



Succinct Approach to Delirium in the Emergency Department

Sangil Lee¹ · Clay Angel² · Jin H. Han^{3,4}

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Abstract

Purpose of Review This study aims to provide a concise delirium review for practicing emergency medicine providers using the Assess, Diagnose, Evaluate, Prevent, and Treat (ADEPT) framework.

Recent Findings Delirium is a form of acute brain dysfunction that results in significant mortality and morbidity for older emergency department (ED) patients. Delirium is frequently missed by healthcare providers, but monitoring for this syndrome using brief delirium assessments may improve recognition. Once delirium is diagnosed, emergency medicine providers' primary goal is to perform a comprehensive history and physical examination to uncover the underlying etiology for delirium. This includes obtaining history from a collateral historian and obtaining an accurate medication history. If possible, emergency physicians (EPs) should treat the medical etiology that precipitated the delirium. If agitated, non-pharmacologic interventions such that minimize the use of tethers are preferred. Pharmacologic agents such as antipsychotic medications should be used as a last resort.

Summary Delirium is a common geriatric emergency and requires the EP to assess, diagnose, evaluate, prevent, and treat. Delirium is a key geriatric syndrome that geriatric ED providers should routinely screen for. A strong emphasis is on the widespread use of delirium screening, followed by prevention and treatment efforts.

Keywords Delirium · Screening · Older adults · Agitation · Pharmacotherapy · Emergency department

Introduction

Delirium is defined as a disturbance in attention and awareness that is accompanied by an acute loss in cognition that cannot be better accounted for by a preexisting or evolving neurocognitive disorder such as dementia [1]. This form of acute brain dysfunction occurs in 10 to 17% of older ED patients [2, 3], 16 to 40% in older hospitalized patients

[4–6], and up to 80% of intensive care unit (ICU) patients [7, 8].

The negative consequences of delirium are well established in the literature. Among older adults in the ED, delirium is associated with increased in-hospital and long-term mortality [2, 9–11], accelerated functional and cognitive decline [12], prolonged hospital stays [12, 13], intensive care unit (ICU) admissions [2, 11], discharge to a skilled nursing facility [2], and increased rehospitalizations [2].

Despite the high morbidity and mortality associated with delirium, emergency healthcare providers miss this syndrome in approximately 75% of cases. Delirium is missed in 57 to 83% of the time when a patient has active delirium in the ED [4–10] because ED providers do not routinely screen for this [14]. The large body of evidence suggests that delirium is underrecognized in the ED. [15–19] If delirium is unrecognized in the ED, then the inpatient providers will also miss delirium 95% of cases [20].

Missing delirium likely has several negative implications for clinical care [21]. Because delirium is frequently misdiagnosed as dementia or psychiatric illnesses, such as depression [22], some may be inappropriately admitted to a psychiatric ward or discharged, thus delaying the diagnosis of

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✉ Sangil Lee
kagocchi2@gmail.com

¹ Department of Emergency Medicine, The University of Iowa Carver College of Medicine, Iowa City, IA, USA

² Department of Hospital Medicine, Kaiser Permanente San Jose Medical Center, San Jose, CA, USA

³ Department of Emergency Medicine, Vanderbilt University Medical Center, Nashville, TN, USA

⁴ Geriatric Research, Education, and Clinical Center, Tennessee Valley Healthcare System, Nashville, TN, USA

their underlying medical illness [23]. If the patient is hospitalized, over 90% of delirium that is missed in the ED will also be missed in the hospital setting [20]. It is also possible that patients with active delirium are discharged after ED evaluation because EPs could not diagnose it or the condition was stabilized during their ED stay. Data suggests that 25% of delirious older ED patients are actually discharged and sent home [13, 17] and may not be able to fully comprehend their ED diagnosis or discharge instructions [24], leading to non-compliance and return ED visits and adverse outcomes [25].

Inadequate routine monitoring contributes to missed diagnosis of delirium. In the setting of credentialing to recognize the quality of practice such as geriatric ED accreditation and age-friendly health system, the needs of effective delirium screening, treatment, and prevention programs are urgently needed [26, 27, 28]. Using the Assess, Diagnose, Evaluate, Prevent, and Treat (ADEPT) framework by the American College of Emergency Physicians (ACEP) [29], with additional insight from hospital medicine, we will describe a concise delirium review for practicing emergency medicine providers.

Assessment

The characteristics of delirium include acute onset, waxing and waning symptoms, inattention, change in cognition, or altered level of awareness [29]. If a patient is delirious, the EP's primary goal is to determine the underlying etiology. First, life-threatening etiologies such as hypoxia, hypoglycemia, stroke, or acute myocardial infarction should be ruled out rapidly. Once these life-threatening conditions have been ruled out, a thorough history and physical examination should be performed to rule out other etiologies. Almost any medical illness can precipitate delirium. The most common etiology includes infection, intracranial lesions such as ischemic stroke, hemorrhage, or mass; electrolyte abnormalities; and medications. When considering delirium's underlying etiology, the EP should also evaluate the patient's vulnerability to developing delirium (Fig. 1). Patients with high vulnerability to developing delirium such as an 88-year-old with severe dementia who requires complete assistance to perform his/her activities of daily living require a relatively benign insult such as an uncomplicated urinary tract infection to develop delirium. Patients with little vulnerability to developing delirium such as a fully functional 70-year-old who still works as an engineer will require a more noxious insult such as severe sepsis to develop delirium. In patients with little or no vulnerability to developing delirium, the EP should be highly concerned for an underlying life-threatening illness.

There are several key points to history taking for older adults with delirium or those who are at risk of developing delirium. Because delirious patients may not be able to

provide an accurate history [24], it is vital that the history is confirmed by family, friends, or caregivers. Delirium can be precipitated by medication side effects or changes. Thus, it is imperative to obtain medication history, including over-the-counter medications, recent changes or altered compliance with medications, and missed medications. Medication lists obtained from the electronic medical record may not be accurate and should be confirmed. High-risk medications which include sedatives, corticosteroids, antihistamines, anticholinergics, tricyclic antidepressants, muscle relaxants, and opioids are notorious for precipitating delirium [34]. Furthermore, it is necessary to inquire about alcohol and illicit drug use.

When talking to a collateral historian, the EP should establish patients' baseline mental status and level of functioning [35]. Besides gaining insight into patient baseline and acute change, one may identify support services or resources for information and options for disposition. It helps to identify activities of daily living.

After history taking, EPs should perform a thorough physical exam, including vital signs. Point-of-care testing for glucose can identify reversible hypo- or hyperglycemia. A full examination of the patient is necessary to inspect the back, sacrum, genitalia, and feet for possible ulcers, infections, and drug patches. The neurological exam includes looking for signs of a stroke, intracranial hemorrhage, or subclinical seizures. This examination will provide an opportunity to evaluate for trauma, as well as accidental, self-inflicted, or non-accidental injury. Besides routine exams, EPs may take a brief moment to assess for delirium by using the delirium assessment tools listed below.

Diagnose

Delirium is missed if its clinicians do not routinely screen for it. The Confusion Assessment Method (CAM) algorithm is the most widely researched and used delirium assessment. The short-form CAM consists of 4 features: (1) altered mental status or fluctuating course, (2) inattention, (3) disorganized thinking, and (4) altered level of consciousness [36]. A patient is considered to meet the criteria for delirium if both features 1 and 2 and either 3 or 4 are present. The CAM's features are determined by subjective impression after performing a brief global cognitive assessment. For this reason, the CAM requires extensive training, and its diagnostic accuracy is operator dependent. Several delirium assessments have incorporated brief objective assessments into the CAM algorithm. One example is the Brief Confusion Assessment Method (bCAM) which was designed for ED use. It asks the patient to recite the months of the year backwards from December to July to determine inattention and four yes/no questions and a simple command to determine disorganized thinking (Table 1). bCAM was reported to take less than 2 min but did not

Fig. 1 Patient vulnerability factors for delirium. *Footnote:* Increased burden of these vulnerability factors will increase the patient's susceptibility to delirium. Modified from Han et al., Pun et al., Fearing et al., and the American Psychiatry Association Delirium Guidelines [30, 31, 32, 33*]. *Psychoactive medications include benzodiazepines, opioids, and medications with anticholinergic properties.



sacrifice sensitivity or specificity substantially, and there was a substantial inter-observer agreement (kapa 0.87) between EPs and research staff. [37]

The 4AT is another widely used delirium assessment and is comprised of four components: (1) alertness, (2) orientation, (3) attention, and (4) acute change or fluctuating course. The 4AT is similarly brief and also incorporates objective testing to determine inattention by asking the patient to recite the months backwards from December to July.

However, both the bCAM and 4AT can take 2 min to perform which may not be feasible for some EDs. To increase screening efficiency, a highly sensitive ultra-brief delirium assessment such as the Delirium Triage Screen (DTS) can be performed to rapidly rule out delirium. Because it has moderate specificity, a positive DTS, however, requires a confirmatory delirium assessment such as the bCAM or 4AT. Briefer delirium assessments typically come at the expense of diagnostic accuracy. However, the month of the years backwards task, Richmond Agitation Sedation Scale (RASS), or Single Question in Delirium (SQiD) can be viable alternative delirium assessments in the ED.

Evaluate

Once delirium is detected, the EP's primary role is to uncover the underlying etiology. The laboratory and radiographic evaluation should be guided by the history and physical

examination. Table 2 lists the laboratory and radiographic tests that are commonly ordered.

It is important to note that the majority of patients with delirium will have more than one etiology. There are multifactorial etiologies contributing to delirium.

In older adults, delirium- and dementia-related psychoses are common causes of confusion and agitation. In this population, new-onset psychosis and schizophrenia are rare. Older adults with hallucinations, agitation, or altered sensorium usually experience delirium or dementia. Delirium has hyperactive, hypoactive, or mixed subtypes. Hyperactive delirium accompanies agitation and restlessness and is easier to recognize. Hypoactive delirium accompanies somnolence or decreased mental status. Mixed delirium has both features of hyperactive and hypoactive delirium. In the ED, hypoactive delirium is the most common, has higher mortality, and is missed more often [20].

Prevention

Finally, delirium prevention is a novel concept for EPs but has become a common language among hospitalists, geriatricians, and intensivists. The multiple and fast-paced decisions that must be made in the ED, coupled with an environment that is often unavoidably loud, bright, and intrusive, can be disorienting and frightening for older patients. Identifying the risk factors for delirium (such as infection, electrolytes,

Table 1 Selected examples of delirium screening tools

Instrument	Synopsis	Sensitivity	Specificity	Time
Confusion Assessment Method (CAM) [38]	A bedside cognitive test is used to determine (1) altered mental status or fluctuating course, (2) inattention, (3) disorganized thinking, and (4) altered level of consciousness using clinical impression	86%	93%	5–10 min
Brief Confusion Assessment Method (bCAM) [37]	Uses the CAM algorithm but uses objective testing to evaluate inattention and disorganized thinking	84%	96%	< 2 min
4AT [39]	Evaluates alertness, orientation, attention, and fluctuation	88%	88%	< 2 min
Delirium Triage Screen (DTS) [37]	Evaluates inattention using object testing and level of consciousness using DTS followed by more specific test to confirm	98%	55%	< 30 sec
Month of the year backwards—12 months (MOTYB-12) [40•]	Asks the patient to recite the months of the year backwards from December to July	84%	71%	< 1 min
Richmond Agitation Sedation Scale [41]	A structured evaluation of level of consciousness based on your observation of the patient during routine clinical evaluation	82%	85%	< 10 sec
Single Question in Delirium (SQiD)	“Do you think [name of patient] has been more confused lately?”	80%	71%	< 30 sec

dehydration, or high-risk medication) can have preventive effects. Although the use of tethers (Foley catheters, telemetry, and intravenous lines [IVs]) is often essential in providing care, it adds yet another layer of complexity that can lead to agitation and delirium. The goal of care to maintain function should be a focus, and this can include active hydration,

limiting NPO time, access to food and toileting, and visual/hearing assists. Sleep regulation and minimizing disruption by turning off the light at night is feasible in the ED. Although pharmacological interventions are sometimes necessary in the treatment of our fragile older patients, there are therapeutic choices and doses that are safer and often equally effective.

Table 2 General tests for delirium in the ED

Name of test	Remarks	Identifiable etiology
Point-of-care glucose	Finger stick	Hypo- and hyperglycemia
Complete blood count		Anemia, leukocytosis
Basic or comprehensive metabolic panel		Hypo-/hypermnatremia, hyperkalemia, hypercalcemia, uremia, acute kidney injury, dehydration
Comprehensive metabolic panel	May also consider comprehensive metabolic panel, liver function panel, ammonia, venous blood gas	Liver disease (cirrhosis, hepatitis, hepatic encephalopathy), drug, medication complication, or side effect
Urinalysis and urine culture	High rates of asymptomatic pyuria and bacteriuria in older adults. Consider alternative etiologies especially in the absence of symptoms of UTI or pyelonephritis, signs of infection such as fever or leukocytosis	Urinary tract infection
Electrocardiogram	May also add BNP, troponin, and CXR.	Ischemic changes, arrhythmia, electrolyte abnormality
Chest X-ray	May expand infection workup and imaging	Infection
Drug levels (lithium, digoxin, acetaminophen, salicylate, ethanol level, urine drug screen)	Venous blood gas could supplement the evaluation of drugs	Drug and medication complications Alcohol withdrawal
Head CT		Trauma, Subarachnoid hemorrhage, hemorrhagic stroke
Miscellaneous		
Venous blood gas,		CO ₂ retention
Thyroid-stimulating hormone		Hypo-/hyperthyroidism
Carboxyhemoglobin		CO poisoning
Blood culture	Selective indication for infection	Infection
Lactic acid		
Lumbar puncture		

Polypharmacy is a real problem in our hospitals, and “less is more” applies to both the frequency with which we prescribe medications and the dosage and frequency.

Preventing delirium might require hospital and system-based measures. Increased length of stay in the ED is generally associated with worse outcomes, and recent studies report an increased risk of delirium [42, 43•]. Since delirious patients are at risk of falls, environmental modification programs such as lowering beds, providing chairs, and nonslip floors or footwear are recommended. Delirium programs recommend not using hallway beds for those who are at risk for delirium and plan expeditious transfer to the designated unit [44•, 45]. If sufficient resources are available, a sitter can monitor patients who are at high risk of falls and agitation.

Treat

EPs will need to consider a multimodal approach to treat delirium in the ED. First, treat the underlying medical condition or derangements based on the evaluation that should be addressed. This means to treat symptoms such as pain, fever, and nausea or initiating antimicrobial therapy for a bacterial infection. Beyond this, the active management of delirium requires consideration of both non-pharmacological and pharmacological options.

The treatment of delirium can start with a non-pharmacological modality. There is a need to mobilize resources, including ancillary staff, when the patients are at high risk for delirium or have active delirium. First, many ED patients are kept nothing by mouth (NPO) for an anticipatory procedure. NPO status should be reassessed, and EPs should address hydration, avoid unnecessary NPO order, and consider feeding assistance [46–48]. Since the decreased activity level is associated with delirium [20], a mobility assessment and a trial of ambulation are a part of geriatric assessments [49]. Often time, assisted ambulation with a nursing assistant or volunteer will suffice. When prolonged immobilization is anticipated, or ambulatory status is difficult to assess, consider using physical therapy. Timed Up & Go (TUG) test is recommended for mobility assessment and can be implemented without access to physical therapy in the ambulatory setting. TUG test has the following steps. (1) Patients wear their regular footwear and can use a walking aid, if needed. (2) The patient starts in a seated position. (3) The patient stands up

upon the therapist’s command: walks 3 m, turns around, walks back to the chair, and sits down. (4) The time stops when the patient is seated. (5) Be sure to document the assistive device used. Since inadequate sleep is associated with delirium, minimize disruption for lab draws, alarms, and noise at nighttime when possible. Also, EPs should sparingly use tethers such as IVs, monitoring, and Foley catheter [50•]. In addition to limiting mobility, ethers can lead to or worsen agitation.

If the older ED patient becomes agitated while delirious, EPs should assess safety risk for both the patients and staff. If at all possible, non-pharmacological measures to reduce agitation should be performed. This verbal de-escalation techniques (Table 3), turning of the lights and minimizing ambient noise, provide reassurance and redirection and provide a means for self-orientation by using clocks, calendars, and signs. Some disoriented patients may become more agitated when their perception of reality is challenged. You may encourage family members or caregivers who demonstrate a calming presence to remain at their bedside. Agitation may be secondary to discomfort, and older patients with delirium or dementia may have difficulty verbalizing this. It is important to rule out urinary retention, constipation, or pain as the cause of their agitation. For the agitated older ED patient, EPs will need to evaluate falls risk and place precautions as needed. Such patients may require a one-to-one sitter to prevent injury during their ED stay.

Pharmacological options are reserved for agitation with delirium. Non-pharmacological options should be tried first [51••]. There are no FDA-approved medications for the treatment of delirium; however, antipsychotics are commonly used to manage hyperactive or psychotic symptoms that threaten safety when non-pharmacologic approaches are ineffective. If pharmacological options are needed, one should start with oral medications. When medications are needed, one should start with low doses and titrate. Rather than choosing a new agent, we recommend the use of antipsychotics previously given at home. If a patient demonstrates a risk of harm to others due to agitation, one may use the list of medications below (Table 4) [29••]. If necessary, one may consider the use of IM or IV medications. This is indicated when oral medication is not effective. Starting the lowest effective dose to maintain patient and staff safety and re-dosing may be needed.

Black box warning: Antipsychotic agents have a black box warning that they increase the risk of death in older adults with

Table 3 The principles of verbal de-escalation

• Respect personal space	• Listen closely to what the patient is saying
• Do not be provocative	• Agree or agree to disagree
• Establish verbal contact	• Set clear limits
• Be concise and use simple language	• Offer choices and optimism
• Identify the patient’s wants and feelings	• Debrief the patient and staff

Table 4 Pharmacological therapy

Oral agent	Dose	Contraindications and risks
Risperidone	≤ 1 mg PO	Orthostatic hypotension Caution for frail or hypovolemic patient
Olanzapine	2.5–5 mg PO	Orthostatic hypotension and somnolence
Quetiapine	25–50 mg PO	Orthostatic hypotension and somnolence
IM or IV dose	Dose	Contraindications and risks
Olanzapine	2.5–5 mg IM/IV	Caution in intoxicated or hypovolemic patients
Ziprasidone	10 mg IM	Caution in uncontrolled heart failure or cardiac disease, intoxicated, or hypovolemic/orthostatic patients
Haloperidol	1–2.5 mg IM 0.25–1 mg IV	More extrapyramidal side effects than the atypical antipsychotics IM is preferred to IV. IV may precipitate torsade de pointes in patients with QT prolongation.

dementia, but the exact mechanism for increased mortality is unknown [52••].

Besides considerations to pharmacological agents to control agitation, it is also necessary to review and identify medications related to harm. Several medications are associated with delirium and increased agitations. Many are listed in the Beers criteria [34], and some examples include diphenhydramine for agitation in older adults. Diphenhydramine has anticholinergic side effects and produces prolonged sedation. Long-term exposure is known to increase the risk of delirium.

Benzodiazepines are commonly used in ED and inpatient treatment, but the risk of delirium is reported in the previous literature. The use of benzodiazepines in older adults is associated with an increased risk of sedation, agitation, and worsened delirium [53•]. There are specific indications where benzodiazepines are the first choice, which are alcohol withdrawal, substance-induced delirium, and chronic benzodiazepine use. It is recommended that a low dose of a benzodiazepine, such as lorazepam, is started from 0.5 to 1 mg either PO, IM, or IV [29••].

A common EM practice involves the assessment and treatment of pain with various analgesias. Studies suggest that pain is associated with delirium [54], and the use of opioids is associated with delirium [55, 56]. Since evidence is still conflicting, this decision is best determined by the clinicians at the bedside. For physicians to avoid heavy reliance on opioid pain medication amid the opioid pandemic, it is recommended to use a multimodal pain management plan. There is an emerging evidence to use regional anesthesia for fracture care instead of systemic opioid, and when resource and skillset are available, it can be an effective modality in the ED. [57–60]

Transition of Care to Hospital Medicine

The frail older adults with concomitant cognitive impairment are a challenging subset who often require hospitalization. Treatments started in the ED can easily have a lasting and significant effect on hospital courses, outcomes, and length of stay. When care is transferred to another physician, the

focus of care shifts to the management of multiple, active, and on-going diseases processes that will, on average, take 3 to 4 days to resolve depending on the subsequent level of disposition (home, home with home health, SNF, hospice, etc.).

When these patients are admitted to the inpatient setting, it is important that our ED and hospital medicine colleagues speak the same language, especially with regard to evaluating mentation. If your inpatient setting has a successful delirium program, it is important to follow its lead regarding assessment and choose a similar tool that will translate from the ED to the inpatient level of care. Mentation assessments should be considered as a vital sign. As delirium awareness and education continue to increase across the country, so do the number of inpatients, ED, and ICU delirium management programs. As delirium awareness and education continue to increase across the country, so do the number of inpatient, ED, and ICU delirium management programs. To develop a common ground, we recommend the use of the ADEPT tool to build a program.

Conclusion

Delirium is a common geriatric emergency and requires the EP to assess, diagnose, evaluate the severity and its etiology, prevent, and treat the underlying cause. The management and prevention of delirium is an area of active investigation. Delirium is a key geriatric syndrome that geriatric ED providers should routinely screen for. A strong emphasis is on the widespread use of delirium screening followed by prevention and treatment efforts.

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