PREVENTION, RECOGNITION AND MANAGMENT OF DELIRIUM IN PATIENTS WHO ARE CRITICALLY ILL


Abstract
Delirium is common in patients who are critically ill, often resulting in extended hospital stays and increased mortality and morbidity. There are several subtypes of delirium, which are often undiagnosed and untreated, resulting in suboptimal patient outcomes. This article examines delirium in patients in the intensive care unit, including its signs and symptoms, incidence, causes and subtypes. It outlines the assessment of delirium and the pharmacological and non-pharmacological interventions that can be used to manage the condition, as well as describing the optimal prevention measures.

Keywords
agitation, cognitive function, cognitive impairment, Confusion Assessment Method, critical care, delirium, disorientation, intensive care unit, Richmond Agitation-Sedation Scale, sedation

DELIRIUM IS A serious condition that has long-term implications for patients, family members and healthcare services (Siddiqi et al 2016). It is characterised by an acute and rapid onset of fluctuating mental function involving inattention and disorganised thinking (Trzepacz et al 2010). Depending on the subtype of delirium experienced by the patient, symptoms can include agitation, disorientation, apathy, inattention and withdrawal. The symptoms of delirium typically last for less than six months and, in the past, this type of altered brain function was described using a range of terms, including intensive care unit (ICU) psychosis (Burns et al 2004, Girard et al 2008a). The term delirium has replaced the various terms that were previously used, enabling a structured approach to research and clinical practice (European Delirium Association and American Delirium Society 2014).

Delirium is associated with increased mortality and morbidity in adult patients in the ICU, including prolonged periods on mechanical ventilation and increased length of hospital stays (Morandi et al 2009, National Institute for Health and Care Excellence (NICE) 2010, van den Boogaard et al 2012, Barr et al 2013, Andrews et al 2015, Salluh et al 2015). The potentially serious consequences of delirium mean that it should be regarded as an emergency and treated as an acute organ failure (Morandi et al 2009). The prevalence of delirium among patients in the ICU is uncertain, with estimates ranging from 9.4% (Forsgren and Eriksson 2010) to 74% (Ely et al 2001a).

The effects of delirium are considerable, increasing the likelihood of patients experiencing cognitive impairment in the short and long term (Girard et al 2008a, Barr et al 2013, Wolters et al 2014, Mitchell et al 2016). Van Rompaey et al’s (2009a) study of patients who had been discharged from hospital for three months found that those who had experienced delirium while an inpatient demonstrated suboptimal quality of life compared with those who had not experienced delirium.
while an inpatient. People are at increased risk of developing delirium if they are older, have dementia, are severely ill, or have sustained a hip fracture (NICE 2010). As well as dementia being a risk factor for delirium, patients in the ICU with delirium have an increased incidence of dementia following ICU admission (Jackson et al 2004, NICE 2010).

Qualitative studies examining the effects of delirium have identified feelings of fear, anger, tiredness, frustration and isolation, with patients experiencing a disrupted perception of time, including an inability to distinguish day from night, and a fear of going to sleep (Whitehorne et al 2015, Van Rompaey et al 2016). The increased length of hospital stay associated with delirium has been attributed to the development of complications, such as pressure ulcers and healthcare-associated infections, which have financial implications for healthcare services (Ely et al 2001a, Devlin et al 2008, NICE 2010, Pauley et al 2015).

Knowledge of the causes of delirium will enable nurses to improve their interactions with patients; similarly, nurses who can communicate effectively with patients with delirium can assist them to feel connected to, and safe within, their environment (Whitehorne et al 2015).

Causes

The causes of delirium are multifactorial, including:

- Disruption of neurotransmitter function and altered cerebral metabolism, such as decreased cholinergic activity and serotonin deficiency, the effects of which may be exacerbated by medications used in the ICU, including some anticholinergic agents, pain medications and antiemetics (Cavallazzi et al 2012, van Ewijk et al 2016).
- The presence of risk factors, including the ICU environment, sleep deprivation and under-stimulation (Table 1).

Risk factors

Table 1 lists many of the factors that can increase the risk of a patient developing delirium, although it is not exhaustive. It should be noted that individual patients can experience multiple risk factors simultaneously. Ely et al (2001a) advised that the presence of three or more risk factors means a patient is at ‘high risk’ of developing delirium.

Additional risk factors, such as age and a possible link between serotonin toxicity and delirium, have been suggested (van Ewijk et al 2016). However, there is no consensus in the literature concerning these risk factors, for example some authors have identified being aged over 65 years as an independent risk factor for delirium (Huai and Ye 2014), whereas Ouimet et al (2007) and Van Rompaey et al (2009b) found no statistical correlation between age and the development of delirium.

Environmental issues and sleep deprivation are two areas where nurses can take the lead in preventing the development of delirium. While sleep deprivation and delirium share several common characteristics, such as cognitive impairment and inattention (Intensive Care Society (ICS) 2014), a causative relationship between them has not been proven (Weinhouse et al 2009, Bellapart and Boots 2012, Watson et al 2012). Despite this, promoting healthy sleep in the ICU is an important aspect of nursing care that should not be neglected. Excessive noise, for example from equipment, alarms, lights and nursing interventions, can disrupt patients’ sleep (Lawson et al 2010), and these variables can be controlled by nurses. One Cochrane review found evidence supporting the use of ear plugs and/or eye masks to reduce the incidence of delirium (Hu et al 2015).

Under-stimulation may also be a risk factor for delirium. Berney et al’s (2015) study observed patients in the ICU between 8am and 5pm, finding that they spent up to 30% of their time alone, mostly in bed, with little or no activity. While this study made no explicit link between under-stimulation and delirium, patients recalling their experiences of
delirium in a separate study reported a sense of isolation and physical disconnection from their environment (Whitehorne et al 2015).

**Subtypes**

There are three clinical subtypes of delirium: hyperactive, hypoactive and mixed (NICE 2010).

**Hyperactive delirium**

While hyperactive delirium is relatively uncommon, it is the most easily recognised subtype. It is characterised by agitation, disorientation and abnormal vital signs (Devlin et al 2008, NICE 2014).

**Hypoactive delirium**

Hypoactive delirium is the most common subtype, although it is often under-diagnosed. Patients with hypoactive delirium present with apathy, inattention and withdrawal (NICE 2010). Detailed assessment by healthcare professionals in the ICU is required to diagnose hypoactive delirium (Pandharipande et al 2007, Jackson et al 2014).

**KEY POINT**

Detailed assessment by healthcare professionals in the ICU is required to diagnose hypoactive delirium (Pandharipande et al 2007, Jackson et al 2014), since it is often missed or mistaken for depression (Griffiths and Jones 2007).

| TABLE 1. Risk factors that can contribute to the development of delirium |
|--------------------------|-------------------------------------------------------------------|
| Risk factor              | Examples                                                                 |
| Acute illness            | » Acidaemia (increased acidity in the blood)                         |
|                         | » Acute respiratory distress syndrome                               |
|                         | » Anaemia                                                            |
|                         | » Electrolyte abnormalities                                          |
|                         | » Hip fracture                                                      |
|                         | » Hypertension                                                      |
|                         | » Hypotension and dehydration                                      |
|                         | » Hypoxaemia (abnormally low concentration of oxygen in the blood) |
|                         | » Metabolic and haemodynamic instability                            |
|                         | » Severe infection                                                  |
|                         | » Severity of illness                                               |
| Patient-related factors  | » Age over 65 years                                                 |
|                         | » Cognitive impairment                                              |
|                         | » Existing cerebral illness, such as dementia                       |
|                         | » Frustration                                                       |
|                         | » Hypertension                                                      |
|                         | » Living alone at home                                              |
|                         | » Pre-existing alcohol and/or substance misuse and associated withdrawal |
|                         | » Respiratory disease                                               |
|                         | » Smoking                                                           |
|                         | » Vision and hearing impairment                                     |
|                         | » Withdrawal from prescription drugs                                |
| Environmental or healthcare-associated factors | » Absence of daylight                                               |
|                         | » Drug interactions                                                 |
|                         | » Immobility                                                        |
|                         | » Invasive devices such as urinary or rectal catheters and central venous catheters |
|                         | » Isolation                                                         |
|                         | » Lack of visitors                                                  |
|                         | » Medication such as opioids, benzodiazepines and epidurals         |
|                         | » Pain                                                              |
|                         | » Patient-ventilator asynchrony (when the timing of the ventilator cycle does not match the timing of the patient’s respiratory cycle) |
|                         | » Sedatives used to induce coma                                     |
|                         | » Sleep deprivation                                                 |
|                         | » Use of restraints                                                 |

Mixed delirium
Mixed delirium occurs when there is an unpredictable fluctuation between the hyperactive and hypoactive subtypes (Borthwick et al 2006, Morandi et al 2009, NICE 2010).

Subsyndromal delirium
Distinct from hyperactive, hypoactive and mixed delirium is another condition, referred to as subsyndromal delirium, in which patients exhibit some, but not all, of the symptoms of delirium. Subsyndromal delirium involves a less severe level of cognitive impairment than delirium and is a state between delirium and normal cognition. Studies have shown that patients with subsyndromal delirium experience increased length of hospital stay and increased mortality rates compared with patients who experience no symptoms of delirium (Ouimet et al 2007, Egerod 2013, Serafim et al 2017).

Assessment
The prevention of delirium by modifying potential risk factors and providing the optimal ICU environment is paramount. However, if a patient does develop delirium, early detection is vital to enable prompt treatment (NICE 2014). Heymann et al (2010) found that if treatment for delirium began within 24 hours of diagnosis, the duration of any mechanical ventilation was reduced and mortality decreased. The use of reliable assessment tools is necessary to ensure that patients are not incorrectly diagnosed with dementia or depression and that, after an accurate assessment, they subsequently receive the appropriate treatment (Ely et al 2001a, 2001b, Bergeron et al 2001, Boot 2012). As the healthcare professionals who spend the most time with patients, nurses are ideally placed to undertake assessments; however, there remains a theory-practice gap among some ICU nurses about assessments for delirium (Glynn and Corry 2015).

Best practice guidance recommends that all healthcare service providers should have systems in place for assessing delirium, which should take place within 24 hours of the patient’s admission using a validated tool and be repeated every 8-12 hours (NICE 2010, 2014, Boot 2012). Recommended assessment tools include the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) (Ely et al 2001b), which uses standardised non-verbal assessments for patients who are mechanically ventilated to determine the presence of delirium (Figure 1), and the Intensive Care Delirium Screening Checklist (ICDSC), which uses markers including altered level of consciousness, disorientation, hallucination and inappropriate mood or speech to assess delirium (Figure 2) (Bergeron et al 2001). Both tools have been found to be reliable in assessing delirium in patients in the ICU, with optimal inter-rater reliability (Gusmao-Flores et al 2012).

The CAM-ICU (Ely et al 2001b) tool was recommended by NICE (2010) and, following training, has been found to be suitable for use by nurses to identify delirium (Vasilevskis et al 2011, Cavallazzi et al 2012, Andrews et al 2015). In a postal survey of ICS members, the CAM-ICU tool was found to be the most commonly used in the UK; however, routine screening for delirium was only undertaken in 25% of ICUs (Mac Sweeney et al 2010). In 2015, a Scottish telephone survey found that 70% of ICUs screened patients for delirium each day and that, of the 91% of units aware of recommended screening tools for delirium, all used the CAM-ICU tool (McGuire et al 2015).

The ICDSC was developed to be quick and straightforward to undertake at the patient’s bedside; however, it can lead to false positive results by identifying some
patients who do not go on to develop delirium (Bergeron et al 2001).

While nurses may be aware of the importance of undertaking bedside delirium assessments, the number of these being completed is inadequate (Devlin et al 2008, Forsgren and Eriksson 2010, Eastwood et al 2012, Christensen 2014). This has been attributed to a lack of education about delirium; complexity of the available tools; lack of training; time restraints; patient intubation; the inability to use the chosen tool on patients who are sedated; and doctors not acting on the findings of the assessment (Devlin et al 2008, Forsgren and Eriksson 2010, Eastwood et al 2012, Elliott 2014).

**Targeted sedation**

A delirium assessment can only be undertaken with patients who are responsive; therefore, targeted sedation is an integral element of the procedure and ensures that patients are alert enough to participate in the assessment. The goal of sedation is to ensure that patients are comfortable and that they can tolerate any procedures required in the ICU, such as endotracheal intubation and ventilation (ICS 2014). Over-sedation can cause respiratory depression, prolonged mechanical ventilation, immunosuppression, renal failure and delirium. Under-sedation can cause pain, ventilator asynchrony (when the timing of the ventilator cycle does not match the timing of the patient’s respiratory cycle), hypertension, tachycardia and increased risk of self-extubation (where a patient removes their endotracheal tube deliberately) (Bourne 2008, O’Keefe-McCarthy et al 2008, Westwell 2008, Williams et al 2008).

**Figure 1.** Flow diagram demonstrating use of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)

Confusion assessment method for the ICU (CAM-ICU) flowsheet

1. Acute change or fluctuating course of mental status:
   - Yes
   - No

2. Inattention:
   - 0 - 2 Errors
   - > 2 Errors

3. Altered level of consciousness
   - Current Richmond Agitation-Sedation Scale (RASS) level
   - RASS = zero

4. Disorganized thinking:
   - Command: ‘Hold up this many fingers’ (Hold up 2 fingers)
     ‘Now do the same thing with the other hand’ (Do not demonstrate)
   - Or ‘Add one more finger’ (If patient unable to move both arms)

(Ely et al 2001b)

**KEY POINT**

While nurses may be aware of the importance of undertaking bedside delirium assessments, the number of these being completed is inadequate (Devlin et al 2008, Forsgren and Eriksson 2010, Eastwood et al 2012, Christensen 2014)
**Figure 2. Intensive Care Delirium Screening Checklist**

<table>
<thead>
<tr>
<th>PATIENT EVALUATION</th>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
<th>DAY 4</th>
<th>DAY 5</th>
</tr>
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<tbody>
<tr>
<td>Altered level of consciousness* (A-E)</td>
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<tr>
<td>Inattention</td>
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<td></td>
<td></td>
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<tr>
<td>Disorientation</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hallucination - delusion - psychosis</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Psychomotor agitation or retardation</td>
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<tr>
<td>Inappropriate speech or mood</td>
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<td></td>
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<tr>
<td>Sleep/wake cycle disturbance</td>
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<td></td>
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<tr>
<td>Symptom fluctuation</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL SCORE (0-8)</td>
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</tr>
</tbody>
</table>

*Level of consciousness: A: no response  
B: response to intense and repeated stimulation (loud voice and pain)  
C: response to mild or moderate stimulation  
D: normal wakefulness  
E: exaggerated response to normal stimulation

**SCORING SYSTEM:**
The scale is completed based on information collected from each entire 8-hour shift or from the previous 24 hours. Obvious manifestation of an item = 1 point. No manifestation of an item or no assessment possible = 0 point. The score of each item is entered in the corresponding empty box and is 0 or 1.

1. **Altered level of consciousness:**  
A) No response or B) the need for vigorous stimulation in order to obtain any response signified a severe alteration in the level of consciousness precluding evaluation. If there is coma (A) or stupor (B) most of the time period then a dash (-) is entered and there is no further evaluation during that period.  
C) Drowsiness or requirement of a mild-to-moderate stimulation for a response implies an altered level of consciousness and scores 1 point.  
D) Wakefulness or sleeping state that could easily be aroused is considered normal and scores no point.  
E) Hypervigilance is rated as an abnormal level of consciousness and scores 1 point.

2. **Inattention:** Difficulty in following a conversation or instructions. Easily distracted by external stimuli. Difficulty in shifting focus. Any of these scores 1 point.

3. **Disorientation:** Any obvious mistake in time, place or person scores 1 point.

4. **Hallucination, delusion or psychosis:** The unequivocal clinical manifestation of hallucination or of behaviour probably due to hallucination (e.g. trying to catch a non-existent object) or delusion. Gross impairment in reality testing. Any of these scores 1 point.

5. **Psychomotor agitation or retardation:** Hyperactivity requiring the use of additional sedative drugs or restraints in order to control potential dangerousness (for example pulling out intravenous lines, hitting staff). Hypoactivity or clinically noticeable psychomotor slowing. Any of these scores 1 point.

6. **Inappropriate speech or mood:** Inappropriate, disorganised or incoherent speech. Inappropriate display of emotion related to events or situation. Any of these scores 1 point.

7. **Sleep/wake cycle disturbance:** Sleeping less than 4 hours or waking frequently at night (do not consider wakefulness initiated by medical staff or loud environment). Sleeping during most of the day. Any of these scores 1 point.

8. **Symptom fluctuation:** Fluctuation of the manifestation of any item or symptom over 24 hours (e.g. from one shift to another) scores 1 point.

(Bergeron et al 2001)
Ideally, patients in the ICU should be pain-free – using medication as appropriate – with non-pharmacological interventions, such as reassurance and reorientation, used to reduce the need for sedative drugs (ICS 2014). The patient should be conscious and concordant with their care. Daily sedation interruptions, or ‘holds’, which form part of the high-impact intervention care bundle for reducing ventilation-associated pneumonia (Department of Health (DH) 2010), can assist healthcare professionals to achieve the appropriate level of sedation. Sedation holds can reduce the amount of sedative that accumulates in the patient’s body, avoid over-sedation, enable neurological and pain assessment, and assist the patient to gradually reduce the length of time spent on a ventilator (Girard et al 2008b, ICS 2014).

Sedation holds are also useful for undertaking therapeutic interventions such as physiotherapy and occupational therapy. One randomised controlled study found that early exercise and mobilisation during sedation holds improved patients’ functional status at hospital discharge, reduced the duration of episodes of delirium and decreased the length of time spent on a ventilator compared with patients in a control group (Schweickert et al 2009). Patient suitability for sedation holds must be assessed by the multidisciplinary team in the ICU because they are not safe for all patients, for instance those requiring sedation for neuroprotection. Sedation has neuroprotective properties, including reducing intracranial pressure and cerebral perfusion pressure (ICS 2014).

**Sedation scoring**

A sedation score is a scale used to measure a patient’s level of agitation and sedation. The Society for Critical Care Medicine (Barr et al 2013) guidelines and the ICS (2014) advocate the use of a validated tool for sedation scoring, such as the Richmond Agitation-Sedation Scale (RASS) (Sessler et al 2002) (Table 2). The RASS (Sessler et al 2002) uses a score ranging from +4 (combative) to -5 (unrousable); the goal is to target analgesia and sedation so that the patient is maintained at a score of 0 (alert and calm).

This tool is used in conjunction with the CAM-ICU (Ely et al 2001b) (Figure 1) tool to assist healthcare professionals to make treatment decisions as well as to undertake delirium assessments (Hipp and Ely 2012). A target sedation score should always be documented in the patient’s notes, with the appropriate level of sedation being adapted to the patient’s clinical condition. Ideally, patients should be conscious, cooperative and comfortable, with appropriate titration of analgesic and sedative medications (ICS 2014).

**Management**

**Non-pharmacological interventions**

Non-pharmacological interventions, such as early mobilisation, daily sedation holds and providing compassionate care, are the first line in preventing and treating delirium (NICE 2010, 2014, Bledowski and Trutia 2012). Nurses can ensure that these interventions are implemented and monitored for effectiveness.

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**TABLE 2. Richmond Agitation-Sedation Scale**

<table>
<thead>
<tr>
<th>Score</th>
<th>Term Description</th>
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<tr>
<td>+4</td>
<td>Combative Overtly combative or violent, immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitated Pulls on or removes tube(s) or catheter(s), or demonstrates aggressive behaviour towards staff</td>
</tr>
<tr>
<td>+2</td>
<td>Agitated Frequent non-purposeful movement, or patient-ventilator dyssynchrony</td>
</tr>
<tr>
<td>+1</td>
<td>Restless Anxious or apprehensive but movements not aggressive or vigorous</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy Not fully alert but has sustained (more than ten seconds) awakening, with eye contact to voice</td>
</tr>
<tr>
<td>-2</td>
<td>Light sedation Briefly (less than ten seconds) awakens with eye contact to voice</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation Any movement (but no eye contact)</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation No response to voice, but movement on physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>Unrousable No response to voice or physical stimulation</td>
</tr>
</tbody>
</table>


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Interventions are undertaken. They are also best placed to manage many of the delirium risk factors outlined in Table 1, such as cognitive impairment, pain and sleep deprivation, which will assist in reducing the incidence and duration of delirium (Kalabalik et al 2014).

Minton and Batten (2016) discussed the effect of the ICU environment on patients who are critically ill, noting that while the interventions provided can be life-saving, the environment itself can be harmful. They stated that factors such as noise, artificial lighting and multi-bedded rooms can stimulate a stress response in patients and have a negative effect on outcomes, including the development of delirium. Minton and Batten (2016) asserted that modifications to the ICU environment would improve the critical care experience for patients and nurses, resulting in fewer errors and improved patient outcomes. They also emphasised the requirement for nurses to be aware of these environmental factors and ensure that patients’ stress is reduced by providing an optimal environment for healing and recovery.

Non-pharmacological interventions aimed at preventing and treating delirium include:

- Early mobilisation – studies have demonstrated the positive outcomes of early mobilisation within the first two to five days of admission to the ICU, which can range from passive limb movements to assisting the patient with sitting out of bed (Bahadur et al 2008, Barr et al 2013, Egerod 2013, Cameron et al 2015, Karadas and Ozdemir 2016). Early mobilisation requires input from the multidisciplinary team, including nurses, medical staff, physiotherapists and occupational therapists (Barber et al 2015, Eakin et al 2015).
- Daily sedation holds or targeted sedation.
- Environment management – this can include measures such as noise reduction, for example appropriate use of equipment alarms to avoid over-stimulation; temperature control to improve comfort; use of a 24-hour clock to reduce disorientation that can contribute to delirium; and exposure to natural light, which can assist in maintaining a patient’s circadian rhythms and melatonin production (Dubois et al 2001, ICS 2014, NICE 2014, Minton and Batten 2016).
- Promotion of sleep and maintenance of the patient’s sleep-wake cycle – the provision of appropriate lighting and ear plugs at night can promote sleep and assist in preventing delirium (Morandi et al 2009, Van Rompaey et al 2012, Barr et al 2013, Engwall et al 2015).
- Communication – reassurance can be provided by: ensuring that patients use their glasses, hearing aids and dentures; using communication aids, such as picture or alphabet boards; and explaining any interventions to patients (Morandi et al 2009, NICE 2014, Whitehorne et al 2015).
- Providing compassionate care – regularly reorientating the patient to time and place and providing clear information concerning any interventions can relieve a patient’s anxiety and agitation, and reduce the need for pharmacological intervention (DH 2012, ICS 2014).

Pharmacological interventions
Pharmacological interventions for the management of delirium should only be considered when non-pharmacological interventions have been unsuccessful and patients present a risk to themselves or others (NICE 2014). The goal of pharmacological management is to prevent onset, reduce severity and shorten the duration of delirium (Hipp and Ely 2012). The minimum effective dose of any medication should be used to achieve the preferred outcome, for example a reduction in the patient’s level of agitation (ICS 2014).

Siddiqi et al (2016) found no evidence to support the use of any medication to reduce the incidence of delirium. The Society of Critical Care Medicine (Barr et al 2013) guidelines do not advocate the use of pharmacological prophylaxis protocols because of a lack of evidence of their efficacy in delirium. However, historically, haloperidol
(an antipsychotic medication) has been regarded as the optimal pharmacological treatment for delirium (Ely et al 2001a, Burns et al 2004, NICE 2010, Cavallazzi et al 2012), although there is a lack of supporting evidence of its efficacy (Barr et al 2013, Tomichek et al 2016). One study identified a significant reduction in the duration of delirium when haloperidol was administered, but only after non-pharmacological interventions had been tried (Sullinger et al 2017).

The efficacy of atypical antipsychotic medications, such as olanzapine, to treat patients with delirium has not been conclusively demonstrated, although it is thought they may reduce the duration of delirium (Barr et al 2013). However, a systematic review found that no medication used to treat delirium in patients in the ICU significantly improved clinical outcomes, such as mortality (Serafim et al 2015). NICE (2010) guidelines mention haloperidol and olanzapine as potential unlicensed short-term treatments for the distress caused by delirium; however, atypical antipsychotic medications should not be considered as a long-term option in patients in the ICU (Tomichek et al 2016).

The use of dexmedetomidine, an alpha-2 agonist, has been found to reduce the necessity for analgesics and sedatives in the ICU, and is safe to use for up to 30 days (Bledowski and Trutia 2012, Cavallazzi et al 2012). Sedation with dexmedetomidine has also been found to more closely resemble normal sleep than other sedatives commonly used in the ICU, such as propofol (a medication used in anaesthesia and sedation in patients who are intubated) and benzodiazepines (a class of psychoactive drugs that act as minor tranquillisers) (Watson et al 2012). However, dexmedetomidine’s effect on the development and duration of delirium in ventilated patients has yet to be demonstrated, with studies producing various outcomes (Mo and Zimmerman 2013, Nelson et al 2015, Serafim et al 2015).

Pain management is a priority in the ICU (Barr et al 2013), and while opioids are the most common form of analgesia used in critical care, this group of medications has been noted to increase the risk of developing delirium (ICS 2014). Therefore, simple analgesics, such as paracetamol, could be used to reduce the use of opioids (World Health Organization 1996).

The possible role of melatonin in the prevention and treatment of delirium has been identified (Watson et al 2012). Melatonin is a hormone that assists in the maintenance of the body’s sleep-wake cycle and low levels may disrupt the patient’s sleep patterns. While the use of melatonin to promote sleep and maintain circadian rhythms in the ICU, as well as its effect on delirium, has not been demonstrated, this is an important area for future research (Bellapart and Boots 2012, Mo et al 2016). Night-time sedation should be avoided where possible in all patients in the ICU and non-pharmacological interventions used to promote normal sleep (ICS 2014).

It is important to include pharmacists in a multidisciplinary team approach to managing delirium in the ICU, since they can provide advice on the use of medications that can prevent or treat delirium, as well as ways to reduce polypharmacy (Kalabalik et al 2014). Pharmacists should also be included in any education programmes for delirium and its management (Devlin et al 2011).

**Prevention**

The serious consequences of developing delirium mean that it is crucial to consider its prevention (Devlin et al 2012, Barr et al 2013, ICS 2014, Collinsworth et al 2016). Protocols have been developed that identify which patients in the ICU are at highest risk of developing delirium and recommend interventions such as controlling environmental factors and early therapeutic treatments, including attention to nutrition, hydration, pain management and mobilisation (Mistraletti et al 2012).

Awissi et al (2012) found that the introduction of a protocol reduced the amount of days that patients spent on a ventilator and the length of time...
spent in the ICU; however, there was no reduction in the incidence of delirium. Rivosecchi et al (2016) found a statistically significant reduction in the incidence and duration of delirium when a care bundle exclusively based on non-pharmacological interventions was introduced, which included the provision of music, the opening and closing of blinds to regulate light, reorientation and cognitive stimulation, and eye and ear care.

Introduction of a care bundle that reduces sedation, promotes gradual reduction of ventilatory support and encourages mobility is one potential strategy to manage delirium (Trogrlic et al 2015, Collinsworth et al 2016). For example, the ABCDE bundle focuses on awakening, breathing, coordination, delirium monitoring and management, early mobility and exercise (Hipp and Ely 2012). Balas et al (2012) suggested that the ABCDE bundle should be used daily for all adult patients in the ICU unless a specific reason not to has been documented, such as unstable cardiovascular, respiratory or neurological conditions requiring heavy sedation and/or paralysis.

Vincent et al (2016) advocated the use of the eCASH approach – early Comfort using Analgesia, minimal Sedatives and maximal Humane care – to facilitate rehabilitation and reduce the long-term complications of critical illness. Vincent et al (2016) maintained that: analgesia should take priority over sedation except where deep sedation is necessary to ensure effective treatment, such as during paralysis; rehabilitation and mobilisation should commence on admission to the ICU; and non-pharmacological methods should be used to ensure that patients are calm and comfortable. The eCASH approach is a method for reducing pain, agitation, anxiety, delirium and immobility in patients in the ICU (Vincent et al 2016).

The involvement of family members and carers in the assessment of patients for delirium and decisions about treatment has been advocated by NICE (2014), since they may experience fear and a sense of helplessness (Christensen and Probst 2015). Asking family members to keep a diary during their relative’s stay in the ICU can assist them in maintaining their relationship with the patient because it provides a substitute for ‘normal’ communication (Johansson et al 2015).

Conclusion

Many risk factors can contribute to the development of delirium in patients in the ICU and nurses are ideally placed to assess and manage patients’ care in accordance with clinical practice guidelines. Nurses can also undertake the important non-pharmacological interventions required to prevent and manage delirium, as well as informing families about the nature of delirium and how they can assist their relatives in the ICU. Since nurses are the healthcare professionals who spend the most time with patients, and they are required to possess well-developed communication skills, they should be at the forefront of a multidisciplinary team approach to the prevention and treatment of delirium in the ICU.

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