (Internal Audit)

<table>
<thead>
<tr>
<th>Audit Technique</th>
<th>Auditable Item, Observation, Procedure, etc.</th>
<th>30 Days</th>
<th>60 Days</th>
<th>90 Days</th>
<th>6 Months</th>
<th>1 Year</th>
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<tr>
<td>Electronic Data</td>
<td>Have all RNs been trained?</td>
<td>In Progress</td>
<td>Complete</td>
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<td>Is training documentation available?</td>
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<td>Is the visual storyboard visible on the unit?</td>
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<td>Verbal Inquiry</td>
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</table>

Number of Incomplete Observations: 7
Total Observations: 8
Corrective Actions Required: 8

Reviewer Comments

The CAM ICU screen went live on 6/25/2014. All assigned RNs completed Healthstream education by 6/30/2014. Currently one-third of CAM positive assessments reported as critical value.