EVALUATION AND MANAGEMENT OF DELIRIUM IN THE CRITICALLY ILL PATIENT: A LITERATURE REVIEW

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ABSTRACT

Problem: Differentiating delirium from other conditions resulting in acute confusion has been an obstacle in the effective and timely management of this cognitive alteration. In the medical setting, delirium has been documented as ranging between 10% and 50% and even as high as 80% in specialized populations, including the elderly and those in postoperative, intensive care, sub-acute and palliative settings. Although a temporary condition, successful treatment depends on the early identification and medical management of the underlying condition that has triggered such a state. The acute care nurse practitioner can play a significant role in the development and implementation of evidence based treatment strategies to standardize care and improve early identification and treatment.

Purpose: The purpose of this review was to examine the current evidence in the evaluation and management of delirium in the critically ill patient.

Search strategy: A computerized search of original research was conducted using the online databases of OVID, CINAHL and PubMed from January 2000 to the present. References in selected articles were also reviewed.

Findings: Optimal treatment involves a primary prevention approach which addresses underlying causes and reducing modifiable risk factors.

Implications: Evidence suggests that the implementation of a multidisciplinary approach can improve outcomes in the critically ill.

Keywords: delirium, aging, psychosis, severe agitation, cognitive impairment, ICU, and mortality, acute disturbances.
CHAPTER 1

Introduction

Delirium was defined as an “acute disturbance of consciousness with inattention accompanied by a change in cognition or perpetual disturbance that develops over a short period and fluctuates over time” by the Diagnostic Statistical Manual of Mental Disorders (DSM-IV: diagnostic and statistical manual of mental disorders; 1994). Delirium is a common complication in the intensive care unit (ICU) and it is especially problematic in mechanically ventilated patients (Lat et al., 2009; Pisani et al., 2009; Pandharipande et al 2006, 2008; Robinson et al., 2008). Other terms used to describe the acute cognitive change associated with delirium include “psychosis, ICU syndrome, septic encephalopathy, acute confusional state, acute brain failure and acute cerebral insufficiency” (Pun & Ely, 2007, p. 110).

According to recent studies, delirium remains undiagnosed in up to 70% of hospitalized patients (Miller, 2008; Pun et al, 2005; Fong et al., 2009). The incidence of delirium is rising as high as 80% in specialized populations, including the elderly and those in postoperative, intensive care, sub-acute and palliative settings (Fong et al., 2009; Oiumet et al., 2007). Despite these data, Ely et al. (2004) reported that while 92 % of clinicians considered delirium a significant problem in the ICU, only 40% routinely screened for delirium and even a smaller percentage, 16%, indicated using an assessment tool, only 7% used a validated one.

In the United States, healthcare costs associated with ICU treatment in patients with delirium ranges between 6 and 20 billion dollars annually (Girard et al., 2010; Pun & Ely, 2007). Delirium has also been implicated in negative outcomes including but not limited to long-term
cognitive impairment, three-fold increase in re-intubation, increased length of stay (LOS) and increased 1-year mortality, even after adjustment for important co-variables such as age, race, gender and severity of illness (Balas et al., 2009; Pisani et al., 2009; Lat et al., 2009, Pandaharipande et al., 2007; Robinson et al., 2008).
CHAPTER 2

Etiology and Pathophysiology

Delirium can be classified into three sub-types: 1. hyperactive, 2. hypoactive and 3. mixed. Hyperactive delirium is characterized by agitation, combativeness and/or irritability and often accompanied by hallucinations and delusions (Fong et al. 2009; Saxena & Lawely, 2009). In contrast, hypoactive delirium is characterized by lethargy, inattentiveness, and/or decreased mobility (Fong et al., 2009; Saxena & Lawley, 2009). The last type of delirium is a combination of both sub-types. In the ICU, the rates of hyperactive, hypoactive and mixed sub-types have been reported to be 1.6%, 43.5% and 54.1%, respectively (Pun & Ely, 2007; Peterson et al., 2006).

Research has suggested delirium is a product of multi-factorial mechanisms related not only to the predisposition of patients but also to exposure to triggering mechanisms, such as drug toxicity, acute stress, traumatic injury and inflammation (Figure 1).
Some of these risk factors are modifiable and can be targeted for prevention. Inouye et al (2007) developed a predictive model for delirium specific to the elderly non-ICU patient. This model classifies risk into two categories: predisposing and precipitating (Table 1). Inouye and associates found that ICU patients had an average of 11 ± 4 of these same factors as elderly non-ICU patients.
### TABLE 1: Risk Factors for Delirium

<table>
<thead>
<tr>
<th>Predisposing Factors</th>
<th>Precipitating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic characteristics</strong></td>
<td><strong>Drugs</strong></td>
</tr>
<tr>
<td>Age of 65 years or older</td>
<td>Sedative hypnotics</td>
</tr>
<tr>
<td>Male sex</td>
<td>Narcotics</td>
</tr>
<tr>
<td><strong>Cognitive status</strong></td>
<td>Anticholinergic drugs</td>
</tr>
<tr>
<td>Dementia</td>
<td>Treatment with multiple drugs</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>Alcohol or drug withdrawal</td>
</tr>
<tr>
<td>History of delirium</td>
<td><strong>Primary neurologic diseases</strong></td>
</tr>
<tr>
<td>Depression</td>
<td>Stroke, particularly nondominant hemispheric</td>
</tr>
<tr>
<td><strong>Functional status</strong></td>
<td>Intracranial bleeding</td>
</tr>
<tr>
<td>Functional dependence</td>
<td>Meningitis or encephalitis</td>
</tr>
<tr>
<td>Immobility</td>
<td><strong>Intercurrent illnesses</strong></td>
</tr>
<tr>
<td>Low level of activity</td>
<td>Infections</td>
</tr>
<tr>
<td>History of falls</td>
<td>Iatrogenic complications</td>
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<tr>
<td><strong>Sensory impairment</strong></td>
<td>Severe acute illness</td>
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<tr>
<td>Visual impairment</td>
<td>Hypoxia</td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>Shock</td>
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<tr>
<td><strong>Decreased oral intake</strong></td>
<td>Fever or hypothermia</td>
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<tr>
<td>Dehydration</td>
<td>Anemia</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Dehydration</td>
</tr>
<tr>
<td><strong>Drugs</strong></td>
<td>Poor nutritional status</td>
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<tr>
<td>Treatment with multiple psychoactive drugs</td>
<td>Low serum albumin level</td>
</tr>
<tr>
<td>Treatment with many drugs</td>
<td>Metabolic derangements (e.g., electrolyte, glucose, acid–base)</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td><strong>Surgery</strong></td>
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<tr>
<td><strong>Coexisting medical conditions</strong></td>
<td>Orthopedic surgery</td>
</tr>
<tr>
<td>Severe illness</td>
<td>Cardiac surgery</td>
</tr>
<tr>
<td>Multiple coexisting conditions</td>
<td>Prolonged cardiopulmonary bypass</td>
</tr>
<tr>
<td>Chronic renal or hepatic disease</td>
<td>Noncardiac surgery</td>
</tr>
<tr>
<td>History of stroke</td>
<td><strong>Environmental</strong></td>
</tr>
<tr>
<td>Neurologic disease</td>
<td>Admission to an intensive care unit</td>
</tr>
<tr>
<td>Metabolic derangements</td>
<td>Use of physical restraints</td>
</tr>
<tr>
<td>Fracture or trauma</td>
<td>Use of bladder catheter</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>Use of multiple procedures</td>
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<tr>
<td>Infection with human immunodeficiency virus</td>
<td>Pain</td>
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<tr>
<td><strong>Prolonged sleep deprivation</strong></td>
<td>Emotional stress</td>
</tr>
</tbody>
</table>

The exact pathophysiology of delirium is not clearly understood and more research is needed (Fong et al., 2009; Miller, 2008; Gunther et al., 2008; Oiumet et al., 2007). Diverse insults linked to this cognitive dysfunction may act on the brain by disturbing the homeostasis of metabolic and cellular pathways (Figure 2).

Deficiency in the neurotransmitter acetylcholine has been linked to impairments in cognition and attention (Hshieh et al., 2008; Trzepacz, 2000). Dopamine, serotonin and gamma-aminobutyric acid (GABA) have also been suspected as organic causes for delirium (Hshieh et al., 2008; Inouye, 2004). Additionally, excessive secretion of glucocorticoid hormones, such as cortisol, which are important for managing stress have been shown to have negative effects on mood and memory (Broadhurst & Wilson, 2001; Fong et al., 2009; Maclullich et al., 2008). In the case of immune dysfunction, pro-inflammatory cytokines can proliferate in the presence of infection caused by trauma or surgery. Inflammatory proteins which include tumor necrosis factor (TNF), interleukin 1 (IL-1) and interleukin 6 (IL-6), support leukocyte adhesion, induce the release metabolites and increase cytokine levels in the brain, which further disrupts homeostasis and the functioning of neural pathways (Broadhurst & Wilson, 2001; Hshieh et al., 2008).
CHAPTER 3

Methods of Diagnosis

A thorough clinical history, observation and cognitive assessment are the cornerstone of delirium diagnosis. Cole et al (2002) demonstrated that a detection protocol which screened patients within 24 hours after hospital admission using the Short Portal Mental Status questionnaire coupled with multidisciplinary care which included consultation and follow-up by a geriatric specialist, follow up by study nurse and implementation of nursing intervention protocol that targeted environment, orientation, familiarity, communication and activities, did not seem to be more beneficial than usual and customary care for delirious patients. However, it has been advocated that assessment occur at hospital admission and every 8 to 12 hours throughout hospitalization, especially for those “at risk” (Pun & Ely, 2007; Devlin et al., 2007; Jacobi et al., 2002). Use of a validated tool should be a part of standard care in the ICU in order to differentiate other conditions causing acute confusion from delirium itself (Devlin et al., 2007; Ouimet et al., 2007; Luetz et al., 2010).

There are several validated instruments available to diagnose delirium in the ICU. These include the Cognitive Test for Delirium (CTD), Neelon and Champagne Confusion Scale (NEECHAM), Delirium Detection Score (DDS), Confusion Assessment Method (CAM) and Intensive Care Delirium Screening Checklist (ICDSC). However, not all are appropriate for the ICU population due to poor reliability, sensitivity and specificity for delirium in non-verbal patients being mechanically ventilated and/or sedated in the ICU (Devlin et al., 2007; Jacobi et al., 2002; Ely, Siegel & Inouye, 2001; Waters, 2008). Two well-validated tools for assessment
have been adapted for use in the non-verbal ICU patient: the Confusion Assessment Method (CAM) and the Intensive Care Delirium Screening Checklist (ICDSC).

Ely et al (2001) replaced the Mini Mental Stats Examination (MMSE) component of the original CAM with an Attention Screening Exam (ASE) in order to evaluate non-verbal ICU patients (Devlin et al., 2007). The CAM-ICU has four features, including 1). acute onset of mental status change or fluctuating course, 2). inattention, 3). disorganized thinking and 4). altered level of consciousness. A positive diagnosis of delirium is considered when a patient exhibits both features 1 and 2 and either feature 3 or 4. The CAM-ICU algorithm is presented in Table 3.
Table 3: Confusion Assessment Method (CAM) Algorithm

1. Acute onset and fluctuating Course
   Indicated by positive responses to the following questions:
   Is there evidence of an acute change in mental status from the patient’s baseline? and
   Did this behavior fluctuate during the past day—that is tend to come and go or
   increase and decrease in severity?

2. Inattention
   Indicated by a positive response to the following question:
   Does the patient have difficulty focusing attention—for example, being easily
   distractible or having difficulty keeping track of what is being said?

3. Disorganized thinking
   Indicated by a positive response to the following question:
   Is the patient’s speech disorganized or incoherent, with rambling or irrelevant
   conversation, unclear or illogical flow of ideas, or unpredictable switching from
   subject to subject?

4. Altered level of consciousness
   Indicated by any response other than alert (normal) to the following question:
   Overall, how would you rate this patient’s level of consciousness?
   Alert (normal)
   Vigilant (hyperalert)
   Lethargic (drowsy, easily aroused)
   Stupor (difficult to arouse)
   Coma (unarousable)

Note: The diagnosis of delirium requires a present or abnormal rating for criteria 1, 2, and 3 or 4.
From “Delirium in mechanically ventilated patients: validity and reliability of the confusion
assessment method for the intensive care unit (CAM-ICU) by E.W. Ely et al, 2001, JAMA, 286,
p. 2705.

In a pilot study which included 22 mechanically ventilated patients, the interrater
reliability of CAM-ICU was established to be 95% (Sona, 2009; Ely et al., 2001). Ely et al
(2001) conducted a subsequent validation study to establish sensitivity (93% to 100%) and
specificity (98% to 100%) for CAM-ICU in identifying delirium. In the non-verbal patient,
arousal/sedation vacation incorporating the Richmond Agitation and Sedation Scale (RASS) should be implemented prior to commencing CAM-ICU assessment (Ely et al., 2003).

The ICDSC (Table 4) is an eight-item checklist based on DSM-IV criteria of delirium which includes altered level of consciousness, inattention, disorientation, hallucinations, psychomotor agitation/retardation, inappropriate mood/speech, sleep/wake cycle disturbance, and symptom fluctuation (Sona, 2009). Based on data from the previous 24 hours, eight items are scored and rated as either present (1) or absent (0), for a maximum of 8 points. Any score of 4 or greater is a positive diagnosis for delirium. Just as with the CAM-ICU, an arousal/sedation vacation incorporating the Riker Sedation-Agitation Scale should be implemented prior to commencing assessment. The initial validation study of 221 patients in mixed medical surgical ICUs by Bergeron et al (2001) found a 99% sensitivity, 64% specificity and greater than 94% interrater reliability of ICDSC in identifying delirium.
### Table 4: ICDSC CHECKLIST

**Time**

1. **Altered level of consciousness** Choose ONE from A-E.
   - A. Exaggerated response to normal stimulation SAS = 5, 6, or 7  
     Score 1 point
   - B. Normal wakefulness SAS = 4  
     Score 0 points
   - C. Response to mild or moderate stimulation SAS = 3  
     Score 1 point  
     (follows commands) **Stop assessment**
   - D. Response only to intense and repeated stimulation (e.g. loud voice and pain)  
     SAS = 2  
     **Stop assessment**
   - E. No response SAS = 1  
     **Stop assessment**

2. **Inattention:**
   - A. Difficulty in following commands OR
   - B. Easily distracted by external stimuli OR
   - C. Difficulty in shifting focus
   **Does the patient follow you with their eyes?**

3. **Disorientation**
   - A. Mistake in either time, place or person
   **Does the patient recognize ICU caregivers who have cared for him/her and not recognize those that have not? What kind of place are you in? (list examples)**

4. **Hallucinations or Delusions:**
   - A. Equivocal evidence of hallucinations or a behavior due to hallucinations  
     (Hallucination = perception of something that is not there with NO stimulus) OR
   - B. Delusions or gross impairment of reality testing  
     (Delusion = false belief that is fixed/unchanging)
   **Any hallucinations now or over past 24 hrs? Are you afraid of the people or things around you? [fear that is inappropriate to clinical situation]**

5. **Psychomotor Agitation or Retardation**
   - A. Hyperactivity requiring the use of additional sedative drugs or restraints in order to control potential danger (e.g. pulling IV lines out or hitting staff) OR
   - B. Hypoactive or clinically noticeable psychomotor slowing or retardation
   **Based on documentation and observation over shift by primary caregiver**

6. **Inappropriate Speech or Mood**
   - A. Inappropriate, disorganized or incoherent speech OR
   - B. Inappropriate mood related to events or situation
   **Is the patient apathetic to current clinical situation (i.e. lack of emotion)?**
   **Any gross abnormalities in speech or mood? Is patient inappropriately demanding?**

7. **Sleep/Wake Cycle Disturbance**
   - A. Sleeping less than four hours at night OR
   - B. Waking frequently at night (do not include wakefulness initiated by medical staff or loud environment) OR
   - C. Sleep ≥ 4 hours during day **Based on primary caregiver assessment**

8. **Symptom Fluctuation Based on primary caregiver assessment**
   **Score 1 point for:**
   fluctuation of any of the above items (i.e. 1 – 7) over 24 hours (e.g. from one shift to another)

**TOTAL ICDSC SCORE (Add 1 – 8)**

Because the pathophysiology of delirium is unclear, identifying accurate biomarkers for detection may be difficult but not impossible. In conjunction with clinical evaluation, screening for common precipitants can be accomplished using laboratory test. These biomarkers can be used not only for identifying delirium but also assisting in differential diagnosis, staging severity and evaluating the long-term effects of cognitive impairment (Marcantonio et al., 2006). Serum chemistries, toxicology screen and drug levels can reveal electrolyte abnormalities, liver and/or renal dysfunction in metabolic disturbances (Saxena & Lawley, 2009; Sandhaus et al., 2006; Marcantonio et al., 2006). If infection is implicated as a cause, complete blood count, blood/urine/sputum cultures, lumbar puncture, arterial blood gases and chest X-ray are appropriate to obtain (Saxena & Lawley, 2009; Sandhaus et al., 2006; Marcantonio et al., 2006). Lab studies including B12, folate and thyroid stimulating hormone (TSH) can reveal neurological causes of delirium (Sandhaus et al., 2006, Marcantonio et al., 2006). Additionally, biomarkers detecting neuronal injury can be assayed using the enzyme-linked immunosorbent assay (ELISA) method. These include neuron-specific enolase, S-100 beta and neuronal tau protein (Marcantonio et al, 2006). Although research has been promising, findings on these last assay methods have been inconsistent when applied to delirium (Marcantonio et al., 2006).

Neuroimaging is another tool which may allow for the identification of brain dysfunction. Research has shown that a relationship exists between structural brain abnormalities detected on computed tomography (CT) or magnetic resonance imaging (MRI) and delirium; however, such association cannot be definitively established (Alsop et al., 2006). Some studies demonstrated a positive association and others demonstrated no association between abnormalities related to lesions and/or structural brain abnormalities and delirium (Naughton et al, 1997; Kobayashi et al,
2004). This diagnostic option is best reserved in the case of a recent fall or head trauma or if there is a suspicion that delirium may be linked to stroke, hemorrhage, and/or structural lesions (Inouye, 2004).
CHAPTER 4

Standard Treatment Strategies for Delirium

Management of delirium should focus on prevention and treatment to minimize predisposing and precipitating factors.

Pharmacological intervention is usually the first-choice of clinicians in delirium. However, research suggests that non-pharmacological approaches, such as early mobilization, identification and correction of sensory impairments, and consistency in care can lessen the effect of predisposing and/or precipitating factors in the delirious patient and should be considered first. Marcantonio et al (2001) evaluated the efficacy of an assessment protocol consisting of daily consultation by a geriatric specialist for delirium prevention in elderly post-operative patients. Results from this study showed that the incidence of delirium was 32% in the intervention group versus 50% in the control group. Moreover, there was a significant reduction in the severity of delirium: 12% in the intervention group and 29% in the control group. In this study, consultation by a geriatric specialist occurred either pre-operatively or within 24 hours post-operatively and daily thereafter. Treatment recommendations were based on structured protocols which included interventions for cognitive impairment, sleep hygiene, immobility, visual / hearing impairment and dehydration. Fosnight et al (2004) used a method known as academic detailing, which uses educational tools to improve drug prescribing practices. Pharmacists raised physician awareness to problems associated with drug prescribing practices and provided references supporting their recommendations. These researchers reported a 30-50% decrease in the usage of twenty-three high risk drugs for delirium in a geriatric ICU population. Furthermore, the introduction of educational interventions in both non-ICU and ICU
populations has also proven to be promising in reducing delirium (Tabet & Howard, 2009; Tabet et al., 2005).

Commonly used agents of benzodiazepines, sedative-hypnotics and antipsychotics, are effective in managing the symptoms of delirium but they also have hazards (Ely et al., 2002; Pun & Dunn, 2007; Pandharipande et al., 2006, Girard et al., 2010). In a multi-center randomized control trial (RCT) of 198 ICU patients, Pandharipande and associates (2006) reported lorazepam, one of the most widely used medication in sedative regimens in ICUs, was an independent risk factor for delirium and with every unit dose administered within the preceding 24 hour was associated with a two- to three-fold increase in the likelihood of delirium. Midazolam, propofol, fentanyl, and morphine were also associated with higher but not statistically significant odds for delirium.

The Food and Drug Administration (FDA) has not approved any drug specifically for the treatment of delirium (Devlin et al., 2007; Jacobi et al., 2002). Although the 2002 Society of Critical Care Medicine guidelines recommend haloperidol as the preferred agent for delirium, there is only limited evidence from uncontrolled studies to support its efficacy or safety for delirium in the ICU (Pun & Dunn, 2007; Girard et al., 2010, Devlin et al., 2010). In fact, in 2007, a black box warning was issued against intravenous administration or for higher dosing of haldol than recommended (Pisani et al., 2009; Pun & Dunn, 2007).

Hu et al (2004) demonstrated that haloperidol compared to placebo hastened the resolution of delirious symptoms in a non-ICU population (Girard et al., 2010). Correspondingly, Kalisvaart et al (2005) found that the use of low dose haloperidol as prophylaxis in geriatric post-
operative patients reduced duration and severity but not the incidence of delirium (Girard et al., 2010; Pun & Dunn, 2007). Recently, Girard and associates (2010) conducted a double-blinded, placebo-controlled randomized trial known as Modifying the INcidence of Delirium (MIND) and concluded that treatment with the antipsychotics haloperidol and ziprasidone was neutral: neither medication increased adverse outcomes nor provided any improvement in the number of days alive without delirium or coma. Results from a recent pilot study of 36 adult ICU patients suggested the addition of quetiapine, an atypical antipsychotic, to “as needed” haloperidol may improve delirium and other patient outcomes, such as ventilator-days, LOS, morbidity and mortality (Devlin et al., 2007). These mixed findings emphasize the need for additional research to determine whether use of antipsychotics for the treatment of delirium is appropriate in the ICU.

Several rigorous studies have shown that a better option for the treatment of ICU delirium than antipsychotics is dexmedetomidine. Dexmedetomidine is a selective $\alpha_2$-adrenergic agonist that works by providing: 1). sedation and anxiolysis, 2). analgesia in spinal cord receptors, and 3). a decrease in the stress response without concomitant respiratory depression.

In one RCT, 175 patients were randomized to receive placebo and 178 to receive dexmedetomidine at a dose of 0.4 mcg/kg/hr (with adjustment between 0.2 and 0.7 mcg/kg/hr) following an initial loading infusion. Rescue midazolam was administered as needed and morphine sulfate was administered for pain. The primary outcome measure was the total amount of rescue medication (midazolam) needed to maintain sedation while intubated. Patients randomized to placebo received significantly more midazolam than those who received
dexmedetomidine. Moreover, at comparable sedation levels, patients treated with
dexmedetomidine had decreased ventilator days, lower incidence of delirium, tachycardia and
ehypertension (Riker et al., 2009).

In a second study, patients who were unable to be extubated due to hyperactive delirium
were randomized to receive an infusion of either haloperidol (0.5 to 2 mg/hr) or
dexmedetomidine (0.2 to 0.7 mcg/kg/hr) (Reade et al., 2009). The primary outcome was time to
extubation. Secondary outcomes included time to ICU discharge, time to achieve desired
Ramsay sedation score, and need for supplemental sedative and/or analgesics. On all measures,
Dexmedetomidine as compared to haloperidol was more effective in treating ICU associated
delirious agitation.

Similarly, Pandaharipande and colleagues (2007) conducted a study to Maximize
Efficacy of targeted sedation and reduce Neurological Dysfunction (MEND). These researchers
compared the effect of sedation with dexmedetomidine and lorazepam in 106 randomized
mechanically ventilated medical and surgical ICU patients and found that the dexmedetomidine
cohort demonstrated more days alive without acute brain dysfunction, shorter time to extubation
and decreased LOS.

Unlike the mixed findings associated with haloperidol administration, RCTs have
demonstrated the safety and efficacy of dexmedetomidine for delirium in the ICU. Additionally,
dexmedetomidine has been approved by the FDA for short-term use (less than 24 hours) for
delirium treatment; trials evaluating longer term use are being undertaken.
There are only limited studies which demonstrated how well-designed non-pharmacological intervention protocols can offer positive health outcomes in patients with delirium. Tabet et al. (2005) implemented programs targeting physicians and registered nurses. The educational content consisted of: 1). a 1 hour session including a formal presentation and small group discussion, 2). written guidelines on how to prevent, recognize and manage delirium in older people; and 3). regular one-to-one and small group discussions during which staff were encouraged to discuss discharged challenging cases they had encountered with the aim of enhancing their learning experience with specific examples. Remediation was provided in follow-up sessions using a question and answer method to identify any deficiencies in knowledge. Similarly, Schweickert et al (2009) assessed the efficacy of early mobilization of ventilated patients in conjunction with daily wake-up from sedation, also resulted in reducing delirium. Supportive measures have also been suggested in delirium management (Table 2).
Table 2: Supportive Non-Pharmacological Interventions in Delirium

<table>
<thead>
<tr>
<th>Provide support and orientation</th>
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<tbody>
<tr>
<td>Communicate clearly and concisely; give repeated verbal reminders of the day, time, location, and identity of key persons, such as members of the treatment team and relatives. Provide clear signposts to patient’s location, including a clock, calendar, and chart with the day’s schedule. Place familiar objects from patient’s home in the room. Ensure consistency in staff (e.g., a key nurse). Use television or radio for relaxation and to help the patient maintain contact with the outside world. Involve family members and caregivers to encourage feelings of security and orientation.</td>
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<tr>
<th>Provide an unambiguous environment</th>
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<tbody>
<tr>
<td>Simplify care area by removing unnecessary objects; allow adequate space between beds. Consider using private room to aid rest and avoid extremes of sensory experience. Avoid using medical jargon in patient’s presence because it may encourage paranoia. Ensure that lighting is adequate; provide a 40- to 60-watt night light to reduce misperceptions. Control sources of excess noise (e.g., staff, equipment, visitors); aim for fewer than 45 dB during the day and fewer than 20 dB during the night. Maintain room temperature between 21.1 C (69.98 F) and 23.8 C (74.8 F)</td>
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<th>Maintaining competency</th>
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<td>Identify and correct sensory impairments; ensure patients have their glasses, hearing aids, and dentures. Consider whether interpreter is needed. Encourage self-care and participation in treatment (e.g., ask patient for feedback on pain). Arrange treatments to allow maximum periods of uninterrupted sleep. Maintain activity levels: ambulatory patients should walk three times daily; non-ambulatory patients should undergo full range of movement exercise for 15 minutes three times daily.</td>
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CHAPTER 5

Relevance to the ACNP in the ICU setting

The acute care nurse practitioner (ACNP) is well-prepared to provide advanced care to patients with complex acute, critical and chronic health conditions. In this position, he/she plays a vital role in prevention, early recognition and delivery of treatment for patients with delirium. With core competencies as the foundation of clinical knowledge, the ACNP plays a multifaceted role as clinician, educator and advocate in the identification of at-risk patients, assessment and implementation of treatment strategies to restore the individual to maximum health.

The ACNP provides health promotion and disease prevention care by assessing risks in complex acute, critical, and chronically-ill patients. In the case of delirium, this means being aware of intrinsic and extrinsic risk factors of delirium at admission that may predispose patients to this derangement. Research has shown that targeting modifiable risk factors is essential in trying to reduce mortality, complications and other adverse outcomes caused by this condition. Etiology and pathogenesis of delirium are usually multi-factorial, preventative strategies designed as multi-component interventions have been found to be successful (Marcantonio et al., 2001; Milisen et al., 2004; Lundstrom et al., 2005; Schweickert et al., 2009). Inouye et al (2000) concluded that intervention designed in this manner reduced the incidence of delirium in 40% of hospitalized patients.

Balas et al (2009) found that medical complications such as medication therapy, infection, metabolic imbalances, hypoxia and nutritional deficits often preceded the diagnosis of delirium. The ACNP must be able to accurately evaluate both acute and chronic conditions that can lead to rapid physiologic changes or life-threatening instability. As delirium remains
unrecognized in 60-80% of mechanically ventilated patients (Pun & Ely, 2007; Girard et al., 2010), the use of a validated and reliable clinical tool becomes more critical for this identification, however, adherence to use in daily practice must also be embraced.

Once assessment and diagnostics are completed, the ACNP can formulate a plan of care to address the patient’s needs. The ACNP should work collaboratively within a team of health professionals to develop, implement, and evaluate appropriate interventions, both pharmacological and non-pharmacological, for delirium.
CHAPTER 6

Summary

Delirium is a serious disturbance that contributes significantly to long-term cognitive impairment, re-intubation, increased LOS and increased 1-year mortality. Despite these consequences, it is frequently unrecognized and poorly managed, if at all. A growing awareness is that optimal management of delirium requires a three pronged focus: prevention, identification and treatment.

Delirium is a potentially preventable condition that occurs among hospitalized patients. As such, early recognition of predisposing and/or precipitating risk factors can facilitate identification of those patients who may benefit from targeted prevention measures. Providing supportive care such as fostering orientation to the environment, maximizing mobility and providing appropriate levels of sensory stimulation can help to minimize these risk factors. Despite preventive efforts, it is likely that a certain proportion of hospitalized patients will develop delirium. The varied presentation of delirium often makes its diagnosis difficult. Therefore, the use of a validated tool should be a standard of assessment. In both ventilated and non-ventilated patients, CAMU-ICU and ICDSC have been shown to be sensitive and specific. Given the fluctuating nature of delirium, assessments should be completed at hospital admission and at least every 8-12 hours during hospitalization to monitor patients.

Finally, mixed findings associated with haloperidol administration as the preferred treatment of delirium suggest that a practical treatment protocol should not be limited to antipsychotic medication. RCTs have demonstrated the safety and efficacy of another option,
dexmedetomidine, for delirium in the ICU. Adherence to a multidisciplinary approach to care can significantly improve clinical outcomes in patients at risk for delirium.
REFERENCES


