

## Review Article

# Improving Patient Outcomes with an Emergency Department Delirium Screening Protocol

Tonja M. Hartjes\* and Erica Gallen<sup>2</sup><sup>1</sup>Department of Adult Gerontology and Acute Care Nurse Practitioner, University of Florida, USA<sup>2</sup>College of Nursing, University of Florida, USA**Abstract**

Emergency department (ED) patients with delirium have an increased risk for mortality, length of stay, financial burden, decreased functional status, and need for long term care. The implementation of a delirium protocol can aide in early detection of delirium, appropriate treatments, which are expected to improve outcomes of patients with delirium who present to the ED. This article will discuss the background and significance of delirium and the processes taken to develop and implement an ED delirium treatment program as a quality improvement project.

## IMPACT OF DELIRIUM IN THE EMERGENCY DEPARTMENT (ED)

Each year, nearly 130 million patients are seen in the ED: 30 percent of these patients are adults over the age of 65 years [1]. Unlike the intensive care unit (ICU) setting, the ED does not routinely screen for delirium and has no national guidelines or standard of care for delirium assessment and treatment [2]. In a study by Han, Wilson, and Ely, [2] 57-83% of ED delirium cases were undiagnosed. There are numerous, costly repercussions to a lack of standardized delirium care including increased risk for mortality, length of stay (LOS), nosocomial complications, institutionalization, and financial costs [3]. A standardized delirium screening tool and protocol are recommended measures to potentially reduce complications associated with delirium for ED patients.

## WHAT IS DELIRIUM?

Delirium is a syndrome with an abrupt alteration in mental status. It often presents with acute illness and is characterized by a fluctuating course of altered consciousness, perception, attention and psychomotor activity. The patient experiences lowered awareness and is unable to maintain or move his or her attention. Additionally, cognition is impaired with many patients experiencing hallucinations, disorientation, deficits in memory, and/or altered language. Abstract thinking is also affected and short term memory is also compromised.

Delirium is categorized by the psychomotor activity that is present: Hypoactive, Hyperactive, or Mixed delirium. Hypoactive delirium is marked by a lethargic or withdrawn state. Patients may appear depressed and experience difficulty in maintaining attention. Hyperactive delirium is characterized by an agitated

**\*Corresponding author**

Tonja M. Hartjes, Department of Adult Gerontology and Acute Care Nurse Practitioner, University of Florida, USA, Email: hartjtm@ufl.edu

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state. Patients may have difficulty remaining at rest and some may become aggressive towards caregivers. Patients with mixed delirium may fluctuate between hypoactive and hyperactive states. The majority of patients who experience delirium have a hypoactive or mixed form [2]. Unfortunately, hypoactive delirium is more likely to go undiagnosed than the more obvious hyperactive form [2]. Within the emergency department, approximately 1 out of every 10 patients experiences delirium [4]. Therefore, the need for early detection and treatment is warranted.

## ETIOLOGY AND OF DELIRIUM

The etiology of delirium is often unclear but is often the result of multiple underlying conditions, and a relationship with acute illness is commonly present. Many factors predispose patients to developing delirium as noted by Han [2] (See Figure 1). Girard [5] identified a significant relationship between acute inflammation and the development of delirium. An acute rise in the inflammation factors matrix metalloproteinase (MMP-9), protein C, and soluble tumor necrosis factor (sTNFR1) were all found to significantly increase the probability of delirium manifesting in patients [5].

Additionally, polypharmacy may increase a patient's risk for delirium. As new drugs are introduced, drug reactions and interactions can occur. This is especially a consideration for older patient populations. Cleves-Bayon [6] noted various medications that are associated with the onset of delirium. These include anticholinergics, hypnotics, opiates, neuroleptics, antidepressants, anticonvulsants, H<sub>2</sub> receptor antagonists, cardiac medications, nonsteroidal anti-inflammatories, corticosteroids, and antibiotics.

Factors Contributing to the Development of Delirium	
<b>Patient Characteristics:</b>	
Age greater than 65 years	
Males	
<b>Predisposing Conditions:</b>	
Multiple comorbidities	
High severity of illness or terminal illness	
Polypharmacy	
Current use of psychiatric medications	
Substance abuse	
Impaired motility and/or independent functioning	
Auditory and/or Visual impairments	
Altered nutritional status	
Underlying psychiatric illness	
<b>Nosocomial Interventions:</b>	
Indwelling devices	
Physical restraints	

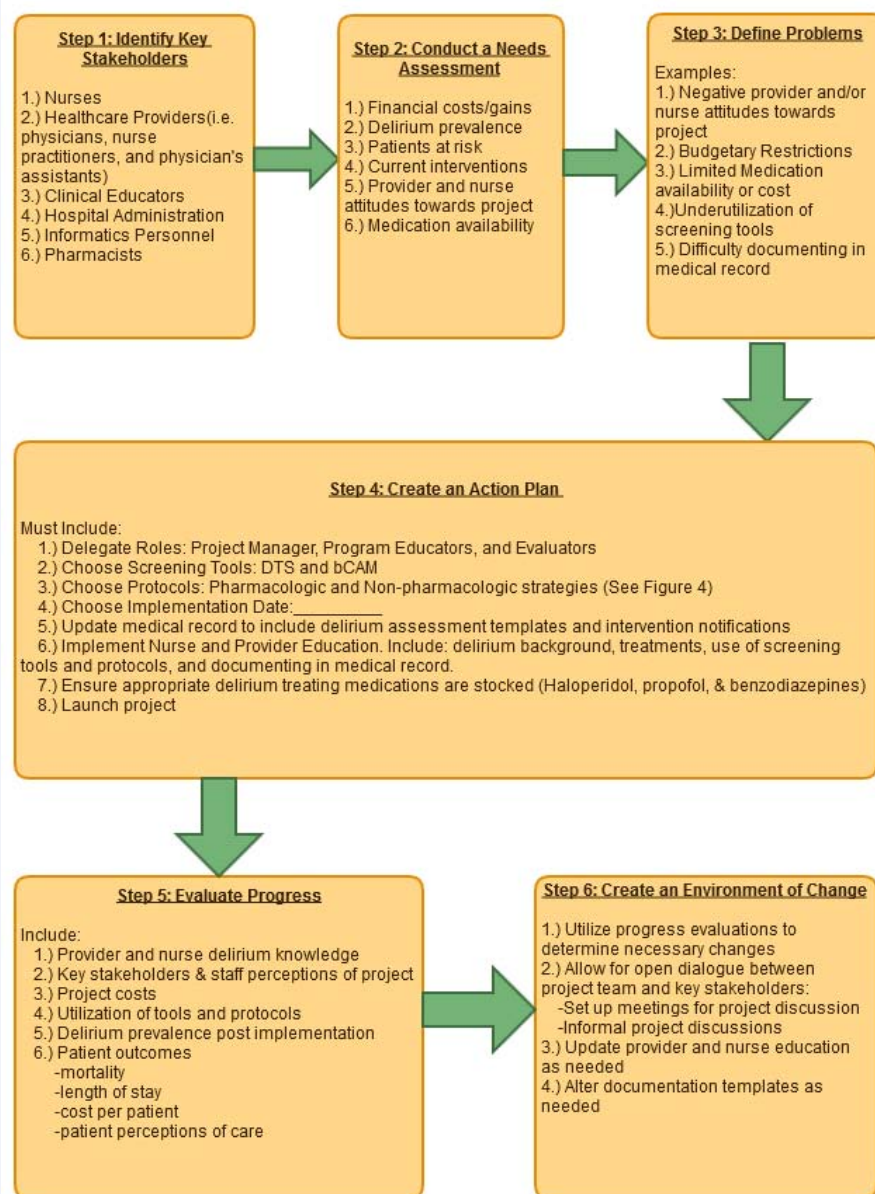
**Figure 1** Factors contributing to the development of delirium.(Adapted from Han, Shintani, Eden et al., 2010).

## SIGNIFICANCE OF DELIRIUM

Delirium screening and detection in the ED is an important aspect of patient care as it can reduce the risk for patient mortality, LOS, financial burden, decreased functional status, and need for long term care facility placement.

### Mortality

Several studies have demonstrated that patients who experience delirium during hospitalization have an increased risk of mortality. In a cohort study by Melkas [7], delirium was found to be a significant predictor of early mortality. Patients who had recovered from a delirium episode experienced a reduced long term survival by 3 years. Additionally in a meta-analysis by Witlox [8], delirious patients had more than a 10 percent increased risk of short-term mortality following discharge when compared to controls.



**Figure 2** Steps to Implementation of project.

The risk of mortality can be further exacerbated if interventions are not made to treat the delirious state. Heymann [9], found a three-fold increase in mortality when treatment for delirium was delayed beyond 24 hours. Moreover, mortality risk increases by 11 percent for each 48 hour period the patient experiences delirium [10]. Therefore early detection and treatment of delirium is crucial to mortality risk reduction.

### LENGTH OF STAY

Hospital LOS is also increased for patients develop delirium. Even when adjusting for severity of illness, age, and comorbidities, LOS doubled for patients with delirium. This is attributed to complications that result from delirium such as over-sedation, malnutrition and falls [11]. In a prospective cohort study by Fick [12], LOS was measured for delirium positive patients and compared to delirium negative patients. Patients who were positive for delirium had an increase in LOS from 5.7 days to a range of 9.1 days.

When delirium treatment was delayed beyond 24 hours, patients were more likely to experience delirium for longer periods than patients treated within 24 hours [9]. The delayed treatment group was also more likely to acquire a nosocomial

infection such as pneumonia [9]. Patients with delayed delirium therapy had a 1.85 hazard ratio for developing nosocomial pneumonia [9]. The delayed therapy group was also more likely to be treated with neuroleptic drugs during their stay, and have higher Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential Organ Failure Assessment (SOFA) scores at discharge [9]. All of these factors increase recovery time which increases patient LOS.

Allen [3] determined LOS was significantly reduced by a range of 3.6 days after the implementation of the screening tool and protocol. Additionally, after implementation of the protocol, transfers to the ICU for delirious patients were reduced by 18 percent to zero. The study demonstrated improved long term results, as the hospital readmission rate for delirium patients reduced by 26 percent [3].

### FINANCIAL COSTS

National healthcare costs related to delirium are estimated between \$38 billion to \$152 billion annually [13]. These costs can be direct, such as increased LOS, or result from services such as mechanical ventilation or an ICU admission.

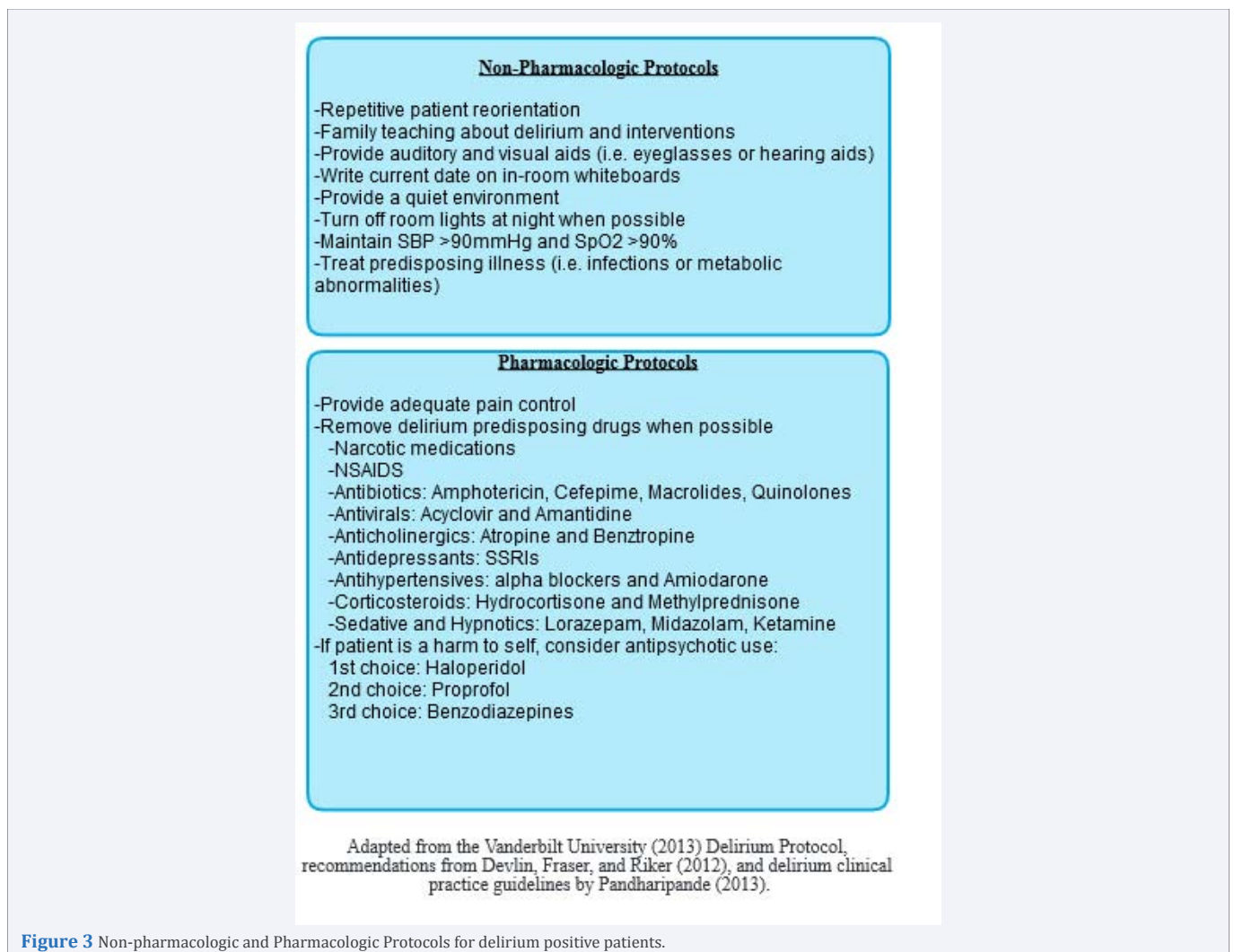


Figure 3 Non-pharmacologic and Pharmacologic Protocols for delirium positive patients.

Quality improvement measures have been shown to reduce the associated costs of delirium within the hospital setting. Rubin [14] evaluated the effects of the Hospital Elder Life Program (HELP) within a community hospital. The HELP program included a non-pharmacologic sleep protocol, hearing and vision protocols, and interventions to support cognitive and physical functioning. The program utilized nurses for early detection and prevention of delirium. The evaluation of over 7,000 in-hospital patients found that the HELP program saved over \$7.3 million in one year. The authors attributed this cost savings to the reduction in LOS [14].

Indirect costs, such as requiring additional staffing to ensure patient safety, can also occur, further increasing healthcare costs associated with delirium. Patients experiencing delirium often require direct observation by additional staff. In a literature review by Dewing [15], hospitals noted that 20 percent of the nursing staff budget was being used for direct observation care. Reported financial costs for direct observation of delirium patients ranged between \$232,000 and \$581,000 annually. Early delirium interventions proved beneficial, reducing the need for direct observation [15].

Zaubler [16] conducted a study measuring the effects of delirium within the study hospital. This community hospital adapted a delirium assessment and treatment program for the general medical floors. This intervention reduced LOS for patients by a mean of two days. Financial costs were reduced by \$841,000 in nine months.

## FUNCTIONAL STATUS

Multiple studies have shown the effects on functional decline for patients who have experienced delirium. In fact, decreased physical and cognitive functioning can occur well beyond the initial delirium episode. Brummel [17], determined that critical care patients who experience delirium were at an increased risk for developing a new physical disability. Physical disabilities were defined as a loss of self-executed activities of daily living. Rudolph [18] found that delirium nearly doubled the risk for functional decline for over a month. The study adjusted for severity of illness and baseline status. Functional decline was determined by loss of the ability to complete two or more activities of daily living. Unfortunately, these functional impairments increase the patient's risk for further complications. These include aspiration, falls, decubitus ulcers, arterial and venous thrombosis, and malnutrition. These complications can further exacerbate the delirious state and worsen outcomes for the patient [19].

## LONG TERM CARE

Impairments of physical and cognitive functioning decrease the patient's ability for self-care. Fong [20] conducted a prospective cohort study to determine the adverse outcomes in patients with Alzheimer's Disease (AD) who develop delirium during hospitalization. Institutionalization was the greatest outcome for these patients, affecting one out of seven patients. In a meta-analysis by Witlox [8], similar outcomes were found for patients without AD: delirium increased the need for long term care facility placement by 22.7 percent. Patients with preexisting dementia experienced similar rates of institutionalization at

25.8 percent. This increased need for long term care further exacerbates the financial costs associated with delirium.

Conversely, in a review by Barr [21], the application of a delirium assessment tool and protocol showed up to a 300 percent increase in functional independence. These patients did not require institutionalization via a nursing home or rehabilitation unit since their functionality was restored.

## IMPLEMENTING A DELIRIUM PROTOCOL IN THE ED

The implementation of a standardized delirium assessment tool and protocol has shown promising findings in research [3,4,9,11]. Currently, there are no studies regarding the effectiveness of implementing a protocol or screening tool within the ED. The remainder of this article will outline the processes involved with implementing a delirium protocol as a quality improvement project in the ED. The implementation of this project will be modeled after the Vanderbilt Delirium Prevention and Safety program for non-ICU patients.

Implementing a delirium screening tool and protocol within the ED requires an in depth evaluation of current ED microsystem and hospital macrosystems, to determine administrative support, available resources, identification of key stake holders, and the development of a reasonable action plan. The following procedures are recommended for the implementation of a delirium assessment and treatment program within the ED (See Figure 2).

### Step 1

**Identify key stakeholders** within the department and hospital whose support is necessary for the program's success. Many stakeholders are involved with the development of a delirium protocol and to implementation the changes, which will be required. Stakeholders may include hospital administration, nurses, physicians, clinical educators, pharmacists, and informatics personnel. Hospital administration will need to support the program before it can move forward. Administration will drive and support the needed change. Approval for all measures are required as they will facilitate: 1) sustainability of the program through the addition of delirium hospital policies and procedures; 2) staff education; 3) creation of order sets for providers; 4) documentation templates for nursing; 5) follow-up of protocol use and compliance; and 6) report outcomes. Pharmacists can function as consultants for the treatment protocol, and appropriate stock of medications in the ED. If medications are not cost effective or stock is limited, alternative therapies would require their approval.

Identifying and gaining cooperation of these individuals will create the necessary support system to carry out this program. In a study by Johansen [22], successful key stakeholder involvement required an understanding of expected outcomes and implications of the program. Key stakeholders must understand how the program can benefit them in order to build project support.

### Step 2

**Conduct a needs assessment** for the project. These are necessary evaluations prior to the planning and implementation



phases. Estimating a daily average of patients who meet the common risk factors for delirium is recommended for this project. The financial costs and benefits should be assessed and ascertained, which may influence change or the implementation of the program within the emergency department. These metrics can also be utilized to evaluate the effectiveness of the program, in its outcome phase. The prevalence of delirium may appear to initially increase after implementation due to more effective screening measures. A full evaluation of the current interventions for delirium (such as the ICU who utilizes the Confusion Assessment method for the Intensive Care Unit {CAM-ICU}) should also be conducted. This requires an interviewer to survey department providers and nurses on current practices, perceptions, and knowledge regarding delirium.

### Step 3

**Identify and Define problems** that will affect implementation. These are potential issues that may occur during some phase of the project. Examples include:

- Negative provider and/or nurse attitudes towards project;
  - Budgetary restrictions for education;
  - Limited medication availability or excessive cost;
  - Underutilization of screening tools;
  - Difficulty recording findings on medical record;
  - Limited provider and/or nurse understanding of interventions;
  - Other projects that take priority from the Delirium Protocol.
- Interventions within an action plan should address these potential issues, and options should be created to mitigate their effect.

### Step 4

**Create an action plan** that is tailored to meet the needs of the department. The project should include the sequential steps for implementation outlined in Figures 2 and 3.

The Delirium Triage Screen (DTS) and the brief Confusion Assessment Method (bCAM) could be used for delirium evaluation. Non-pharmacologic protocols and pharmacologic protocols are written based on the scope of interventions for the ED, and require approval of the providers, nurse management, pharmacy, and hospital administration.

A coordinated plan with a set implementation date is necessary as well as deadlines for project goals. Delegation of project roles should also be made during this stage. Medical record systems should be updated to allow for the appropriate documentation of patient assessments. If using an electronic health record, the system should flag nurses and providers for the suggested interventions.

Education should be provided to all ED providers, pharmacists, and nurses regarding the screening tool and protocols and should be tailored to each profession's scope of practice. Nurses should be given simulation scenarios to assess patients for delirium.

### Step 5

**Evaluate Progress.** Progress of the program should be evaluated at designated intervals. Alterations to the program should occur based on outcome findings to improve the delirium assessment tool and protocol. Examples of measures requiring evaluation include:

- Key stakeholders and staff perceptions of the program;
- Program costs;
- Evaluating provider and nurse delirium knowledge following educational sessions;
- Utilization of delirium tools and protocols by nurses and providers;
- Delirium prevalence following implementation;
- Patient outcomes (i.e. patient mortality rates, LOS, cost per patient, patient satisfaction, adequate pain control, etc.)

### Step 6

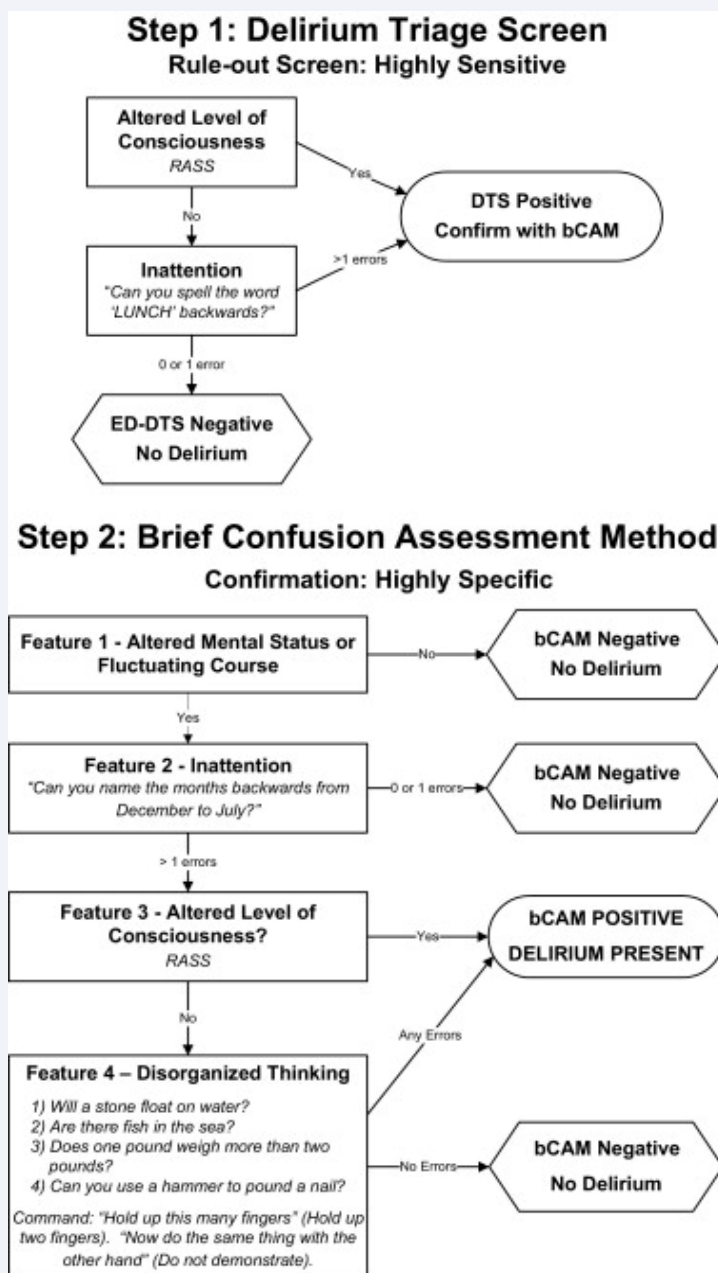
**Create an environment of change** that promotes the project's success. Allowing for an open dialogue of communication between the project developer(s) and the key stakeholders as well as staff will promote further project success. Kerzer [23] found that in order to achieve success with a project, the project manager and team should utilize informal discussions to create open communication. The project manager should use the information gained via the project's outcome evaluation and through personal interviews in order to make the appropriate program changes. The project manager(s) should provide support to providers and nurses in the forms of additional education and clarifying misconceptions.

Findings from the project evaluation should guide changes such as alterations to the documentation template or providing additional nurse and/or provider education. Allowing the concerns of the key stakeholders to influence change creates open communication and promotes the project's success.

### Delirium screening tools

In 2013, Vanderbilt University recommended the use of the Delirium Triage Screen (DTS) to expedite delirium evaluations in demanding clinical settings outside of the ICU. DTS consists of a two-step assessment [24]. (See Figure 4). Providers and nurses assess for altered level of consciousness and inattention. The Richmond Agitation Sedation Scale (RASS) tool is utilized to assess level of consciousness (See Figure 5). Inattention is ascertained by asking the patient to perform complex thinking, such as requesting the patient to spell a common word backwards. In a study by Han [24] the DTS tool showed 98 percent sensitivity and 55 percent specificity for delirium detection when conducted by a provider. Patients that are assessed positive for either 1) Altered level of consciousness or 2) Inattention will require evaluation per the brief Confusion Assessment Method tool (bCAM) for confirmation [25].

The bCAM has shown a 95.8 percent specificity and 84 percent sensitivity when used in combination with the DTS tool within



**Figure 4** The Delirium Triage Screen and Brief Confusion Assessment Method tools for urgent care and emergency department patients (Han, Wilson, Vasilevskis et al., 2013).

the emergency department setting. The sensitivity and specificity of the CAM-ICU on ED patients has not been conducted [25].

The authors recommend all patients be tested for delirium via the DTS upon arrival to the ED by the triage nurses within the electronic health record (EHR) system. Emergency departments that do not utilize EHR systems should prompt nurses within a written triage form. Patients that test positive for altered level of consciousness or inattention via the DTS are then confirmed by administering the bCAM tool. Reassessment for all patients (positive and negative for delirium) should occur if the patient experiences a noticeable change in mental status or every 4 hours. Patients that are found positive for delirium should then be flagged within the EHR. Delirium protocol recommendations will

be prompted to be initiated by the nurses (non-pharmacologic interventions) and ordered by the providers (pharmacologic interventions).

### Delirium protocol

The following delirium protocol was adapted from the Vanderbilt University's delirium protocol flow chart, current clinical guidelines, and recommendations for medications. This program is designed as a nurse driven protocol. However, depending on your facility and key stakeholders, it can be revised to a physician driven program. Regardless of who assesses the patients for delirium, if the patient tests positive for delirium (based on the DTS and bCAM) the non-pharmacologic and

### Richmond Agitation Sedation Scale (RASS) \*

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive	
+2	Agitated	Frequent non-purposeful movement, fights ventilator	
+1	Restless	Anxious but movements not aggressive vigorous	
0	Alert and calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice ( $\geq 10$ seconds)	} Verbal Stimulation
-2	Light sedation	Briefly awakens with eye contact to voice (<10 seconds)	
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)	
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation	} Physical Stimulation
-5	Unarousable	No response to voice or physical stimulation	

**Figure 5** The Richmond Agitation Sedation Scale is used to evaluate for altered level of consciousness within the DTS and bCAM (Vanderbilt University, 2013).

pharmacologic protocols should be instituted quickly (see Figure 3). Following the initiation of these protocols, these patients should undergo further evaluation by an admitting physician for predisposing causes.

**Non-pharmacologic interventions:** These measures have been compiled from the Vanderbilt University's non-pharmacologic protocol and the National Institute for Health and Clinical Excellence (NICE) [26] delirium prevention and management guidelines. These interventions target environmental, orientation, familiarity, communication, and activity categories of risk factors.

The non-pharmacologic measures can be implemented by the nurse independently. The final 2 measures require interventions as prescribed by the provider such as intravenous fluids to maintain systolic blood pressure or medications to treat the underlying illness (see Figure 3).

## PHARMACOLOGIC INTERVENTIONS

These interventions required a three phase evaluation:

- Provide adequate pain control;
- Remove delirium predisposing drugs when possible;
- If patient is a harm to self, consider antipsychotic use.

### Phase 1

The patient should be evaluated for pain. Uncontrolled pain is considered to be a predisposing factor to the development of delirium [4]. Patients with mild pain ratings, 1-3 on the scale, should be treated with non-opioid analgesics such as ibuprofen or acetaminophen. Patients with moderate to severe pain should be treated with an appropriate opioid analgesic as prescribed by the emergency department provider. Clinical practice guidelines recommend the use of intravenous opioids as a first line pain treatment in patients with moderate to severe pain.<sup>21</sup>

### Phase 2

Following the assessment and treatment of pain, providers

should evaluate the current medications the patient is receiving for any predisposing causes. Devlin, [27] found the several medications to be predisposing factors to the development of delirium (See Figure 3).

### Phase 3

Pharmacologic intervention requires the provider to evaluate the patient for sedation measures. Patients who present a risk to themselves should be sedated appropriately. This includes patients that exhibit an agitated state that compromises necessary care, such as a patient who attempts to remove his or her central line or acts violently towards caregivers. Based on the NICE [26] guidelines and the National Guideline Clearinghouse [28] for acute confusion and delirium, the use of the atypical antipsychotic, haloperidol, via intravenous injection was supported. When haloperidol is contraindicated, Vanderbilt University [29] recommends the use of propofol via intravenous injection for sedation as a second line choice. Benzodiazepines are a third line choice for sedation in delirium due to risk for further agitation of patient symptoms.

## OUTCOME MEASURES

The development of outcome measures for evaluation of your project actually begins during your needs assessment. Baseline data regarding changes in personnel, care delivery processes, and patient outcomes associated with the improvement interventions should be observed, documented and reported. Key stakeholders will then analyze the outcome metrics as the project has evolved over time to determine its success.

The outcome metrics will guide future interventions. Alterations to the project are frequently made to the current project based on these findings. The most common outcomes measured are patient mortality, LOS, financial costs, functional status, and need for long term care. Therefore, improvements within these metrics are desirable. However, it should be expected that delirium incident rates increase following the implementation of the delirium screening tool. In a systematic review by Hosie [30], delirium prevalence and incidence

increased dramatically following the use of daily delirium screenings on inpatients. This was due to increased provider and nurse knowledge and hypoactive delirium awareness. In their review, 68-86 percent of delirium cases were classified as hypoactive, which is the most commonly undiagnosed delirium type [30].

## CONCLUSIONS

Delirium can result in potentially life-threatening and long-term negative outcomes. Implementing a delirium screening tool and protocol has shown to reduce the negative effects of this syndrome in various patient settings. Early detection within the ED has several benefits. The application of a delirium assessment and treatment protocol has the potential to reduce patient risks and improve outcomes.

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