



Review

Delirium in Older Adults: What a Surgeon Needs to Know

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Abstract: Delirium remains a challenging clinical problem in hospitalized older adults, especially for postoperative patients. This complication, with a high risk of postoperative mortality and an increased length of stay, frequently occurs in older adult patients. This brief narrative paper aims to review the recent literature regarding delirium and its most recent update. We also offer physicians a brief and essential clinical practice guide to managing this acute and common disease.

Keywords: delirium; postoperative complications; delirium perspectives



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1. Introduction

Delirium remains a challenging clinical problem in hospitalized older adults, especially for postoperative patients [1]. This syndrome consists of a disturbance in attention and awareness that develops acutely and tends to fluctuate; it is one of the most well-known diseases and cognitive changes, with manifestation during hospitalization or soon after anesthesia and surgery. This complication frequently occurs in older adult patients, has a high risk of in-hospital death, and increases the length of stay [2]. This concise narrative report aims to review the recent literature regarding delirium and its most recent update. We also aim to offer the physicians a brief and essential clinical practice guide to managing this acute and widespread disease.

2. Materials and Methods

We conducted a narrative review across the principal medical databases Pubmed[®], Science Direct[®], and Google Scholar[®] by selecting results of the last five years. We searched the following terms: older adults, delirium, postoperative perioperative, agitation, and antipsychotic drugs, used separately and in combination. We divided the results into six essential paragraphs: delirium definition, pathophysiology of delirium, delirium assessment, incidence and population at risk, perioperative management of delirium, therapy for postoperative delirium, and outcomes of postoperative delirium. Lastly, we discussed the perspectives of postoperative delirium through the novel coronavirus disease-19 (COVID-19) era.

3. Results

3.1. Delirium Definition

Postoperative delirium comprises acute onset of disturbances in arousal, attention, and other domains of cognition, hallucinations, and delusions; it can be a hypoactive or hyperactive state or mixed [2]. It is an acute disease that requires the following features:

- (A) Disturbance in attention (for example, reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment);
- (B) Disturbance that develops over a short period (usually hours to a few days), represents an acute change from baseline attention and awareness, and tends to fluctuate in severity during a day;
- (C) An additional disturbance in cognition (for example, deficit of memory, disorientation, language, visuospatial ability, or perception);
- (D) The disturbances in Criteria A and C are not better explained by a pre-existing, established, or evolving neurocognitive disorder, and do not occur in the context of a severely reduced level of arousal, such as a coma (Criterion D must not occur in the context of a severely reduced level of arousal, such as a coma);
- (E) There is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal (i.e., due to a drug of abuse or to a medication), or exposure to a toxin, or is due to multiple etiologies [3,4].

Delirium occurs in the hospital up to 1 week post-procedure or until discharge and meets DSM-5 diagnostic criteria. It is also often undetected and underdiagnosed. The screening tools most used for delirium are the four 'A's test (Arousal, Attention, Abbreviated Mental Test 4, Acute change) and the Confusion Assessment Method (CAM4) [5]. Cognitive decline is accelerated in people with delirium, and the appearance of delirium after a surgical procedure acts as an alarm for postoperative cognitive dysfunction [6,7].

3.2. Delirium Pathophysiology

Neuroinflammation, neurotransmitter dysregulation, and brain network disconnection are the common causes of delirium. However, in recent years, it is common to think of delirium as a consequence of multiple simultaneous molecular dysfunctions, which, due to multiple reasons, can lead to this disease [8].

- Systemic inflammation, as a septic shock syndrome, can lead to neuroinflammation with microglial cells activation, neuronal dysfunction, synaptic dysfunction, cellular apoptosis, and neuronal ischemia by the passage through a damaged blood–brain barrier (BBB) of proinflammatory cytokines (such as interleukin (IL) IL6, IL1, IL8, tumor necrosis factor alpha (TNF α), and C reactive protein CRP [9]).
- Stress conditions cause neuroinflammation with the unbalance of the limbic–hypothalamic–pituitary–adrenal axis (LHPA) by increasing cortisol blood levels. Several factors can influence cortisol levels, one of them being an alteration in melatonin pathways caused by sleep deprivation [10].
- Studies have demonstrated that prolonged exposure of neurons to high levels of cortisol, insulin, and glucose leads to neuronal malfunction and damage because of continuous metabolic stress. Therefore, people develop cognitive failure, and the devastating effect is more evident in older adults in which the LHPA axis is often already dysregulated. Inflammatory conditions can lead to hyperactivation of microglia and the consequent release of inflammatory cytokines and direct neuronal damage [11].
- Abnormal gamma-aminobutyric acid (GABA)-related transmission in the nervous system actively contributes to the development of delirium. It has been largely demonstrated that the use of drugs that increase GABAergic synaptic transmission, such as benzodiazepines, increases the risk of delirium manifestation [12].

All these hormonal and neurotransmitter alterations cause oxidative stress to cells which are exacerbated in hypoxic conditions that lead to chaotic neuronal signaling.

3.3. Delirium Assessment

Firstly, it is fundamental to assess the cognitive function and presurgical mental condition to detect any underdiagnosed pre-existing cognitive function decline [13].

There are several cognitive tests:

- The mini-mental test is one of the most accurate and known cognitive tests, but is often not simple to perform.
- However, the Rapid Cognitive Screen Test (Appendix A) and the Six-Item Cognitive Test are rapid, applicable, and feasible in the surgery ward units [14–18].

People with cognitive deficit have a greater risk of developing delirium, and sometimes this problem is difficult to distinguish from dementia [6].

The delirium diagnosis is a clinical one and must be confirmed by an expert in the field. This acute disease is often underestimated because of its fluctuating nature or the hypoactive delirium type [19].

There are three principal delirium assessment tools.

- The four ‘A’s test (4AT) (Appendix B) is a simple, quick clinical test that requires less than 2 min to perform and is a well-validated bedside test to detect delirium in day-to-day practice and different settings [20]. It does not require special training, and it is easy to implement for delirium diagnosis. A recent article reported this test’s sensitivity and specificity as over 81.5% and 87.5%, respectively [21–24].

In the end, the 4AT test investigates acute changes or fluctuations [25].

- The Confusion Assessment Method (CAM4) (Appendix C) was developed in 1990. It has high sensitivity (94–100%) and high specificity (90–95%), and is easy to perform [26]. Nurses and physicians can perform it, but delirium diagnosis can only be confirmed by physician experts in the field. It can be used in clinical and research settings, with expert judgment, and is helpful to avoid hypoactive delirium.
- In recent years, the CAM4 score was also adapted for intensive care units and critically ill patients. The CAM-ICU score for intensive care unit (ICU) patients (Appendix D) has a pooled sensitivity of 80.0% and a pooled specificity of 95.9% [27]. This score investigates the presence of acute onset or fluctuating course and inattention with either disorganized thinking or altered level of consciousness; these features indicate a possible delirium diagnosis [28,29]. Like the CAM4, this tool evaluates the same core features of delirium, but in a different way, with clinical tests or observations. Furthermore, this assessment needs to be combined with the Richmond Agitation–Sedation Scale to evaluate the arousal/sedation [30]. This test is helpful in conditions such as coma or arousal, which nurses can easily perform.
- An alternative to CAM-ICU is the Intensive Care Delirium Screening Checklist (ICDSC). However, this tool must be integrated with agitation [28,31–33]. By the way, CAM4, CAM-ICU, and 4AT tools required multiple interviews or clinical observations of the patients.
- The severity of delirium and the clinical course of the delirium can be measured with these tools [34–36]. The Delirium Rating Scale—Revised-98 and The Memorial Delirium Assessment have both been translated in many languages, which is helpful for longitudinal studies and assessing and evaluating answers to the treatments.
- Recently, two delirium-prediction models in ICUs have been introduced: the model for delirium (PRE-DELIRIC) and the early prediction model for delirium (E-PRE-DELIRIC). In these models, the delirium prediction, as reported above, demonstrated both a moderate-to-good performance to predict delirium, especially in ICU; however, more validations are necessary [37–40]. These tools allow practicing preventive strategies to avoid delirium in critical patients.

Instruments such as EEG have been proposed to exclude conditions, such as non-convulsive status epilepticus, which, in some instances, can present with behavioral cognitive alterations that can mimic ‘delirium’. Moreover, intraoperative EEG monitoring has increased its relevance for its potential role in finding a pattern related to postoperative delirium [41–43].

Differently, in recent years, several biomarkers have also been studied, but the best tools with the highest specificity and sensitivity are clinical [44].

3.4. Postoperative Delirium: Epidemiology and Risk Factors

Postoperative delirium infrequently affects young adults who undergo minor elective surgery. Interestingly, the incidence increases to 15–25% after elective surgery in older adults and reaches more than 50% of cases in high-risk elderly patients who undergo major surgery, such as cardiac surgery, requiring cardiopulmonary bypass or orthopedic hip fracture repair [45,46]. Notably, patients who need ICU admission after the surgery have a higher risk of developing delirium, which is worsened by prolonged mechanical ventilation [46]. Risk factors of developing postoperative delirium could be patient-related, could be different depending on the timing of appearance during hospitalization, and could be medical- or surgery-related factors [47,48]. More generally, the risk of developing postoperative delirium derives from the presence of some predisposing factors in addition to one or more precipitant factors (Table 1) [46–50].

Table 1. Risk factors of developing postoperative delirium.

Categories of Risk	Factors
Predisposing factors	Age > 65 years
	Male gender
	Low autonomy in daily activities
	Low educational level
	History of alcohol abuse
	Illicit drug use
	Pre-existing neurological and cognitive impairments (dementia)
	Comorbidities and pre-existing organ failures
	High critical prognostic score at the hospital admission
	Sepsis or septic shock
	Stroke
	Trauma
	Frailty
	Visual and hearing impairment
	Depression
	Poor nutrition, dehydration, electrolyte unbalance
	Endocrinopathies
	History of delirium
	Use of predisposing drugs
	Impairment in oxygenation (anemia, anoxic/hypoxic state, low organs perfusion)
Precipitant factors	Surgery (especially if emergency and high-risk)
	Sedation or general anesthesia
	Mechanical ventilation > 96 h
	Psychoactive drugs (benzodiazepines, opiates plus corticosteroids, dihydropyridinic drugs, antihistamines)
	Sepsis or septic shock
	Stroke
	Dehydration or electrolyte unbalance
	Uncontrolled pain
	Invasive devices on the body
	Immobility
	Circadian rhythm alterations
	Psychological stress
	Isolation

3.5. Perioperative Management of Delirium

The management of delirium starts in the preoperative period, with environmental and clinical strategies and daily neurological assessment by clinicians, and is fundamental. First of all, physicians should promote fast-track surgery and short hospitalization [51–53]. The right approach to treat delirium disturbances begins with administering drugs and medications correctly, avoiding benzodiazepines, and promoting dexmedetomidine and clonidine as sedative and analgesic drugs [54]. During the entire period, physicians should

exclude acute neurological damage or metabolic or infective CNS involvement, ensuring correct oxygen delivery (DO₂) by maintaining normal hemoglobin levels, avoiding blood loss, and avoiding uncontrolled pain because it is a possible delirium trigger. Avoiding metabolic alterations, as well as ensuring normal blood glucose, physiologic endocrine function, normal renal function, and hydro electrolytic balance, can reduce delirium risk [11,55]. Furthermore, nurses and physicians should take care of the environmental factors in the hospital unit, and clocks, radio or television, and books could be helpful to maintain attention and orientation. It is crucial to assess CAM fluctuations during the day, and the presence of relatives or next of kin of the patients could also be a resource in delirium prevention [56]. To summarize, actions to avoid or reduce delirium incidence can be divided into three categories: preoperative, intraoperative, and postoperative strategies (Table 2) [57–66].

Table 2. Strategies to avoid or reduce delirium.

Timing of Action	Strategies
Preoperative	Daily evaluation of clinical conditions Consider predisposing and precipitant factors (if possible, treat them) Preoperative geriatric consult Evaluate surgery and anesthetic risk
Intraoperative	Prefer total intravenous anesthesia to inhalational anesthesia Choose desflurane over other inhalational agents Avoid drugs that facilitate postoperative delirium (benzodiazepines) Maintain normoxia during surgery and normal DO ₂ Reduce blood loss Maintain the normal level of hemoglobin Monitor anesthesia depth with BIS or EEG (>60-year-old, surgery lasts > 1 h)
Postoperative	Early physical rehabilitation Early mental activities Reorientation in usual life routine (presence of patient's family, familiar objects nearby) Supplying patient's daily prosthesis Listening to music Promote the normal circadian rhythm (reduce night exposure to lights, noises with the help of earplugs, incremental exposure to light daily, reduce medications and interventions at night, facilitate single-room bed rest, administer melatonin agonist) Remove invasive and non-invasive medical devices as soon as possible Avoid physical restraints

3.6. Therapies for Postoperative Delirium

As primary measures, once postoperative delirium starts, it is possible to use non-pharmacological and pharmacological interventions.

Due to the paucity of evidence, the actual guidelines suggest avoiding pharmacological approaches as first-line therapy both in non-intensive and intensive care settings [67–69].

3.6.1. Non-Pharmacological Interventions: Behavioral and Multimodal Approach

This method seems to be the most effective in delirium treatment. It includes non-pharmacological approaches described as preventive actions above, which can also be treatment solutions.

- It is necessary to understand why the patient is delirious and to treat precipitating factors (such as treating hypotension, giving oxygen therapy when needed, treating overdose of drugs, and controlling pain).
- It is fundamental to free the patient from medical devices as soon as possible. This allows starting early rehabilitation and promoting a reorientation program with the patient's family collaboration.
- In addition, some advantages could come from educational programs for staff to illustrate how to deal with this pathology [70].

However, even if effective, in several circumstances of hospital restrictions or logistic limitations, this therapeutic approach could have a difficult realization. When the behavioral and multimodal approach is not enough to treat delirium, the use of antipsychotic drugs is suggested.

3.6.2. Pharmacological Interventions

Several drugs have been historically used to treat postoperative delirium, but only a few of them have strong evidence of efficacy.

- Haloperidol (a dopaminergic antagonist) is the antipsychotic drug traditionally used in emergency intravenously in both non-intensive and intensive care settings. It seems to reduce the length of delirium and agitation. However, there are some safety issues because it can prolong QTc on ECG. In addition, there are little evidence and guidelines that support its use, with a paucity of data regarding its use in non-intensive care settings [71,72].
- Second-generation antipsychotic drugs, such as risperidone, olanzapine, and quetiapine, have been used in place of haloperidol. However, there is a lack of evidence of their superiority in solving delirium [54,73,74].
- An α_2 agonist, dexmedetomidine, has been used in the ICU setting to treat delirium in mechanically ventilated patients. Recent guidelines suggest it helps to wean patients from ventilators by reducing ventilation days and the length of stay in the ICU. Evidence suggests that it reduces delirium in postoperative cardiovascular patients and. When haloperidol fails, it can be used in non-ventilated patients. As well as dexmedetomidine, the use of clonidine (α_2 agonist) seems to be promising, but further studies are necessary to better define its role in delirium treatment [30,75,76].
- In the end, acetylcholinesterase inhibitors, such as rivastigmine and donepezil or melatonin, seem to help in some clinical settings, but more data are needed [77,78].

4. Outcomes on Postoperative Delirium

Postoperative delirium prevention and treatment are fundamental to restoring a normal cognitive function after surgery, especially in older adults. Evidence suggests that, after one month from major surgery, the recovery time is reduced in patients who develop postoperative delirium compared to non-delirious ones [79]. Moreover, elderly patients with postoperative delirium can quickly develop long-term cognitive dysfunction. However, younger people could also have a reduction in cognitive function improvement at 90 days post-surgery if they had developed postoperative delirium [80]. In addition, some authors underline that postoperative delirium could not only slow down the recovery after surgery and lead to cognitive dysfunction, but could also increase complications after surgery and mortality rates [81]. The evidence supports the need to act against the development of postoperative delirium.

5. The Perspectives of the Postoperative Delirium through the COVID-19 Era

Data reported above showed the essential notions for managing delirium both in surgery wards and in ICUs (Table 3).

Table 3. The essential points to detect and manage postoperative delirium.

Steps to Detect and Manage	Actions
Wards strategies	Implement cognitive screening as soon as possible Monitor delirium (5 points of DSM-5 definitions, Mini-Mental State Evaluation, Rapid Cognitive Screen, 4A test, CAM4 Scale, CAM-ICU) Optimization environment (family support, reorientation programs, maintain a circadian rhythm, communication with the patient)
Optimize perioperative settings	Avoid/treat infections Maintain physiological DO ₂ oxygenation, glycemia, hydro-electrolytic balance, and physiological functions Treat pain Accurately select drugs and avoid benzodiazepines Prefer intravenous anesthesia Monitor anesthesia's depth EEG monitoring
Treatment	First-line treatment: behavioural and multimodal approach (rapid rehabilitation, remove medical devices, reduce ward transfers, reorientation programs, family support, maintain the circadian rhythm, communication with patients) Second-line treatment: drugs (haloperidol, α_2 agonists such as dexmedetomidine/clonidine, melatonin, acetylcholinesterase inhibitors)
Continuous postoperative follow up	

Although delirium has been widely investigated in recent years, it remains poorly understood. It is an essential topic in the medical literature, including over 1500 papers published and around 50 clinical trials/year in the last five years (Figure 1) [82].

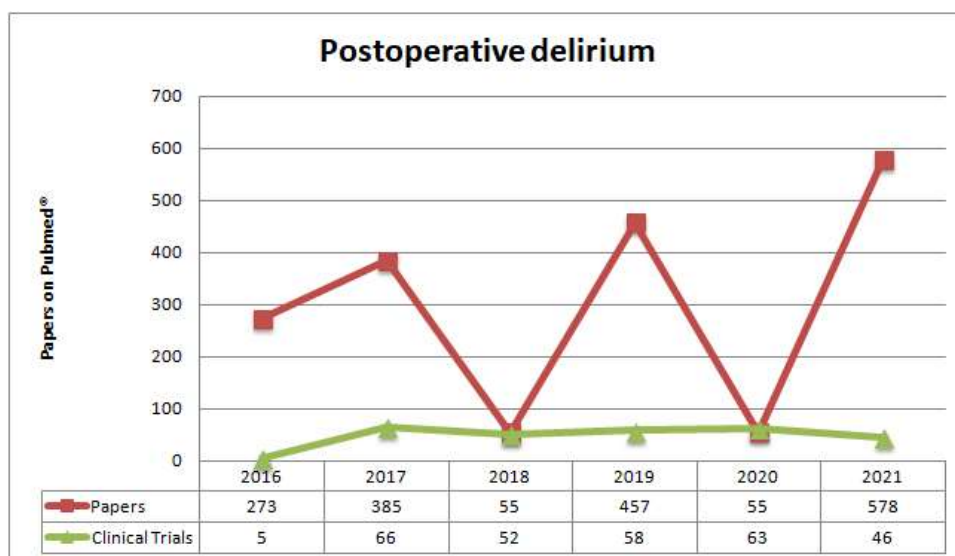


Figure 1. Recent papers published on Pubmed[®] regarding postoperative delirium in the last five years.

The next step of detecting delirium is to quantitatively measure it, and EEG analysis follows this notion [82,83].

Because of life expectancy increasing in western countries, elderly patients are more present in hospitals and in surgery wards; thus, in the future, postoperative delirium could occur with the same frequency as hypertension crisis or glycemic dysregulation. At the same time, with older patients in hospitals, there will also be more elderly in ICUs; for this reason, it is necessary to promote a bundle of environmental, perioperative, and pharmacological treatments in order to improve delirium diagnosis and reduce its incidence [71]. Cognitive functions and delirium screening should be performed like

other life parameters in surgery, operating theaters, or ICUs. The screening or assessment tests reported in the appendices are quick and easy to perform. The use of EEG in the wards could be helpful in the case of neurological impairment by detecting convulsive states. Characteristics of delirium detected by EEG are usually generalized theta or delta slow-wave activity often accompanied by a loss of reactivity of the EEG to eye-opening and closing. Unfortunately, as discussed above, it can present patterns that can mimic 'delirium' [41–43]. Even if laboratory biomarkers have been tested, such as the plasmatic level of cholinesterase or interleukin 6 or melatonin, no current evidence suggests that their clinical use could detect postoperative delirium early on [44]. The delirium diagnosis must be confirmed by an expert in the field, but the screening and the assessment can also be performed by a trained nurse or physician.

Furthermore, delirium is one of the most common neurological symptoms in hospitalized COVID-19 patients [84,85]. Indeed, the pandemic events represent complications for the multimodal approaches. Healthcare policies reduce relatives' presence, so it will be necessary to introduce more technological devices in the healthcare facilities to reduce the distance with relatives as frequently happened, within different and dramatic circumstances, during the first COVID-19 wave [86].

Limits

This paper is a narrative review; papers were selected by the authors according to their relevance and importance. This paper aims to offer a brief and essential guide to detecting and managing delirium.

6. Conclusions

Postoperative delirium remains a high-risk clinical syndrome and postoperative complication. Promoting a healthcare system ready and adequate for elderly patients to face this disturbance in all its features is a challenge for the future.

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Appendix A. The Rapid Cognitive Screen Test

Start the assessment with the **Rapid Cognitive Screen (RCS)**

You can use this practical tool during your patient's bedside rapid cognitive screening.

- Name.
- Age.
- Date of assessment.
- Is the patient alert?
- Level of education.
- Read each object to the patient using approximately 1 s intervals.
 - 'Please remember these five objects. I will ask you what they are later' Apple, Pen, Tie, House, Car.'
 - 'Please repeat the objects for me.' *If the patient does not repeat all five objects correctly, repeat until all objects are recalled correctly or up to a maximum of two times.*

Give the patient a pencil and a blank sheet with a clock face. 'This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock'.

_____/2 (points) Hour markers okay.

_____/2 (points) Time correct.

When scoring, give full credit for all 12 numbers. If the patient only puts ticks on the circle, prompt them once to put numbers next to those ticks for full credit. Do not repeat the time. When scoring the correct time, make sure that the minute hand points at the 10 and the hour hand points at the 11.

○ 'What were the five objects I asked you to remember?'

_____/1 (point) Apple.

_____/1 (point) Pen.

_____/1 (point) Tie.

_____/1 (point) House.

_____/1 (point) Car.

○ 'I'm going to tell you a story. Please listen carefully because afterward, I'm going to ask you about it. Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after. What state did she live in?'

_____/1 (point) Illinois.

Do not repeat the story but do make sure the patient is paying attention the first time you read it to them. Do not prompt or give hints. The answer of 'Chicago' as the state she lives in gets no credit, but you may prompt them once by repeating the question when 'Chicago' is given as the answer.

TOTAL SCORE RCS (10 points)

Score interpretation:

8–10: Normal.

6–7: Mild Cognitive Impairment.

0–5: Dementia.

Appendix B. The 4 AT: Assessment Test for Delirium and Cognitive Impairment

Follow the assessment with 4 AT: assessment test for delirium and cognitive impairment. You can use this practical tool during your patient's bedside 4 AT assessment.

The tester should always take account of communication difficulties (hearing impairment, dysphasia, lack of common language) during both carrying out the test and interpreting the score.

Name.

Age.

(1) ALERTNESS

Patients who may be markedly drowsy (for example: difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. If asleep, try to wake with speech or a gentle touch. Ask the patient to tell their name and home address. Give scores to the examination.

- Normal (fully alert, but not agitated, throughout assessment). 0
- Mild sleepiness for <10 s after waking, then normal. 0
- Clearly abnormal. 4

(2) 4 AMT

Ask the patient for his age, date of birth, place (name of the hospital or building), and current year. Give scores to the examination.

- No mistakes. 0

- 1 mistake. 1
- 2 or more mistakes/untestable. 2

(3) ATTENTION

Ask the patient: 'Please tell me the months of the year in backward order, starting at December.' You can help the patient by suggesting: 'what is the month before December?' Give scores to the examination.

- Achieves 7 months or more correctly. 0
- Starts but scores < 7 months/refuses to start. 1
- Untestable (cannot start because unwell, drowsy, inattentive). 2

(4) ACUTE CHANGE OR FLUCTUATING COURSE

Evidence of significant change or fluctuation in: alertness, cognition, or other mental function (for example: paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs

- No. 0
- Yes. 4

4 AT SCORE

Score interpretation:

0: Delirium or severe cognitive impairment is unlikely (but delirium is still possible if (4) information is incomplete; more detailed testing may be required depending on the clinical context).

1–3: Delirium or possible cognitive impairment (more detailed cognitive testing and informant history-taking are required; these steps are rated solely on the observation of the patient at the time of assessment).

4 or above: Possible delirium +/- cognitive impairment (these steps require information from one or more sources—for example, the knowledge of the patient from the staff ward, GP letter, case notes, and carers).

Appendix C. The CAM SCALE: Confusion Assessment Method

Follow the assessment with the CAM SCALE: Confusion Assessment Method

You can use this practical tool during your patient's bedside CAM SCALE assessment.

- Name.
- Age.
- Date of assessment.
- **Acute Onset.**
 - Is there evidence of an acute change in mental status from the patient's baseline?

YES NO UNCERTAIN NOT APPLICABLE
- **Inattention**

The questions listed under this topic are repeated for each topic where applicable

 - Did the patient have difficulty focusing attention (for example, being easily distractible or having difficulty keeping track of what was being said)?

____ Not present at any time during interview.

____ Present at some time during interview, but in mild form.

____ Present at some time during interview, in marked form.

____ Uncertain.
 - Did this behavior fluctuate during the interview (that is, tend to come and go or increase and decrease in severity, if present or abnormal)?

YES NO UNCERTAIN NOT APPLICABLE
 - Please describe this behavior (if present or abnormal).

- **Disorganized Thinking**
 - Was the patient’s thinking disorganized, incoherent, such as rambling, or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable, switching from subject to subject?

YES NO UNCERTAIN NOT APPLICABLE
- **Altered Level of Consciousness**
 - Overall, how would you rate this patient’s level of consciousness?

___Alert (normal).
___Vigilant (hyperalert, overly sensitive to environmental stimuli, startled very easily).
___Lethargic (drowsy, easily aroused).
___Stupor (difficult to arouse).
___Coma (unarousable).
___Uncertain.
- **Disorientation**
 - Was the patient disoriented at any time during the interview, such as thinking that he or she was somewhere other than the hospital, using the wrong bed, or misjudging the time of day?

YES NO UNCERTAIN NOT APPLICABLE
- **Memory Impairment**
 - Did the patient demonstrate any memory problems during the interview, such as an inability to remember events in the hospital or difficulty remembering instructions?

YES NO UNCERTAIN NOT APPLICABLE
- **Perceptual Disturbances**
 - Did the patient have any evidence of perceptual disturbances, such as hallucinations, illusions, or misinterpretations (for example, thinking something was moving when it was not)?

YES NO UNCERTAIN NOT APPLICABLE
- **Psychomotor Agitation**
 - At any time during the interview, did the patient have an unusually increased level of motor activity, such as restlessness, picking at bedclothes, tapping fingers, or making frequent, sudden changes in position?

YES NO UNCERTAIN NOT APPLICABLE
- **Psychomotor Retardation**
 - At any time during the interview, did the patient have an unusually decreased level of motor activity, such as sluggishness, staring into space, staying in one position for a long time, or moving very slowly?

YES NO UNCERTAIN NOT APPLICABLE
- **Altered Sleep–Wake Cycle**
 - Did the patient have evidence of disturbance of the sleep–wake cycle, such as excessive daytime sleepiness with insomnia at night?

YES NO UNCERTAIN NOT APPLICABLE

Score interpretation:

For a diagnosis of delirium by CAM, the patient must display:

1. Presence of acute onset and fluctuating discourse.

AND

2. Inattention.

AND EITHER

3. Disorganized thinking.

OR

4. Altered level of consciousness.

Appendix D. The CAM-ICU SCALE: Confusion Assessment Method for the ICU

If the patient is in the ICU, you can follow the assessment **with the CAM-ICU SCALE: Confusion Assessment Method—Intensive Care Unit**

You can use this practical tool during your patient bedside the CAM-ICU scale assessment.

- Name.
- Age.
- Date of assessment.
- **Acute onset or fluctuating course.**
 - Is the patient different from his/her baseline mental status? Alternatively, has the patient had any fluctuation in mental status in the past 24 h as evidenced by fluctuation on a sedation/level of consciousness scale (i.e., RASS/SAS), GCS, or previous delirium assessment?

Either question is 'yes'.

- **Inattention**
 - Letters attention test. *Say to the patient, 'I am going to read you a series of 10 letters. Whenever you hear the letter 'A', indicate by squeezing my hand.' Read letters from the following letter list in a normal tone 3 s apart.*

S A V E A H A A R T or C A S A B L A N C A or A B A D B A D A A Y

Errors are counted when the patient fails to squeeze on the letter 'A' and when the patient squeezes on any letter other than 'A.'

Number of errors >2.

- **Altered level of consciousness**
 - Present if the actual RASS score is anything other than alert and calm (zero).
RASS anything other than zero.

- **Disorganized thinking**
 - Yes/no questions.
 1. Will a stone float on water?
 2. Are there fish in the sea?
 3. Does one pound weigh more than two pounds?
 4. Can you use a hammer to pound a nail?

Errors are counted when the patient incorrectly answers a question.
Say to patient: 'Hold up this many fingers' (Hold two fingers in front of patient)
'Now do the same thing with the other hand' (Do not repeat the number of fingers). If the patient is unable to move both arms, for the second part of the command, ask the patient to 'Add one more finger'.
An error is counted if the patient is unable to complete the entire command.
Combined number of errors >1.

Score interpretation:

- Acute onset or fluctuating course plus inattention either altered level of consciousness or disorganized thinking present = CAM-ICU positive and delirium present.

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