

Managing Delirium In The Emergency Department: Tools For Targeting Underlying Etiology

Abstract

Delirium represents the complex junction between vulnerable patients, medical conditions, and environmental factors. Given the varied presentations of this disorder and the emergency department clinical environment, recognition and treatment may be challenging. Delirium can be diagnosed using validated standardized screening tools such as the Confusion Assessment Method. Management of delirium is directed towards rapidly treating the underlying medical condition while preventing and managing the behavioral symptoms with nonpharmacological (first-line) and pharmacological (second-line) interventions. In the severely agitated patient, pharmacological treatment tailored to the patient's age and comorbidities may be required as the initial treatment to facilitate evaluation and management of the underlying medical condition. Effective risk stratification and triage tools can positively impact patient and staff safety, as well as patient outcomes.

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CME Objectives

Upon completion of this article you should be able to:

1. Describe the morbidity and mortality associated with delirium.
2. Identify major vulnerability and precipitant factors for delirium.
3. Apply a delirium screening tool to patients with suspected delirium.
4. Discuss the role of system- and team-based approaches to the prevention, diagnosis, and management of delirium.

Prior to beginning this activity, see "Physician CME Information" on the back page

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Opening Cases

It is the beginning of another Saturday night shift, and as you walk in, you see security and the outgoing attending wrestling a large 20-something-year-old man to the bed. He is yelling about a government conspiracy and his right to freedom of speech. A nurse injects medicine into his left deltoid. You are looking forward to the sign-out on this gentleman and wonder what he was injected with and whether there was another way to manage him.

As your colleagues manage the young man, you scan the board and see that the next patient to be seen is a 79-year-old lady who presents for altered mental status. As you approach the bed, you do not see anyone with her. You begin to take her history, and observe that she seems a bit lethargic and is tangential in her thinking. She is able to tell you that she lives with her husband and has a history of high blood pressure and confusion. She then mentions that you look like a friend of hers from work and asks whether you are married. You see your colleagues finishing up with their patient, so you extricate yourself and return to the physician station wondering why this patient is so lethargic and why her attention is so decreased.

Finally, just as rounds are about to begin, you see an intubated patient in the first resuscitation bay starting to buck at his vent. You notice his hands and feet are in 4-point restraints. After inquiring about the reason for his visit, you are informed that he is a chronic alcoholic who had been attempting to detoxify at home and has come in today in delirium tremens, requiring intubation and large doses of benzodiazepines. You are concerned about the 4-point restraints, which you know are not favored, and you wonder if there was a better (and safer) way to manage the patient's agitation.

Introduction

Delirium is a complex neuropsychiatric disorder that often manifests secondary to a discrete medical condition. *The Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM-5)* describes delirium as an acute (usually developing over hours or a few days) and/or fluctuating disturbance in attention and cognition due to a medical condition, intoxicating substance, or multiple etiologies.

In the younger population, delirium encompasses common chief complaints such as agitation and altered mental status.^{2,3} Among the elderly population, it is estimated that 7% to 24% of patients presenting to the emergency department (ED) will have delirium, and up to 80% of critically ill intensive care patients will have delirium.⁴ A diagnosis of delirium carries with it significant morbidity and mortality, in addition to increased utilization of resources.⁵⁻⁹

Studies have shown that most emergency clinicians do not screen for or document their findings of delirium.¹⁰⁻¹² Because of this lack of screening and the

fluctuating course of the condition, the overall incidence of delirium in the ED is unknown. Some posit that emergency clinicians are aware of the impact of delirium on patient outcomes but are not knowledgeable about its diagnosis and management.¹³

Emergency clinicians are trained to manage the overt signs of delirium while concurrently searching for its underlying etiology. However, gaps in screening, knowledge, and understanding contribute to a missed diagnosis rate in the range of 54% to 89%.^{4,14} Additional complicating factors include the varied presentations of these patients and the inherent time and environmental pressures of the ED clinical environment. Diagnostic accuracy has been poor, and much of the emergency medicine literature on delirium is focused on the issue of recognition. Regarding the prevention and management of delirium in the ED, current guidelines are generalized from inpatient and postoperative studies. This issue of *Emergency Medicine Practice* focuses on the challenge of evaluating and managing the patient with delirium in the ED using the best available evidence from the literature.

Critical Appraisal Of The Literature

A literature search was performed on PubMed using the search terms *delirium* OR *agitation* OR *acute confusion* AND *emergency*. Additional references were obtained from the bibliographies of the articles reviewed. A search of the Cochrane Database of Systematic Reviews yielded several reviews regarding the pharmacological management of delirium, as well as 1 review of multicomponent interventions for preventing delirium in hospitalized patients, and 1 study protocol for interventions to prevent delirium in patients in institutional long-term care.

Clinical policies in the National Guidelines Clearinghouse (www.guideline.gov) and the American College of Emergency Physicians (ACEP) were also searched. Emergency medicine societies weighing in on the diagnosis and management of delirium include ACEP, the Society of Academic Emergency Medicine (SAEM), the Emergency Nurses Association (ENA), and the American Association of Emergency Psychiatry (AAEP). In 1999, ACEP published the "Clinical Policy for the Initial Approach to Patients Presenting with Altered Mental Status," which critically reviewed the literature and provided an evaluation framework; however, it did not address specific pharmacological interventions for delirium. While altered mental status, as a chief complaint, is not sensitive, it has been noted to be specific for delirium, when documented.³ In 2013, ACEP, the American Geriatrics Society, ENA, and SAEM jointly published "Geriatric Emergency Department Guidelines," which included recommendations regarding the workup and management of delirium in elderly

patients presenting to the ED.¹⁵

Various regional and national guidelines for the diagnosis and management of delirium in inpatient settings also exist. Within these guidelines, specific delirium recommendations for the ED are rare, but they can be found in the United Kingdom's National Institute for Health and Care Excellence (NICE) 2010 guideline, "Delirium: Diagnosis, Prevention and Management," and in "Delirium: Model of Care," from the Department of Health of the State of Western Australia.

Overall, the evidence to guide the screening and diagnosis of delirium in the ED is robust, while the literature regarding the subsequent management of delirium in the ED is less exhaustive and more reliant on expert consensus or data extrapolated from inpatient settings. The populations studied in the literature skew heavily towards the elderly patient.

The emergency medicine literature reflects the realities of the ED practice environment, with an emphasis on the management of the acutely agitated patient, in contrast to the work done in other specialties that focuses on prevention and management of delirium in the elderly patient. This dichotomy provides unique challenges in the interpretation of the existing evidence.

Epidemiology

Delirium represents a large burden on healthcare systems, and particularly those that serve the geriatric population. A review of ED delirium in the elderly found that 7% to 20% of patients admitted through the ED experience delirium.⁴ The presence of delirium increases the cost of each visit by approximately \$2500 per patient, representing a total annual cost of \$6.9 billion, or an increase in hospital charges of 27% for each patient.^{16,17} Contributing to these additional costs are increased hospital length of stay (LOS), increased intensive care unit (ICU) admissions, increased staff support for restraints, as well as a general functional decline of patients.^{5,18,19} Furthermore, patients with delirium require increased social support and have questionable ability to comply with medications as prescribed, leading to difficulties in discharge planning and more frequent nursing home placement.^{5,15,19}

Once patients are discharged from the hospital, they have an increased 30-day readmission rate.^{5,20} Estimates for the total cost to the healthcare system run between \$38 billion and \$152 billion.^{5,10,21} In addition to the financial costs, there are human costs. Delirium is a predictor of mortality, both independently as well as in various disease states, such as pneumonia and congestive heart failure.^{18,20,22-25} By some estimates, the presence of delirium portends mortality rates comparable to sepsis and myocardial infarction.^{9,17}

Pathophysiology And Subtypes

Delirium is an acute confusional state on the spectrum of acute brain dysfunction that is suspected to be precipitated by an underlying medical etiology. Current research in delirium suggests 2 distinct, but sometimes coexisting, etiologies: (1) Direct brain insults such as hypotension, hypoxia, trauma, and toxins; or (2) aberrant stress responses induced by physiologic insults such as infections or surgery.²⁶ While both categories represent end-organ damage of the brain, there is overlap between the physiologic underpinnings of the 2 groups, and this dichotomy serves as a framework for understanding delirium.²⁷ Direct brain insults are defined as entities that affect the energy supply or consumption of the brain or have otherwise disruptive effects on the brain architecture and pathways. Aberrant stress response more closely describes the cellular response to systemic insults. The current belief is that stressors and the ensuing sympathetic surge are associated with a preponderance of inflammatory cytokines, resulting in an imbalance of neurotransmitters. There is an increase in the dopaminergic tone and a decrease in acetylcholine in the central nervous system; however, there is some thought that the different psychomotor subtypes each have a unique mix of neurotransmitter dysregulation, and delirium represents the final common pathway of multiple pathologic neurotransmitter pathways.^{7,28,29}

Physiologically, this description of delirium as both a result of local and systemic etiologies agrees with the current model correlating patient vulnerability factors and both patient and environmental precipitant factors for delirium. (See the "Differential Diagnosis" section, page 4.) Additionally, these cellular changes inform and are consistent with the current understanding of the pharmacological treatment of delirium using antipsychotic agents with antidopaminergic activity.

Subtypes Of Delirium

There are 3 psychomotor subtypes of delirium: (1) hypoactive, (2) hyperactive, and (3) mixed type. The hypoactive subtype can be correlated to Richmond Agitation and Sedation Scale (RASS) scores of -3 to -1 (moderate sedation to drowsy) while the hyperactive subtype is associated with RASS scores of +1 to +4 (restless to combative).⁷ See Figure 1 (page 4) for a link to a tool useful in determining delirium subtype. The third type is a mixed-type delirium and is associated with a more persistent course.³⁰ Older patients are more likely to present with the hypoactive subtype.

Excited delirium syndrome is a newly defined entity representing a special case of hyperactive delirium associated with a metabolic derangement and increased mortality.^{31,32} There is some variability

ity in its definition, but excited delirium syndrome typically consists of a combination of pain tolerance, tachypnea, sweating, agitation, tactile hyperthermia, noncompliance with police, lack of tiring, unusual strength, inappropriate clothing, and mirror/glass attraction.^{31,32} A patient presenting with 6 of the 10 symptoms is considered to have a probable diagnosis of excited delirium syndrome. Excited delirium syndrome is differentiated from hyperactive delirium or general agitation, as excited delirium syndrome is considered a medical emergency, with an associated case fatality rate of around 10%.³¹ It is hypothesized that the underlying etiologies are related to intoxication and/or underlying psychiatric disease, with a proposed mechanism of excess dopamine. Patients often present with multiple metabolic derangements including dehydration, acidosis, rhabdomyolysis, and hyperkalemia. Most deaths are attributable to arrhythmias, predominately pulseless electrical activity and asystole; trauma may also play a role.^{33,34}

Differential Diagnosis

The differential diagnosis for delirium is divided into the underlying medical condition precipitating the patient's change in mental status and an alternative diagnosis that can be confused with delirium. It is useful to categorize this first category of conditions into those that are critical, emergent, and iatrogenic. (See Table 1.)

In terms of an alternative diagnosis, dementia is the main entity of concern. Dementia and delirium often coexist, and there are multiple overlapping features and a similar theorized pathophysiology.¹⁷ Without the proper history, it may be difficult to determine the time course and acuity of the symptoms, which are the key differentiating features. Table 2 (page 5) delineates the identifying features of each process. Lewy body dementia can be particularly challenging, as it is characterized by fluctuations in cognition and hallucinations, and its presence potentially redirects management, given the increased extrapyramidal side effects with antipsychotic use.³⁵

Figure 1. Richmond Agitation-Sedation Scale



To access a calculator, scan the QR code with a smartphone, or go to: <http://www.mdcalc.com/richmond-agitation-sedation-scale-rass/>

However, this type of dementia is a diagnosis of exclusion and underlying medical causes should be evaluated first.

Common categories of medical precipitants include: Infection (cited in 16% to 67% of cases, with urinary tract infections and pneumonia predominating); metabolic derangements (including sodium and calcium derangements); intracranial derangements (including cerebrovascular accidents and intracranial hemorrhage); and intoxication and withdrawal syndromes.⁷

One major category of precipitants often under-evaluated, especially in the older population, is prescribed medications. Beers criteria for potentially inappropriate medications describe several drugs

Table 1. Precipitating Factors For Delirium^{7,30,36}

Critical Factors

- Hypoxia/diffuse cerebral ischemia
 - Respiratory failure
 - Congestive heart failure
 - Myocardial infarction
 - Shock
- Systemic processes
 - Hypoglycemia
- CNS infections
- Hypertensive encephalopathy
- Elevated intracranial pressure (medical and surgical origin)

Emergent Factors

- Hypoxia/diffuse cerebral ischemia
 - Severe anemia
- Systemic diseases
 - Abnormal serum albumin
 - Abnormal sodium, glucose, or potassium
 - Acid-base disorders
 - Hypercarbia
 - Increased serum urea
 - Increased BUN:Cr ratio
 - Neoplasm
 - Vasculitis
- Endocrine disease
 - Thyroid
 - Adrenal
- Hepatic failure
- Nutrition/Wernicke disease
- Sepsis/infection*
- CNS disease
- Trauma
- Infections
- Stroke
- Intoxications and withdrawal*
 - CNS sedatives
 - Ethanol
 - Other medication side effects, particularly anticholinergics
- Subarachnoid hemorrhage
- Epilepsy/seizures
 - Postictal state
 - Nonconvulsive status epilepticus
 - Complex partial status epilepticus
- Fever
- Hypothermia/hyperthermia
- Urinary retention
- Fecal impaction
- Pain
- Impaired nutritional status/dehydration*
- Prolonged sleep deprivation

Iatrogenic Factors*

- Use of physical restraints*
- Polypharmacy*
- Use of a bladder catheter*
- Surgery*

*These factors increase the relative risk of delirium as well as precipitate it.

Abbreviations: BUN, blood urea nitrogen; CNS, central nervous system; Cr, creatinine.

and classes that are prone to causing delirium in the elderly: tricyclic antidepressants, anticholinergics, benzodiazepines, chlorpromazine, corticosteroids, H₂-receptor antagonists, meperidine, sedative hypnotics, and thioridazine.³⁹ From the emergency clinician's perspective, it is difficult to determine whether a single dose of these medications would precipitate delirium. A 2011 systematic review recommended that ED providers avoid meperidine and prescribe oxycodone if opioids are necessary, but otherwise, there was insufficient evidence to make recommendations regarding other classes, such as benzodiazepines, antihistamines, steroids, nonsteroidal anti-inflammatory drugs, antidepressants, cardiac glycosides, and anti-Parkinsonian agents.⁴⁰ For these agents, emergency clinicians should continue to use clinical judgment to weigh the risks and benefits of medication administration.

The current understanding of delirium notes an interplay between *precipitating factors* (as noted in Table 1) and what are commonly identified as *vulnerability factors*. (See Table 3.) The ACEP Geriatric Emergency Department Guidelines emphasize the presence of the following as significant risk factors for delirium: (1) Vision or hearing impairment, (2) decreased cognitive ability, (3) severe illness, and (4) dehydration. The presence of 1 or 2 factors increases the risk of development of incident delirium by 2.5

Table 2. Delirium Versus Dementia^{7,37,38}

Characteristic	Delirium	Dementia
Onset	Abrupt; hours to days	Gradual; months to years
Course	Fluctuates	Slow decline
Attention	Impaired	Intact early in course
Sleep-wake cycle	Disrupted	Usually normal
Alertness	Impaired	Intact early in course
Behavior	Agitated, withdrawn, depressed, or a combination of the above	Intact early in course
Speech	Variable; can be disorganized, rapid, or slowed	Word-finding problems
Thoughts	Disorganized, with delusions possible	Impoverished
Perception	Distorted, sometimes with hallucinations	Usually intact early in course
Level of consciousness	Characterized by altered level of consciousness	Normal
Disorganization	May be present	Typically absent
Reversibility	Usually reversible	Rarely reversible

Adapted from Lynn E. J. Gower, DO; Medley O. Gatewood, MD; and Christopher S. Kang, MD. "Emergency Department Management of Delirium in the Elderly." *Western Journal of Emergency Medicine*. 2012; Volume 13, Issue 2, pages 194-201. Used with permission of the authors.

times. The presence of 3 or 4 risk factors increases the incidence by > 9 times.¹⁵ Finally, underlying neurodegenerative diseases (such as dementia) have the strongest association with delirium. Two-thirds of geriatric delirium patients who present to the hospital have underlying dementia.¹⁷ In both mouse and human models, it has been shown that there is a direct dose-response curve, with increasing neurodegenerative disease being associated with increased delirium.⁴¹

Once the patient arrives to the hospital, interventions by medical staff can also precipitate delirium, including physical restraints, malnutrition, the addition of 3 or more medications, introduction of a bladder catheter, or other iatrogenic events.⁴² Often, multiple precipitants coexist. However, according to one study, in 13% of cases, no precipitating factor could be found.⁴³

Prehospital Care

The emergency medical services (EMS) system is an important ally in the recognition of delirium. Shah et al prospectively compared the incidence of cognitive impairment in elderly patients arriving to the ED via EMS versus other modes of transport.⁴⁴ The study reported that 13% of EMS patients had cognitive impairment compared to 8% arriving via other modes of transport ($P < .01$). EMS can be particularly helpful in ascertaining from family, caretakers, and environmental clues the patient's baseline cognitive status and the time course of any changes.

Regarding prehospital detection, we are aware of one study examining a tool for the diagnosis of delirium in elderly patients in the prehospital set-

Table 3. Vulnerability Factors In Delirium^{27,30}

Not Modifiable	Potentially Modifiable
• Dementia*	• Visual impairment*
• Cognitive impairment*	• Hearing impairment*
• History of delirium*	• Depression*
• Functional impairment*	• Alcohol misuse*
• Comorbidity or severity of illness*	• Immobility
• History of transient ischemic attack or stroke	• Low level of activity
• Older age (> 75 years)*	• Decreased oral intake
• Male gender	• Dehydration
• Residence in a nursing home*	• Malnutrition
• History of falls	• Polypharmacy
• Chronic renal or hepatic disease	• Treatment with multiple psychoactive drugs
• Neurologic disease	• Metabolic derangements
• Terminal illness	• Functional impairment
• Infection with human immunodeficiency virus	• Depression

*Studies show an increased relative risk for developing delirium in patients with these factors.

ting. Frisch et al modified the Confusion Assessment Method (CAM) and prospectively applied it to over 250 patient/prehospital provider pairs and found a sensitivity of 63% (95% confidence interval [CI], 0.73-0.84) and a specificity of 0.85 (95% CI, 0.80-0.89).⁴⁵ This was comparable to a Glasgow Coma Scale (GCS) score of < 15. (Sensitivity, 67%; 95% CI, 0.47-0.82; specificity, 85%; 95% CI, 0.80-0.89.)⁴⁵ The GCS score was chosen as a comparator because it is currently the predominant tool for the prehospital assessment of mental status. Of note, formal cognitive testing was not performed; this has been shown to be a factor in poorer performance of CAM-based tools.¹⁶

The other major role of prehospital care in the delirious patient includes the rapid recognition of and intervention in any apparent life-threatening conditions. The data regarding prehospital care distinct to the delirious patient are focused on the management of the agitated patient. While protocols exist, they are variable. The literature is characterized largely by case reports regarding the management of agitated patients. Much of the recent literature is weighted towards descriptions of excited delirium syndrome and its recognition and management. Several case reports and case series examining the use of ketamine and its beneficial and deleterious effects on the hyperactive delirious patient exist, but no widespread recommendations regarding its use can be made at this time.⁴⁶⁻⁴⁹

Emergency Department Evaluation

History

The 2010 geriatric competencies for residents include the expectation that residents are able to “assess and document current mental status and any change from baseline in every elder, with special attention to determining if delirium exists or has been superimposed on dementia.”⁵⁰ This mandate of vigilance applies equally to patients in other age groups.

The ED evaluation of delirium is a parallel process of diagnosis and management that is familiar to providers in the workup of most critical diseases. The first responsibility of the emergency clinician is personal and team safety. Once safety is ascertained, the emergency clinician must simultaneously evaluate the patient and manage emergent conditions. Because delirium can be considered a medical emergency, it is prudent to follow the “airway, breathing, circulation” practice and the primary survey algorithm common in both trauma and medical resuscitations.

The key to diagnosing delirium is to maintain a high index of suspicion in vulnerable patient populations.⁵¹ Several predictive factors have been identified, including cognitive impairment, severity of illness, age, visual impairment, and elevated ratio

of blood urea nitrogen to creatinine (BUN:Cr).^{51,52}

Crucial to the diagnosis of delirium is the determination of the patient’s baseline mental status and confirmation of any acute change.⁵³ Often, this information will need to be corroborated or provided by a family member or other healthcare professional. Prior documentation of the patient’s cognitive baseline by previous clinicians can be particularly helpful and highlights the importance of subsequent documentation of current findings. While the clinical information provided by the history and physical examination provides a basis for diagnosing and managing delirium, these elements are insufficient by themselves.^{54,55}

Concurrent with the establishment of the diagnosis of delirium, emergency clinicians must gather information on the possible precipitating medical event as well as stabilize any life-threatening events. The primary survey and scan of the vital signs to determine the severity of the patient’s condition and manage any life-threatening issues (including trauma and infectious signs) is a helpful place to begin. Historical questions and physical examination targeted at patients with suspected delirium emphasize a search for both precipitating and vulnerability factors. (See **Table 1, page 4** and **Table 3, page 5**.) Special attention should be paid to medication, intoxication, and possible trauma, as well as infectious signs, as these represent the most common reversible causes of delirium.

Physical Examination

The neurological examination should focus on the central nervous system, including focal or lateralizing symptoms, the cranial nerves, and examination of cerebellar signs such as gait and truncal ataxia. The mental status examination involves multiple components. The most commonly recommended ED tools, including the mini-mental status examination and the 6-item screener, test areas such as orientation, registration, attention, calculation, and recall as well as language and praxis.^{19,36} **Table 4 (page 7)** illustrates other commonly cited elements of the history, physical examination, and diagnostic studies as described in delirium guidelines and review articles. The recommendations are based largely on expert consensus.

Screening Tools

A challenge unique to the ED is that delirium is often typified by a fluctuating course, and some patients may be diagnosed only on re-evaluation, sometimes by multiple clinicians. If delirium is suspected, multiple screening tools exist and are generally composed of a component of cognitive testing followed by scoring criteria for the diagnosis of delirium. The predominant screening tool described in the emergency medicine literature is the

CAM.^{16,21} The short form of the CAM has become the reference standard for ED evaluation of delirium. The CAM is composed of 4 elements: (1) Acute onset of fluctuating course, (2) inattention, (3) altered level of consciousness, and (4) disorganized thinking. The presence of elements 1 and 2 and either 3 or 4 indicates delirium. (The training manual for CAM can be found at: <http://www.hospitalelderlifeprogram.org/delirium-instruments/confusion-assessment-method-long-cam/confusion-assessment-method-long-cam-manual/>)

In 2014, LaMantia et al published a review of the literature and found 29 articles on screening for delirium in the ED setting. The CAM was the only tool validated for ED use.²¹ Monette et al evaluated the CAM as administered by trained layperson interviewers compared to geriatrician assessment in 110 elderly patients and found a sensitivity of 86% and a specificity of 100%.⁵⁶ These ED study results are comparable to a larger systematic review of the CAM in multiple clinical settings by Wei et al in 2008.¹⁶ This review cited 239 articles and found a sensitivity range of 46% to 100%; an overall sensitivity of 94% (95% CI, 91%-97%); and specificity range of 63% to 100%, with an overall specificity of 89% (CI, 85%-94%). In 2014, Han et al validated the CAM-ICU (intensive care unit) for ED use in a cohort of 406 patients and showed a sensitivity of 72% and specificity of 98.6%.⁵⁷

Diagnostic Studies

The guidelines for delirium are consistent in the recommendation that diagnostic studies indicated in the workup of delirium are directed by the history,

physical examination, and differential diagnosis. These recommendations are based on expert consensus. Clinical training, judgment, and common sense are the common themes in the literature discussing the workup of delirium. More specific to delirium, a search for both precipitating factors and vulnerability factors should be undertaken.^{19,42}

Infection is the most common etiology noted in elderly patients, and it often presents with a hypoactive subtype of delirium. One-third of patients presenting to the ED with delirium will be diagnosed with infection, and a search for infectious etiologies is required.⁵⁸ Many of the "basic" laboratory tests (including the complete blood count and basic metabolic panel) are useful not only in the diagnosis of the underlying etiology but also in providing information for predictive models of delirium risk. For example, elevated serum bicarbonate, elevated glucose, elevated BUN:Cr ratios, low hemoglobin, and low chloride levels have all been identified in predictive models for delirium.^{5,52} Given the possibility of contributing liver and abdominal processes, liver function tests, lipase, and ammonia levels are recommended. Blood gases may be useful when hypercarbia is suggested by a patient history of pulmonary disease or when pulse oximetry is unreliable in discerning hypoxia. While the ingestion of many toxins may be evident on history and physical examination, it can be useful to obtain screening for drugs of abuse in the specific setting of co-ingestions or atypical presentations. However, the results of these studies must be interpreted with caution, as false-positive and false-negative results do occur. Additionally, positive results may imply chronic or past use and lead away from alternative acute pathology.

Table 4. Emergency Department Evaluation Of Delirium^{7,15,35}

Phase	History	Physical Examination	Diagnostic Studies
Initial evaluation	<ul style="list-style-type: none"> • Verification of information via proxy • Baseline mental status • Medications: anticholinergics, sedatives/hypnotics • Opioids • Medication changes • Drug and alcohol use • Trauma 	<ul style="list-style-type: none"> • Vital signs • Primary survey • Mental status • Neurological 	<ul style="list-style-type: none"> • Blood glucose • Electrolytes • Urinalysis • BUN:Cr • ECG • Chest x-ray • Drug levels
Higher yield (focused by specific history and physical examination features)	<ul style="list-style-type: none"> • Recent illness • Thorough review of systems 	<ul style="list-style-type: none"> • Eye: pupil and fundoscopic examination • Neck: thyromegaly and meningismus • Lung: signs of pneumonia or pulmonary edema • Cardiovascular: new murmurs, fistulas/grafts, pulse deficits • Abdomen: tenderness may indicate inflammatory or infectious process • Genitourinary/rectal: signs of infection or bleeding • Skin: rash, cellulitis/abscess, decubitus ulcers; medication patches; hydration status, signs of shock 	<ul style="list-style-type: none"> • Blood gas • Liver function • Thyroid function tests • CT head • PT/PTT; INR • Lumbar puncture • Drug/toxicology screen • MRI • EEG

Abbreviations: BUN, blood urea nitrogen; Cr, creatinine; CT, computed tomography; ECG, electrocardiogram; EEG, electroencephalogram; INR, international normalized ratio; MRI, magnetic resonance imaging; PT, prothrombin time; PTT, partial thromboplastin time.

The electrocardiogram can be especially helpful to search for causes such as arrhythmia and myocardial infarction. Delirium can be the only presenting symptom in up to 5% of elderly patients with ST-segment elevation myocardial infarction.⁵⁹ Furthermore, alternative morphologies such as signs of right heart strain suggesting pulmonary embolism, as well as changes suggesting electrolyte imbalance or toxic ingestions (such as tricyclic antidepressant or nodal blocking agent ingestion) can be seen. Finally, special attention to a prolonged QT interval is required, as this finding can represent an underlying etiology such as a genetic predisposition to arrhythmia, electrolyte abnormalities (hypokalemia, hypomagnesemia, hypocalcemia), or drug effects. Additionally, a prolonged QT interval can have direct effects on management, as many of the antipsychotic medications have additional QT prolonging effects.⁶⁰⁻⁶³

A study of 106 patients by Hardy and Brennan retrospectively evaluated the results of head computed tomography (CT) scans ordered for acute confusion and recommended that these studies be performed only if a history of fall, trauma, or neurological findings are elicited in the initial workup.⁶⁴ This study noted that, of the 14% of head CTs showing acute findings, all of the patients had focal neurological deficits or a history of fall. In a 2013 retrospective study of 291 elderly ED patients (aged ≥ 75 y), 4.9% of patients scanned for delirium without focal neurologic deficits had acute intracranial pathology.⁶⁵ While the recommendations of these studies are acknowledged, it is difficult to make final recommendations based on small, retrospective data sets with debatable conclusions on clinically significant yield. Additionally, subacute and chronic findings such as hydrocephalus, atrophy, old infarcts, and subdural hematoma may help direct future care.

The 2013 ACEP consensus geriatric ED guidelines recommend an initial workup specifically targeting the following: Infections (urinary tract infections, pneumonia), medications (anticholinergics, sedatives, hypnotics, opioids, new medications), electrolyte imbalance, alcohol/drug use/withdrawal, and new focal neurologic findings. For admitted patients, it is recommended to screen and provide aids for impaired vision and hearing, cognitive impairment, severe illness, dehydration, and prerenal azotemia.¹⁵

Less-common causes of delirium such as nonconvulsive status epilepticus, herpetic encephalitis, and anti-NMDA (N-methyl-D-aspartate) receptor encephalitis are also routinely found in the literature.^{8,66,67} While uncommon, these etiologies highlight the need for a lower threshold for lumbar puncture and the involvement of further neurologic testing (ie, electroencephalogram) and consult in undifferentiated cases as next-line diagnostics. The commonality in these causes is that they can be asso-

ciated with significant morbidity and mortality and are eminently treatable if causes are diagnosed early.

Management

The goal of managing delirium in the ED is to rapidly identify and address the underlying medical conditions. Much of the treatment literature is directed towards hyperactive delirium or agitation and involves the balance between optimizing patient safety and minimizing disruptive behaviors and iatrogenic triggers. Emergency clinicians are encouraged to initiate medical management and provide supportive care and nonpharmacological management as the first steps. In the event that a pharmacological intervention is warranted, the ideal agent targets the underlying etiology, has a rapid onset, and has minimal side effects. Algorithms and protocols may assist in the rapid identification, management, and prevention of delirium.⁶⁸

Medical Management

Patients who present with acute delirium should be rapidly evaluated and treated for reversible emergent medical conditions and acute intoxication, with standard emergency care. Common reversible conditions such as hypoglycemia, hypoxia, hypothermia, hyperthermia, hypotension, pain, or overdose are evident from the initial medical screening and vital signs. Standard treatment such as dextrose, supplemental oxygen, warming, cooling, intravenous fluids, opioids for pain management, or naloxone for opioid overdose often result in rapid resolution of symptoms of delirium or agitation resulting from these conditions. Emergent medical conditions such as severe dehydration; infections; electrolyte abnormalities; metabolic encephalopathy from hepatic, renal, or central nervous system conditions, including central nervous system infections, seizures, hypertensive encephalopathy, acute intracranial hemorrhage, and stroke should also be rapidly identified and treated. Acute intoxication or withdrawal from drugs or chemical agents such as alcohol, tricyclic antidepressants, ethylene glycol, cholinesterase inhibitors, anticholinergic agents, carbon monoxide, and cyanide also require drug screening, rapid treatment, and antidotes.³⁰ If there is a concern for nonconvulsive status epilepticus, electroencephalography in the ED may be warranted.⁶⁶ Initiating rapid workup and treatment of emergent medical conditions (ie, acute intoxication or withdrawal) with standard maximal treatment in the ED should target the suspected underlying etiologies of delirium. Patients with persistent symptoms of delirium and agitation despite administration of standard emergency care may require additional nonpharmacological or pharmacological interventions to control or prevent symptoms of delirium.^{61,69}

Nonpharmacological Management

Nonpharmacological interventions are used to address mild to moderate agitation in cooperative patients. These nonpharmacological interventions may also be used to prevent iatrogenic delirium and agitation. Multicomponent nonpharmacological interventions have been demonstrated to effectively reduce the incidence and duration of delirium and agitation in acute care settings.⁷⁰⁻⁷²

Interventions include verbal de-escalation, show of force, one-to-one observation, decreased environmental stimulation, food or drink, limiting tethering and medical procedures (eg, Foley catheters), reorienting and cognitively stimulating patients, facilitating verbal orientation from family members, avoiding medications known to precipitate delirium, and providing visual and hearing assistive devices.⁷¹⁻⁷⁴ Physical restraints should be reserved for violent and severely agitated patients to facilitate patient and staff safety as well as medical workup.

Verbal De-escalation

Verbal de-escalation is often employed as a first-line treatment, but it is inadequately described in the literature. In 2012, a Consensus Statement of the American Association for Emergency Psychiatry Project BETA (Best Practices in Evaluation and Treatment of Agitation) De-escalation Workgroup provided guidelines in this intervention for emergency clinicians. The workgroup recommends an internationally recognized 3-step approach of: (1) Verbally engaging the agitated patient, (2) establishing a collaborative relationship with the patient, and (3) verbally de-escalating the patient out of agitation.^{73,75,76} This workgroup advises proper training on the 10 elements of verbal de-escalation for maximal effectiveness, which include:^{72,73,77}

1. Respect the patient's personal space
2. Do not be provocative
3. Establish verbal contact
4. Be concise
5. Identify the patient's wants and feelings
6. Listen closely to what the patient is saying
7. Agree or agree to disagree
8. Lay down the law and set clear limits
9. Offer choices and optimism
10. Debrief the patient and staff

An initial show of force with security guard activation is a commonly used intervention and was demonstrated in a sample of 223 security activations to be an effective nonpharmacological intervention in 27% of patients who avoided sedation.⁷⁸ Additionally, a survey of emergency departments revealed that one-to-one observation had a perceived efficacy of 48%.⁷⁹ In the event an initial show of force fails or if a severely agitated patient presents violently, physical restraints are often required to facilitate medical and pharmacological management.

Physical Restraints

Physical restraints are to be used as a temporizing measure, as they can increase agitation and the risk of injury. In the literature, physical restraints in agitated patients have been noted to result in significant injuries and death by asphyxiation.^{80,81} The introduction and application of physical restraints should be systematic and performed by an informed, organized, and professional team of staff members. All objects that could be used as weapons should be removed from the patient by security guards and staff. Patients should be placed in the supine position with the head elevated to prevent aspiration. The team leader should control the patient's head while other team members secure the extremities in extension, with leather restraints, to the bed frame. Frequent monitoring, re-evaluation, repositioning, and anticipation of basic needs are required for patients in physical restraints as well as for patients who have received chemical intervention.⁸²

Multicomponent Protocols

There is growing evidence for instituting a multicomponent nonpharmacological protocol for the treatment of delirium. Traditional strategies rely on isolated interventions such as one-on-one sitters, restraints, or reorientation. A 2011 observational inpatient study supports a promising multicomponent nonpharmacological program consisting of a restraint-free environment maxim of "Tolerate, Anticipate, Don't Agitate" (TADA).⁸³ Flaherty and Little describe a strategy of zero tolerance for restraints that emphasizes patient-centered techniques meant to allow for the patient's natural response to the clinical environment. These tactics return a sense of control to the patient. Instead of immediately restraining patients who have begun to pull at lines and leads, allow the patient leeway, within the bounds of safety, to mobilize and voice his dissent ("tolerate") and potentially uncover the reason for the discontent (ie, the need to void). Additionally, an example given is in removing unnecessary attachments or camouflaging necessary attachments, as they can be predictably disrupting ("anticipate"). One example of the "don't agitate" tenet that appears to run contrary to traditional techniques is to stop reorientation when it proves ineffective or is exacerbating to a patient's condition. This study shows similar LOS, function, mortality rates, and fall rates in hospital for delirious patients in units utilizing the TADA strategy when compared to similar nondelirious patients in other areas of the hospital. While not practical in the current ED setting, with the rise of geriatric and otherwise specialized areas of the department, multicomponent interventions such as these may become more relevant.

Focused interventions have also been shown to be of benefit in reducing delirium in various clinical settings and may be useful for implementation

in the ED setting. For example, improving sleep hygiene decreases incidences of delirium.⁸⁴ In a 2009 prospective study of 219 patients, Mouzopoulos et al demonstrated that fascia iliaca blocks (as an alternative to systemic opioid medications) decreased delirium from 24% to 16% in patients with hip fracture.⁸⁵ By decreasing the rates of delirium in the inpatient setting, studies have shown a decrease in cost per patient as well as overall LOS.⁸⁶

A single study has evaluated the introduction of medication-specific education and interventions, beginning at their point of entry in the ED. These interventions were continued during the patients' inpatient stays. By targeting medications known to precipitate delirium, Naughton et al showed a decrease in delirium from 40.9% at baseline to 22.7% at 4 months and 19.1% at 9 months, following the intervention. This study demonstrated decreased delirium and LOS and hypothesized decreased hospital costs.⁸⁷ The Care and Respect for Elders with Emergencies (CARE) program in the ED at Mount Sinai Hospital in New York, NY is an example of implementation of multicomponent interventions to reorient, cognitively stimulate, and provide hearing and visual assistive devices in the ED to elders who are at high risk for delirium.⁸⁸ The CARE volunteers were trained to address modifiable risk factors for delirium and other geriatric syndromes. Similar interventions have been built into geriatric ED guidelines.

Pharmacological Management

The mainstay and consensus recommendation for the pharmacological management of delirium is to treat the underlying etiology first, then treat the behavioral symptoms. Pharmacological treatments are considered only when nonpharmacological treatments (such as de-escalation techniques) have proven ineffective and the safety of the patient or staff is at risk.⁷³ Pharmacological management is often required for severely agitated and violent patients in order to facilitate rapid medical evaluation and treatment. Pharmacological management should be used cautiously in special populations such as the elderly, patients with Parkinson disease and Lewy body dementia, intoxicated patients, and patients with comorbidities such as cardiac, renal, and hepatic disease. Preferred classes of drugs include antipsychotics and benzodiazepines. Low-dose combinations of these 2 classes are often used to achieve rapid control of agitated behaviors while minimizing risks and side effects.⁸⁹ In the literature, there remains variability in the recommended dose ranges and observed half-life of the classes of drugs used to manage delirium and agitation. Therefore, the dose range and half-life for particular drugs reviewed represent those commonly used in clinical practice and supported by the literature.⁹⁸ Any patient who receives pharmacological management

is at risk for cardiac and respiratory adverse effects and should be closely monitored.

Typical Antipsychotics

Haloperidol (Haldol® in the United States), a first-generation typical antipsychotic is considered an agent of choice due to extensive clinical experience with the drug. Haloperidol is given in doses of 2.5 mg to 10 mg and has a 5-minute to 60-minute onset of action.⁹⁰ Haloperidol dosing should be reduced by half in the elderly patient. Haloperidol may be administered via multiple routes: intravenous, intramuscular, and oral. Droperidol (Inapsine®), an analog of haloperidol, is another first-generation typical antipsychotic given in doses of 2.5 mg to 5 mg. Droperidol has the added advantage of a shorter onset of action, and shorter half life; however, it is more likely to cause orthostatic hypotension. These first-generation antipsychotics have been noted, on postmarketing surveillance, to potentially cause QT prolongation, cardiac dysrhythmias (such as torsades de pointes), and increased mortality in dementia patients, and they received a controversial black box warning from the United States Food and Drug Administration (FDA) in 2008.⁸⁹ However, a retrospective study of 2468 patients aged 20 months to 98 years who received droperidol in the ED identified 6 serious adverse events and concluded that there was no evidence of a causal relationship between droperidol and the adverse events.⁹¹ Therefore, it is recommended that caution be used in patients at risk for QT prolongation, hypokalemia, hypomagnesemia, and other electrolyte disorders. In addition, caution should be used in patients with drug withdrawal syndromes, seizures, or those at risk for anticholinergic toxicity. Furthermore, first-generation typical antipsychotics are not indicated in the treatment of dementia-related psychosis due to increased mortality risk and they are contraindicated in Parkinson disease or Lewy body dementia due to the risk of neuroleptic sensitivity reactions.^{92,93} Certain patient populations may benefit from second-generation atypical antipsychotics or benzodiazepines for management of delirium and agitation.

Table 5 (page 11) summarizes the recommended pharmacological management of delirium and acute agitation. These recommendations are based on both ED and inpatient studies and illustrate the fundamental principal to “start low and go slow.”

Atypical Antipsychotics

Atypical antipsychotics are commonly used for acute agitation in the psychiatric population, but their use in the ED for delirium and agitation is not well characterized. The atypical antipsychotics may be useful in delirium and acute agitation in patients with a contraindication to the use of typical antipsychotics or patients with acute agitation secondary

to an underlying psychiatric disorder. Risperidone (Risperdal®) and quetiapine (Seroquel®) are only available for oral administration, limiting their use in the ED to cooperative patients. Olanzapine (Zyprexa®), ziprasidone, and aripiprazole (Abilify®) are available for intramuscular (IM) and oral administration. The atypical antipsychotics with intramuscular formulations may be useful for uncooperative, severely agitated patients in the acute ED setting. Olanzapine 10 mg IM has a rapid onset of action. Ziprasidone (Geodon®) 10 to 20 mg IM also has a rapid onset of action; however, it may be more likely to cause QT prolongation.⁹⁸ Additionally, due to the limited dopamine antagonism effect, the atypical antipsychotics, at low doses, are preferred over the typical antipsychotics in patients with Parkinson disease or Lewy body dementia.^{94,95}

Recent studies compared the use of atypical antipsychotics to the current standard ED management for delirium and acute agitation. In one study, oral risperidone plus lorazepam demonstrated similar efficacy to the standard and common ED use of intramuscular haloperidol plus lorazepam for rapid control of psychotic agitation, but the study did not assess efficacy in undifferentiated delirium or acute agitation in an ED setting.⁹⁶ A 2013 multicenter randomized double-blind placebo-controlled clinical trial of 336 patients was performed in an ED setting using olanzapine in 1 arm for management of acutely agitated patients. In this trial, patient ICD-10 categories included intoxication, mental illness, and organic

illness. Intravenous droperidol or intramuscular olanzapine as an adjunct to midazolam was, similarly, found to result in effective and more-rapid sedation than midazolam alone.⁹⁷

Benzodiazepines

Benzodiazepines are an additional class of medication preferentially used and effective in the treatment of patients in the ED with undifferentiated severe agitation, intoxication or withdrawal syndromes, younger patients, and in Parkinson disease or Lewy body dementia patients with acute agitation.⁹⁸ Lorazepam is given in doses of 0.5 to 2 mg IV or IM, has a rapid onset of action and half-life of 10 to 20 hours. Midazolam is given in doses of 2.5 to 5 mg intravenously (IV) or IM and has an even more rapid onset and shorter half-life of 2 to 7 hours. Benzodiazepines place patients at risk for respiratory depression and hypotension; therefore, all patients, especially those with underlying pulmonary disease and/or those with concurrent use of central nervous system depressants, require close monitoring after administration.⁹⁸ Use of benzodiazepines is an independent risk factor for delirium, and adverse effects include sedation and falls in the elderly in the acute ED setting.⁹⁹ Additionally, doses should be reduced by 20% to 50% in elderly patients, patients with chronic illnesses such as liver and renal disease, and in combination with opioids or other central nervous system depressants.

A 2010 systematic review of 31 clinical trials found benzodiazepines to be effective and well-

Table 5. Medications For Management Of Delirium And Acute Agitation

Drug	Dose	Adverse Effects	Comments
Typical Antipsychotics			
Haloperidol	2.5 mg-10 mg oral, IM, IV	<ul style="list-style-type: none"> • QT prolongation • Extrapyramidal symptoms • Orthostatic hypotension 	<ul style="list-style-type: none"> • Preferred in acute psychosis • Initial and serial ECGs recommended • Reduce dose in elderly patients • Avoid in QT prolongation, Parkinson disease, Lewy body dementia, withdrawal syndromes, seizures, hypokalemia, hypomagnesemia, congestive heart failure, bradycardia
Droperidol	2.5 mg-5 mg IM, IV		
Atypical Antipsychotics			
Olanzapine	5-10 mg IM	<ul style="list-style-type: none"> • QT prolongation • Orthostatic hypotension • Extrapyramidal symptoms 	<ul style="list-style-type: none"> • Preferred over typical antipsychotics, at reduced doses, in Parkinson disease or Lewy body dementia • Reduce dose in elderly patients • Avoid in QT prolongation or intoxication with CNS depressants
Ziprasidone	10-20 mg IM		
Benzodiazepines			
Midazolam	2.5-5 mg IM, IV	<ul style="list-style-type: none"> • Respiratory depression • Hypotension 	<ul style="list-style-type: none"> • Preferred in intoxication and withdrawal syndromes • Midazolam is preferred for IM administration; when compared to lorazepam, it results in rapid onset and rapid time to arousal • Reduce dose in elderly patients • Reduce dose in chronic liver and renal disease, in combination with opioids or other CNS depressants
Lorazepam	0.5-2 mg IM, IV		

Recommended doses are consolidated from those cited in the literature and confirmed by pharmacological reference manuals. Abbreviations: CNS, central nervous system; ECG, electrocardiogram; IM, intramuscular; IV, intravenous.

tolerated pharmacological therapies for agitation.⁶⁸ In a prospective randomized double-blind trial of agitation in the ED in a population aged 19 to 68 years with a majority of patients diagnosed with intoxication on initial assessment, midazolam resulted in a more rapid and adequate sedation when compared to droperidol and ziprasidone.⁶⁸ Additionally, a randomized prospective double-blind study of violent and severely agitated patients in the ED noted that midazolam (5 mg IM) resulted in a significantly more-rapid onset of action and rapid time to arousal when compared to lorazepam (2 mg IM) and haloperidol (5 mg IM).¹⁰⁰ A Cochrane review of benzodiazepines for alcohol withdrawal reemphasizes benzodiazepines' protective benefit against alcohol withdrawal symptoms when compared to placebo.^{101,102} For more information on management of alcohol withdrawal syndrome in the ED, see the June 2015 issue of *Emergency Medicine Practice*, "Alcohol Withdrawal Syndrome: Improving Outcomes Through Early Identification And Aggressive Treatment Strategies," at www.ebmedicine.net/alcoholwithdrawal.

Ketamine

Ketamine is often used for procedural sedation in the ED and has also been used in the prehospital and hospital settings to manage severe undifferentiated agitation.¹⁰³ Ketamine dosed at 1 to 2 mg/kg IV or 4 to 5 mg/kg IM may be used for acute agitation after traditional management has failed. The studies on ketamine use are limited to small samples, and neither dosing for acute agitation nor its use in delirium has been established in the literature to date.^{46,104} Adverse effects include hypertension, tachycardia, laryngospasm, emergence reactions, and intubation. Ketamine use should be avoided in elderly patients and in patients with heart disease or schizophrenia. A 2015 study of ketamine given for pharmacologic management of agitation in 51 patients demonstrated increasing dose-related rates of hospital admission and intubation (29%) in patients receiving prehospital intramuscular ketamine.⁴⁶ Additionally, patients treated with ketamine for acute agitation in the ED were noted to require additional doses of sedatives due to ketamine's short half-life.¹⁰⁴ These studies highlight the need for further research.

Combination Therapy

Combination therapy is often used in the management of acute agitation in emergency settings.¹⁰⁵ A multicenter randomized double-blind placebo-controlled clinical trial of 336 patients aged 18 to 65 years was published in 2013 on undifferentiated acutely agitated ED patients.⁹⁷ The patients' ICD-10 categories included intoxication, mental illness, and organic illness. In this study, intravenous droperidol or intramuscular olanzapine as an adjunct to

midazolam was found to similarly result in effective and more-rapid sedation than midazolam alone. Extrapolating from studies performed in patients with psychotic agitation, a prospective randomized double-blind multicenter ED trial compared haloperidol (5 mg), lorazepam (2 mg), or both in combination for acute psychotic agitation.¹⁰⁶ Effective symptom reduction was achieved in all treatment groups. Rapid symptom resolution was achieved in the patients receiving the combination treatment of haloperidol and lorazepam.

Additionally, a 2013 Cochrane review of 21 studies involving 1968 patients found insufficient evidence to support or refute the emergency management of acute agitation with benzodiazepines alone or in combination with antipsychotics.¹⁰⁷ Given the insufficient evidence and risk of adverse effects with high doses of either class, a combination of benzodiazepines with antipsychotics, which has been found to be superior to either class alone, remains a recommended clinical practice.⁹⁸ Therefore combination treatment with antipsychotics and benzodiazepines remains the recommended treatment of choice for acute agitation for rapid resolution of symptoms. This combination treatment approach has the added benefit of reducing doses to minimize the adverse effects of both classes of drugs.

Controversies And Cutting Edge

The National Institutes of Health Task Force on Research in Emergency Medicine has identified specific areas of delirium requiring further research, including the following: assessment of delirium and thresholds for involuntary treatment; better definition of outcomes, including calming and sedation; development and efficacy of nonpharmacological interventions; the study of the safety and efficacy of pharmacological interventions, physical restraints, and other interventions; and new treatments for delirium.¹⁰⁸ Regarding prophylaxis in the ED with pharmacological agents, a Dutch randomized controlled multicenter study evaluating the efficacy of haloperidol for the prevention of delirium in patients admitted through the ED (HARPOON Trial) has been proposed.¹⁰⁹ Identified in the literature review of pharmacological management, further research is needed to delineate the optimal management of delirium and undifferentiated agitation in ED settings and in the elderly; the safety of droperidol for use in the ED setting; the utility, safety, and efficacy of atypical antipsychotics in the ED setting; and the minimum effective dose for ketamine use in the prehospital and ED setting. Further research is also necessary to identify the combinations of therapy that are optimal for particular subpopulations. Finally, due to the controversy over the FDA black box warnings issued for the typical and atypical antipsychotics, the FDA plans to revisit this issue.

Risk Stratification Tools

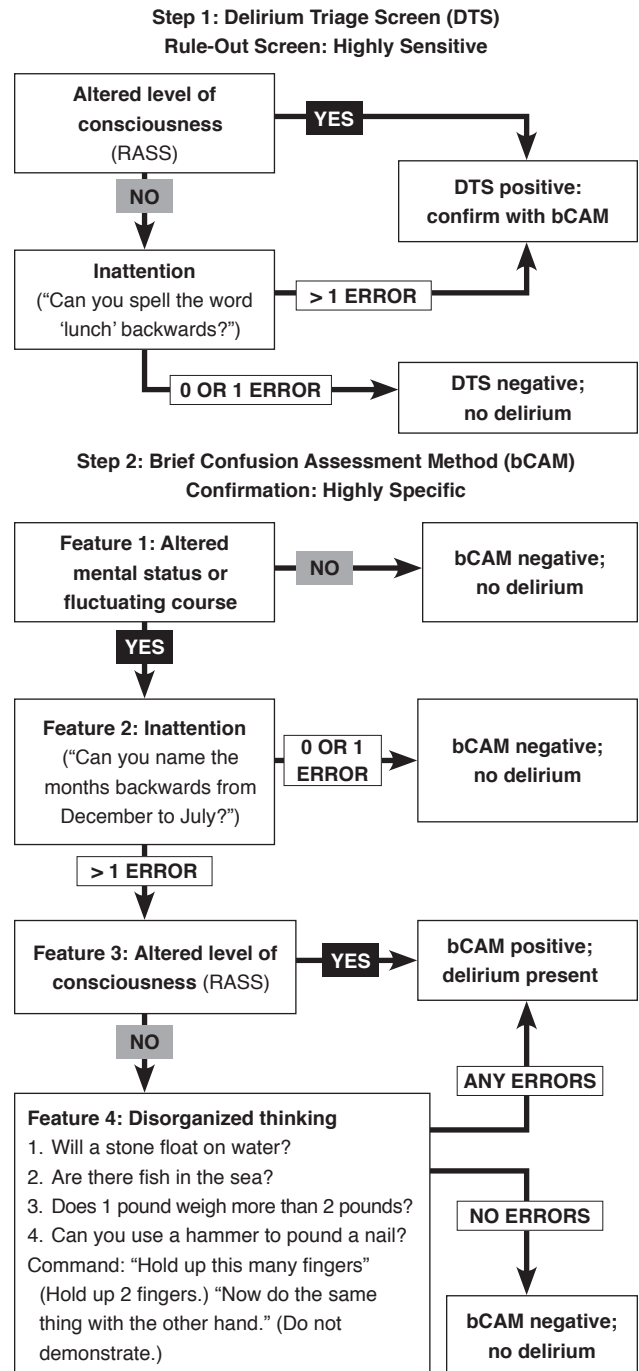
Regarding improved ED diagnosis of delirium, several proposals have been published in recent years. Risk stratification tools have been derived to identify high-risk patients. In a 2009 study, Han et al studied 303 older patients presenting to the ED and derived a prediction rule identifying the presence of dementia, functional impairment (a Katz Activities of Daily Living Score ≤ 4), and hearing impairment.¹⁹ The test characteristics demonstrated an area under the curve (AUC) value of 0.82, and a score of ≥ 1 had a sensitivity of 96% and a specificity of 49.3%. If the score had been applied to the study population, 165 patients (54.5%) would have been screened and 1 patient with delirium would have been missed; 141 of these patients would not have had delirium.

In 2014, Kennedy et al evaluated 700 older patients in the ED and developed a risk stratification tool that included: older age, prior stroke or transient ischemic attack, dementia, suspected infection, tachypnea, and acute intracranial hemorrhage (AUC, 0.77).⁵ Additional findings associated with delirium included a serum bicarbonate level > 30 mmol/L, a serum glucose level > 300 mg/dL, history of anxiety, and APACHE II score > 15 . Finally, in 2014, Hare et al developed a screening tool for nurses to use with the following elements: cognitive impairment, arrhythmia, and depression.¹¹⁰ A score of ≥ 2 yielded a reported sensitivity of 87% and a specificity of 70%. These risk stratification tools have yet to be validated in the ED setting and, as such, are not recommended for current use. However, they may be used in the future to inform triage protocols targeted at both screening for and preventing delirium.

Triage Tools

One recently published triage protocol is gaining traction in the ED literature. Despite the prevalence of the CAM over the past 2 decades as a brief, validated tool in the ED, the number of missed delirium cases has not improved. Low overall recognition has been attributed to lack of education and the heavy workflow found in the typical ED.¹² The recent geriatric ED guidelines now recommend a 2-tiered approach to diagnosis.¹⁵ A sensitive delirium triage screen (DTS) incorporated into the initial screening of elderly patients has been proposed. Patients who screen positive will be followed with a more specific delirium screening. This approach is akin to the recent developments in sepsis screening and is also consistent with the clinical approach to human immunodeficiency virus (HIV) screening and the workup of pulmonary embolism. **Figure 2** is an algorithm based on a 2013 study by Han et al of 406 elderly patients.¹⁴ When compared to a psychiatrist reference standard, physicians completing the 2-part screening process (the DTS followed by a brief form of the CAM [bCAM]) showed a sensitivity of 82%

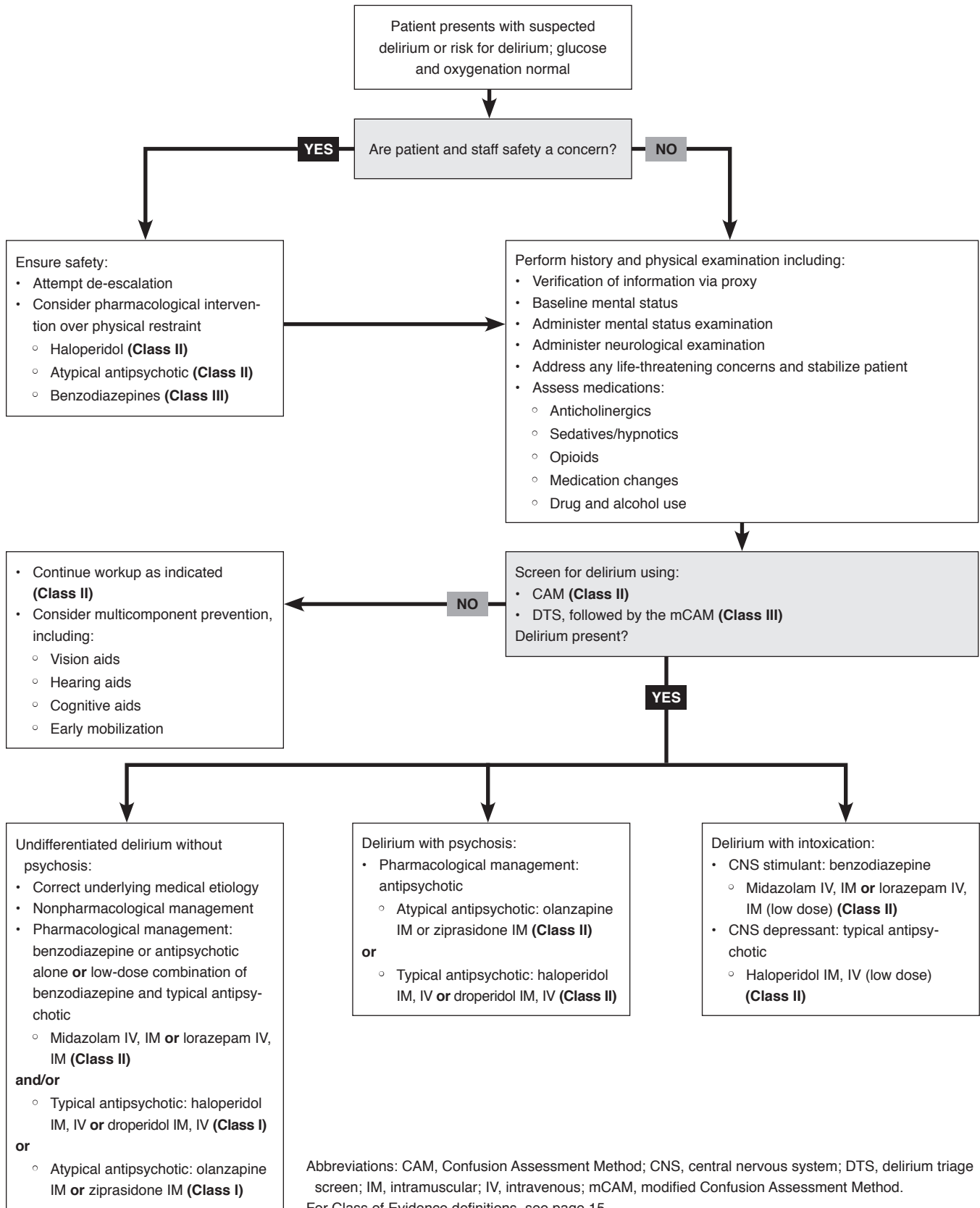
Figure 2. Delirium Triage Screen And bCAM 2-Step Algorithm¹⁴



Step 1 (DTS) can be integrated into the nurses' triage assessment. If the DTS result is negative, then delirium is ruled out and no additional testing is needed. If the DTS result is positive, then a confirmatory delirium assessment such as the bCAM should be performed. Both assessments use the RASS, which assesses for arousal and ranges from -5 (coma) to +4 (combative). A score of 0 indicates normal level of consciousness.

Abbreviations: bCAM, Brief Confusion Assessment Method; DTS, delirium triage screen; RASS, Richmond Agitation-Sedation Scale. Reprinted from *Annals of Emergency Medicine*, Vol. 62, Issue 5, Jin H. Han, Amanda Wilson, Eduard E. Vasilevskis, et al. "Diagnosing Delirium in Older Emergency Department Patients: Validity and Reliability of the Delirium Triage Screen and the Brief Confusion Assessment Method." Pages 457-465. Copyright 2013, with permission from Elsevier.

Clinical Pathway For Diagnosing And Managing Delirium In The Emergency Department



(95% CI, 69.2%-90.2%) and a specificity of 95.8% (95% CI, 93.2%-97.4%). The performance of this algorithm was comparable if a trained nonclinician rater performed the bCAM and/or the initial screening. A small pilot study applying the proposed 2-tiered approach by emergency clinicians showed that the approach was feasible, as demonstrated by a 76.5% adherence rate.⁵⁵

Disposition

Consistent with general ED care, the disposition of patients with delirium hinges on the severity of disease, the underlying etiology, medical comorbidities, and functional status, as well as factors relating to social support and appropriate follow-up. It is difficult to make broad generalizations regarding the disposition of ED patients with delirium, but emergency clinicians should recognize that delirium is an independent risk factor for increased morbidity and mortality. It should be stressed that delirious patients represent a vulnerable population with demonstrated poorer outcomes. Studies have shown that up to 37% of delirious ED patients are discharged home.^{11,111} Mortality for discharged delirium is increased 2 to 3 times in the 3- to 6-month period, when adjusted for comorbidity, age, and severity of illness.²⁵ Two large ED studies with 653 elderly ED patients combined demonstrated a 31% to 37% mortality rate at 6 months post-ED-discharge compared to 14.3% for nondelirious patients.^{112,113}

Observation units may not be the solution for disposition for delirious patients in the ED. A single study of delirious patients managed in an ED observation unit demonstrated similar mortality rates of 30%, versus 10% for patients with and without delirium, respectively.

While some delirious patients may otherwise warrant discharge, the emergency clinician should be mindful of potentially complicating factors. There is a markedly decreased understanding of the current illness and discharge instructions in this patient

population.¹¹⁴ Furthermore, discharge plans require cohesive planning, possibly including geriatric assessment in the ED, telephone follow-up, home-based rapid referral, integration into community centers, in-home assessments, and staff education programs. As hospitals see an increase in the number of acute delirium units or specialized elder-care floors and teams, disposition decisions may best be made in the team setting.

Summary

Delirium represents a difficult diagnosis of acute brain dysfunction and/or geriatric syndrome in the ED population. The emergency clinician is well trained to evaluate the patient's condition, treat emergent conditions, and search for underlying etiologies. Special emphasis should be given to obtaining history verifying the patient's baseline cognitive status as well as medication history. However, the recognition and diagnosis of delirium in the ED remains elusive. While the CAM has been available and validated for ED use for over 2 decades, the inherently pressured characteristics of the ED environment persist, leading to a gap in diagnosis. The current guidelines recommend a systematic and team-based approach to the diagnosis of delirium. At-risk individuals are initially screened at triage, with a subsequent confirmatory test performed if screened positive. Finally, the management and treatment of delirium in the ED population, both with pharmacological and nonpharmacological means, is an area of particular interest and requires further study.

Case Conclusions

You noted that your 20-something-year-old patient with apparent excited delirium syndrome had received haloperidol and lorazepam, so you continued to monitor him via telemetry monitoring, pulse oximetry, and end-tidal

Class Of Evidence Definitions

Each action in the clinical pathways section of *Emergency Medicine Practice* receives a score based on the following definitions.

Class I

- Always acceptable, safe
- Definitely useful
- Proven in both efficacy and effectiveness

Level of Evidence:

- One or more large prospective studies are present (with rare exceptions)
- High-quality meta-analyses
- Study results consistently positive and compelling

Class II

- Safe, acceptable
- Probably useful

Level of Evidence:

- Generally higher levels of evidence
- Nonrandomized or retrospective studies: historic, cohort, or case control studies
- Less robust randomized controlled trials
- Results consistently positive

Class III

- May be acceptable
- Possibly useful
- Considered optional or alternative treatments

Level of Evidence:

- Generally lower or intermediate levels of evidence
- Case series, animal studies, consensus panels
- Occasionally positive results

Indeterminate

- Continuing area of research
- No recommendations until further research

Level of Evidence:

- Evidence not available
- Higher studies in progress
- Results inconsistent, contradictory
- Results not compelling

This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient's individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.

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Risk Management Pitfalls For Delirium In The Emergency Department

- 1. “I thought that this was the patient’s baseline dementia.”**
Dementia is a common confounder for delirium, but it is also a major risk factor for the development of delirium, as the neurologic pathology follows similar pathways. Demented patients are a higher-yield group for delirium screening and they benefit from additional attention and specialized care.
- 2. “I didn’t have time to do a delirium screen on this patient.”**
While the time pressures of the ED environment are uniquely challenging, brief tools have been developed for ED use; specifically, the short version of the CAM takes about 2 minutes to administer.
- 3. “The patient was agitated, so we sedated and restrained him and put him in the corner.”**
Agitated patients often have underlying metabolic disturbances. Once sedated, they are at risk for respiratory depression and, if placed on supplemental oxygen, would benefit from additional ventilatory monitoring in the form of end-tidal CO₂ monitoring. Furthermore, if the patient meets criteria for excited delirium syndrome, there is an increased chance of arrhythmia.
- 4. “We did not find anything wrong with the patient, so we sent him home with our usual discharge instructions.”**
While a certain subset of delirious patients are appropriate for discharge, overall, there is an increased risk of recidivism, morbidity, and mortality, especially in the elderly patient. At the very least, many of these patients have an increased need for coordination of care and may benefit from team-based services such as medication reconciliation, geriatric consultation, home-based assessment, and establishment of support networks.
- 5. “Our elderly patient had a urinary tract infection, so we admitted her to the floor with a urinary catheter.”**
While often indicated, urinary catheters are a known precipitant for delirium and should be avoided, when possible. Admitted patients may benefit from a team-based approach to prevent delirium and other geriatric syndromes. Many hospitals currently have specialized geriatric wards or delirium units that may be more appropriate for elderly patients at risk for delirium.
- 6. “Our elderly patient had mild pneumonia and confusion, so I discharged her.”**
While pneumonia severity scoring systems do not supersede clinical judgment, they include factors such as age and mental status changes that indicate poorer outcomes and warrant increased consideration for admission.
- 7. “He was agitated, so we restrained him right away.”**
Providing visual and hearing assistive devices should be attempted first. Alternative nonpharmacological techniques include verbal de-escalation, show of force, one-to-one observation, decreased environmental stimulation, food or drink, limiting tethering and medical procedures, reorienting and cognitively stimulating patients, verbal orientation from family members, and avoiding medications known to precipitate delirium. If patient or staff safety is a concern, restraints and pharmacological agents may be indicated as first-line treatment.
- 8. “The patient had a psychiatric history, so we assumed this was his usual psychosis.”**
Patients with an episode of acute psychosis may be difficult to distinguish from patients with delirium due to a medical etiology, and they are easy to dismiss as having a strictly functional diagnosis. However, these patients are also at increased risk for delirium, and, specifically, excited delirium syndrome is associated with baseline psychiatric comorbidity. Pay particular attention to the patient’s baseline, usual episodes, changes in attention, cognition, and the time course of these changes, as well as any signs or symptoms pointing to a medical diagnosis.
- 9. “The patient said he was fine and did not know why he was even in the hospital.”**
Patients with delirium often have baseline confusion, and it is vital to the workup to obtain corroborating information via proxy. A specific timeline of cognitive change is high-yield, as acute alterations or fluctuation are a hallmark of delirium.
- 10. “The patient said she was not prescribed any new medications.”**
Medications are a particularly prevalent cause of delirium, especially in older patients. Even without new prescriptions, it is important to obtain a detailed medication history as changes in dosages and interactions with over-the-counter medications can lead to unintended delirium.

CO₂. Intermittently, his breathing slowed, his end-tidal CO₂ rose, and the patient required stimulation and airway repositioning. His lab results showed rhabdomyolysis and an elevated lactate. You initiated fluid and monitored his renal function and urine output.

You returned to your 79-year-old patient who presented for altered mental status. Although her husband returned and stated that he was not sure why she was in the hospital, as she had baseline dementia, she screened positive for delirium. Preliminary laboratory and diagnostic testing was significant only for a positive urinalysis, which you treated promptly. You placed her in the newly designed geriatric ED and initiated a geriatric team consult, inquiring about further admission to the inpatient delirium ward.

Finally, for your struggling mechanically ventilated patient, you initiated an analgesic agent and you were able to gradually titrate down the sedative dose and change the patient over to soft restraints.

References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, randomized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study will be included in bold type following the reference,

Time- And Cost-Effective Strategies

- While delirium is widely prevalent in the ED population, screening can be directed toward patients with specific risk factors, including increased age, underlying cognitive impairment, visual or hearing impairment, and multiple comorbidities.
- After the identification of at-risk individuals, the current recommendation is for a 2-tier assessment. The initial delirium triage screen has similar performance characteristics when performed by trained lay interviewers, as compared to clinicians.
- While a comprehensive testing program for altered patients is reasonable, directed testing for high-yield etiologies based on the initial history and physical examination can be cost-effective. For example, head CT scan in undifferentiated delirium has a diagnostic yield of only roughly 5%, and those patients will usually manifest signs of trauma or neurologic deficits. However, the caveat here is the need for a reliable history and physical examination.

where available. In addition, the most informative references cited in this paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Arlington, VA: American Psychiatric Association; 2013. doi:10.1176/appi.books.9780890425596.744053. **(Book)**
2. Nassisi D, Okuda Y. ED Management Of Delirium. *Emergency Medicine Practice*. 2007;9(1):1-20. **(Review)**
3. Han JH, Schnelle JF, Ely EW. The relationship between a chief complaint of "altered mental status" and delirium in older emergency department patients. *Acad Emerg Med*. 2014;21(8):937-940. doi:10.1111/acem.12436. **(Retrospective; 400 patients)**
4. Barron EA, Holmes J. Delirium within the emergency care setting, occurrence and detection: a systematic review. *Emerg Med J*. 2013;30(4):263-268. doi:10.1136/emmermed-2011-200586. **(Systematic review)**
5. Kennedy M, Enander R, Tadiri SP, et al. Delirium risk prediction, healthcare use and mortality of elderly adults in the emergency department. *J Am Geriatr Soc*. 2014;62(3):462-469. doi:10.1111/jgs.12692. **(Prospective; 700 patients)**
6. Thompson K, Allen SC. Outcomes of emergency admission of older patients: impact of cognitive impairment. *Br J Hosp Med (Lond)*. 2008;69(6):320-323. **(Review)**
- 7.* Han JH, Wilber ST. Altered mental status in older patients in the emergency department. *Clin Geriatr Med*. 2013;29(1):101-136. doi:10.1016/j.cger.2012.09.005. **(Review)**
- 8.* Wilber ST. Altered mental status in older emergency department patients. *Emerg Med Clin North Am*. 2006;24(2):299-316. doi:10.1016/j.emc.2006.01.011. **(Review)**
9. Witlox J, Eurelings LS, Jonghe JF, et al. Delirium in elderly patients and the risk of postdischarge mortality. *JAMA*. 2010;304(4):443-451. **(Systematic review)**
10. Carpenter CR, Griffey RT, Stark S, et al. Physician and nurse acceptance of technicians to screen for geriatric syndromes in the emergency department. *West J Emerg Med*. 2011;12(4):489-495. **(Prospective; 55 participants)**
11. Hustey FM, Meldon SW. The prevalence and documentation of impaired mental status in elderly emergency department patients. *Ann Emerg Med*. 2002;39(3):248-253. doi:10.1067/mem.2002.122057. **(Prospective; 297 patients)**
12. Press Y, Margulin T, Grinshpun Y, et al. The diagnosis of delirium among elderly patients presenting to the emergency department of an acute hospital. *Arch Gerontol Geriatr*. 2008;48(2):201-204. doi:10.1016/j.archger.2008.01.008. **(Retrospective; 319 patients)**
13. Davis D, MacLulich A. Understanding barriers to delirium care: a multicentre survey of knowledge and attitudes amongst UK junior doctors. *Age Ageing*. 2009;38(5):559-563. doi:10.1093/ageing/afp099. **(Prospective; 784 patients)**
14. Han JH, Wilson A, Vasilevskis EE, et al. Diagnosing delirium in older emergency department patients: validity and reliability of the delirium triage screen and the brief confusion assessment method. *Ann Emerg Med*. 2013;62(5):457-465. doi:10.1016/j.annemergmed.2013.05.003. **(Prospective; 406 patients)**
- 15.* American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, et al. Geriatric emergency department guidelines. *Ann Emerg Med*. 2014;63(5):e7-e25. doi: 10.1016/j.annemergmed.2014.02.008. **(Practice guidelines)**
16. Wei L, Fearing M, Sternberg EJ, et al. The Confusion Assessment Method: a systematic review of current usage. *J Am Geriatr Soc*. 2008;56(5):823-830. doi:10.1111/j.1532-5415.2008.01674.x. **(Systematic review)**
- 17.* Inouye S. Delirium in older persons. *N Engl J Med*.

- 2006;354(11):1157-1165. **(Review)**
18. Mariz J, Santos NC, Afonso H, et al. Risk and clinical-outcome indicators of delirium in an emergency department intermediate care unit (EDIMCU): an observational prospective study. *BMC Emerg Med.* 2013;13:2. doi:10.1186/1471-227X-13-2. **(Prospective; 238 patients)**
 19. Han JH, Zimmerman EE, Cutler N, et al. Delirium in older emergency department patients: recognition, risk factors, and psychomotor subtypes. *Acad Emerg Med.* 2009;16(3):193-200. doi:10.1111/j.1553-2712.2008.00339.x. **(Prospective; 303 patients)**
 20. Uthamalingam S, Gurm GS, Daley M, et al. Usefulness of acute delirium as a predictor of adverse outcomes in patients > 65 years of age with acute decompensated heart failure. *Am J Cardiol.* 2011;108(3):402-408. doi:10.1016/j.amjcard.2011.03.059. **(Prospective; 883 patients)**
 - 21.* LaMantia M, Messina FC, Hobgood CD, et al. Screening for delirium in the emergency department: a systematic review. *Ann Emerg Med.* 2014;63(5):551-560. doi:10.1016/j.annemergmed.2013.11.010. **(Systematic review)**
 22. Dhaussy G, Dramé M, Jolly D, et al. Is health-related quality of life an independent prognostic factor for 12-month mortality and nursing home placement among elderly patients hospitalized via the emergency department? *J Am Med Dir Assoc.* 2012;13(5):453-458. doi:10.1016/j.jamda.2011.10.002. **(Prospective; 1306 patients)**
 23. Dramé M, Lang PO, Novella J-L, et al. Six-month outcome of elderly people hospitalized via the emergency department: the SAFES cohort. *Rev Epidemiol Sante Publique.* 2012;60(3):189-196. doi:10.1016/j.respe.2011.11.004. **(Prospective; 1306 patients)**
 24. Pieralli F, Vannucchi V, Mancini A, et al. Delirium is a predictor of in-hospital mortality in elderly patients with community acquired pneumonia. *Intern Emerg Med.* 2014;9(2):195-200. doi:10.1007/s11739-013-0991-1. **(Retrospective; 443 patients)**
 25. Han JH, Shintani A, Eden S, et al. Delirium in the emergency department: an independent predictor of death within 6 months. *Ann Emerg Med.* 2010;56(3):244-252. doi:10.1016/j.annemergmed.2010.03.003. **(Prospective; 628 patients)**
 26. MacLulich AMJ, Ferguson KJ, Miller T, et al. Unravelling the pathophysiology of delirium: a focus on the role of aberrant stress responses. *J Psychosom Res.* 2008;65(3):229-238. doi:10.1016/j.jpsychores.2008.05.019. **(Review)**
 27. Han JH, Wilson A, Ely EW. Delirium in the older emergency department patient: a quiet epidemic. *Emerg Med Clin North Am.* 2010;28(3):611-31. doi:10.1016/j.emc.2010.03.005. **(Review)**
 28. Flacker JM, Lipsitz L. Neural mechanisms of delirium: current hypotheses and evolving concepts. *Journals Gerontol Ser A Biol Sci Med Sci.* 1999;54(6):B239-B246. doi:10.1093/gerona/54.6.B239. **(Review)**
 29. Meagher DJ, O'Hanlon D, O'Mahony E, et al. Relationship between symptoms and motoric subtype of delirium. *J Neuropsychiatry Clin Neurosci.* 2000;12(1):51-56. **(Review article)**
 30. Inouye SK, Westendorp RGJ, Saczynski JS. Delirium in elderly people. *Lancet.* 2014;383(9920):911-922. doi:10.1016/S0140-6736(13)60688-1. **(Review)**
 31. Vilke GM, Payne-James J, Karch SB. Excited delirium syndrome (ExDS): redefining an old diagnosis. *J Forensic Leg Med.* 2012;19(1):7-11. doi:10.1016/j.jflm.2011.10.006. **(Review)**
 32. Vilke GM, DeBard ML, Chan TC, et al. Excited delirium syndrome (ExDS): defining based on a review of the literature. *J Emerg Med.* 2012;43(5):897-905. doi:10.1016/j.jemermed.2011.02.017. **(Review)**
 33. Strote J, Walsh M, Auerbach D, et al. Medical conditions and restraint in patients experiencing excited delirium. *Am J Emerg Med.* 2014;32(9):1093-1096. doi:10.1016/j.ajem.2014.05.023. **(Retrospective)**
 34. Gordon C, Schmelzer M. Care of the patient in excited delirium. *J Emerg Nurs.* 2013;39(2):190-196. doi:10.1016/j.jen.2012.03.007. **(Review)**
 35. Trzepacz P, Breitbart W, Franklin J, et al. Practice guideline for the treatment of patients with delirium. American Psychiatric Association. *Am Psychiatr Assoc.* 1999;156(5 Suppl):1-20. **(Guideline)**
 36. Huff JS. *Rosen's Emergency Medicine – Concepts and Clinical Practice.* 7th ed. New York, NY: Saunders; 2010. doi:10.1016/B978-0-323-05472-0.00013-X. **(Textbook)**
 37. Gillis A, MacDonald B. Unmasking delirium. *Can Nurse.* 2006;102(9):18-24. **(Review)**
 38. Gower LEJ, Gatewood MO, Kang CS. Emergency department management of delirium in the elderly. *West J Emerg Med.* 2012;13(2):194-201. doi:10.5811/westjem.2011.10.6654. **(Review)**
 39. American Geriatrics Society 2012 Beers Criteria Update Expert Panel. American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2012;60(4):616-631. doi:10.1111/j.1532-5415.2012.03923.x. **(Guideline)**
 40. Carpenter CR. Which medications are associated with incident delirium? *Ann Emerg Med.* 2012;59(4):321-322. doi:10.1016/j.annemergmed.2011.05.029. **(Systematic review)**
 41. Davis DHJ, Skelly DT, Murray C, et al. Worsening cognitive impairment and neurodegenerative pathology progressively increase risk for delirium. *Am J Geriatr Psychiatry.* 2014;1-13. doi:10.1016/j.jagp.2014.08.005. **(Prospective; 465 patients)**
 42. Inouye S, Charpentier P. Precipitating factors for delirium in hospitalized elderly persons: predictive model and interrelationship with baseline vulnerability. *JAMA.* 1996;275(11):852-857. **(Prospective; 508 patients)**
 43. Koponen H, Stenbäck U, Mattila E, et al. Delirium among elderly persons admitted to a psychiatric hospital: clinical course during the acute stage and one-year follow-up. *Acta Psychiatr Scand.* 1989;79(6):579-585. **(Prospective; 70 patients)**
 44. Shah MN, Jones CMC, Richardson TM, et al. Prevalence of depression and cognitive impairment in older adult emergency medical services patients. *Prehosp Emerg Care.* 2011;15(1):4-11. doi:10.3109/10903127.2010.514093. **(Prospective; 1342 patients)**
 45. Frisch A, Miller T, Haag A, et al. Diagnostic accuracy of a rapid checklist to identify delirium in older patients transported by EMS. *Prehosp Emerg Care.* 2013;17(2):230-234. doi:10.3109/10903127.2012.744785. **(Prospective; 259 patients)**
 46. Burnett AM, Peterson BK, Stelpflug SJ, et al. The association between ketamine given for prehospital chemical restraint with intubation and hospital admission. *Am J Emerg Med.* 2015;33(1):76-79. doi:10.1016/j.ajem.2014.10.016. **(Retrospective)**
 47. Burnett AM, Watters BJ, Barringer KW, et al. Laryngospasm and hypoxia after intramuscular administration of ketamine to a patient in excited delirium. *Prehosp Emerg Care.* 2011;16(3):412-414. doi:10.3109/10903127.2011.640766. **(Case report)**
 48. Le Cong M, Gynther B, Hunter E, et al. Ketamine sedation for patients with acute agitation and psychiatric illness requiring aeromedical retrieval. *Emerg Med J.* 2012;29(4):335-337. doi:10.1136/emj.2010.107946. **(Review)**
 49. Ho JD, Smith SW, Nyström PC, et al. Successful management of excited delirium syndrome with prehospital ketamine: two case examples. *Prehosp Emerg Care.* 2013;17(2):274-279. doi:10.3109/10903127.2012.729129. **(Case report)**
 50. Hogan TM, Losman ED, Carpenter CR, et al. Development of geriatric competencies for emergency medicine residents using an expert consensus process. *Acad Emerg Med.* 2010;17(3):316-324. doi:10.1111/j.1553-2712.2010.00684.x. **(Guideline)**
 51. Sendelbach S, Guthrie P. Evidence-based practice guideline: acute confusion/delirium. *J Gerontol Nurs.* 2009;35(11):11-18.

- doi: 10.3928/00989134-20090930-01. **(Practice guidelines)**
52. Inouye SK, Viscoli CM, Horwitz RI, et al. A predictive model for delirium in hospitalized elderly medical patients based on admission characteristics. *Ann Intern Med.* 1993;119(6):474-481. doi:10.7326/0003-4819-119-6-199309150-00005. **(Prospective; 281 patients)**
 53. Potter J, George J. The prevention, diagnosis and management of delirium in older people: concise guidelines. *Clin Med (Northfield Il).* 2006;6(3):303-308. doi:10.7861/clinmedicine.6-3-303. **(Guideline)**
 54. Suffoletto B, Miller T, Frisch A, et al. Emergency physician recognition of delirium. *Postgrad Med J.* 2013;89(1057):621-625. doi:10.1136/postgradmedj-2012-131608. **(Prospective; 259 patients)**
 55. Grossmann FF, Hasemann W, Graber A, et al. Screening, detection and management of delirium in the emergency department - a pilot study on the feasibility of a new algorithm for use in older emergency department patients: the modified Confusion Assessment Method for the emergency department (mCAM-E). *Scand J Trauma Resusc Emerg Med.* 2014;22:19. doi:10.1186/1757-7241-22-19. **(Prospective; 207 patients)**
 56. Monette J, Galbaud du Fort G, Fung SH, et al. Evaluation of the Confusion Assessment Method (CAM) as a screening tool for delirium in the emergency room. *Gen Hosp Psychiatry.* 2001;23(1):20-25. **(Prospective; 100 patients)**
 57. Han JH, Wilson A, Graves AJ, et al. Validation of the Confusion Assessment Method for the intensive care unit in older emergency department patients. *Acad Emerg Med.* 2014;21(2):180-187. doi:10.1111/acem.12309. **(Prospective; 406 patients)**
 58. Heppner HJ, Cornel S, Peter W, et al. Infections in the elderly. *Crit Care Clin.* 2013;29(3):757-774. doi:10.1016/j.ccc.2013.03.016. **(Review)**
 59. Grosmaître P, Le Vasseur O, Yachouh E, et al. Significance of atypical symptoms for the diagnosis and management of myocardial infarction in elderly patients admitted to emergency departments. *Arch Cardiovasc Dis.* 2013;106(11):586-592. doi:10.1016/j.acvd.2013.04.010. **(Retrospective; 255 patients)**
 60. Gleason OC. Delirium. *Am Fam Physician.* 2003;67(5):1027-1034. **(Review)**
 61. Barr J, Fraser GL, Puntillo K, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Crit Care Med.* 2013;41(1):263-306. doi:10.1097/CCM.0b013e3182783b72. **(Guideline)**
 62. Steinberg M, Lyketsos CG. Atypical antipsychotic use in patients with dementia: managing safety concerns. *Am J Psychiatry.* 2012;169(9):900-906. doi:10.1176/appi.ajp.2012.12030342. **(Review)**
 63. Rea RS, Battistone S, Fong JJ, et al. Atypical antipsychotics versus haloperidol for treatment of delirium in acutely ill patients. *Pharmacotherapy.* 2007;27(4):588-594. doi:10.1592/phco.27.4.588. **(Systematic review)**
 64. Hardy JE, Brennan N. Computerized tomography of the brain for elderly patients presenting to the emergency department with acute confusion. *Emerg Med Australas.* 2008;20(5):420-424. doi:10.1111/j.1742-6723.2008.01118.x. **(Prospective; 106 patients)**
 65. Segard J, Montassier E, Treweek D, et al. Urgent computed tomography brain scan for elderly patients: can we improve its diagnostic yield? *Eur J Emerg Med.* 2013;20(1):51-53. doi:10.1097/MEJ.0b013e32834f9d51. **(Retrospective; 291 patients)**
 66. Naeije G, Gaspard N, Depondt C, et al. Acute confusional state of unknown cause in the elderly: a study with continuous EEG monitoring. *Epilepsy Behav.* 2012;23(3):330-334. doi:10.1016/j.yebeh.2012.01.023. **(Retrospective)**
 67. Douglas VC, Josephson SA. Delirium. *Continuum (Minneapolis Minn).* 2010;16(2 Dementia):120-134. doi:10.1212/01.CON.0000368215.71588.22. **(Review)**
 68. Zeller SL, Rhoades RW. Systematic reviews of assessment measures and pharmacologic treatments for agitation. *Clin Ther.* 2010;32(3):403-425. doi:10.1016/j.clinthera.2010.03.006. **(Systematic review)**
 69. Irwin SA, Pirrello RD, Hirst JM, et al. Clarifying delirium management: practical, evidenced-based, expert recommendations for clinical practice. *J Palliat Med.* 2013;16(4):423-435. doi: 10.1089/jpm.2012.0319. **(Review)**
 70. Inouye SK, Viscoli CM, Horwitz RI, et al. A predictive model for delirium in hospitalized elderly medical patients based on admission characteristics. *Ann Intern Med.* 1993;119(6):474-481. **(Two prospective cohort studies; 107 and 174 patients)**
 71. Landefeld CS, Palmer RM, Kresevic DM, et al. A randomized trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. *N Engl J Med.* 1995;332(20):1338-1344. doi:10.1056/NEJM199505183322006. **(Prospective; 651 participants)**
 72. Fox MT, Persaud M, Maimets I, et al. Effectiveness of acute geriatric unit care using acute care for elders components: a systematic review and meta-analysis. *J Am Geriatr Soc.* 2012;60(12):2237-2245. doi:10.1111/jgs.12028. **(Systematic review and meta-analysis)**
 73. Richmond JS, Berlin JS, Fishkind AB, et al. Verbal de-escalation of the agitated patient: consensus statement of the American Association for Emergency Psychiatry Project BETA De-escalation Workgroup. *West J Emerg Med.* 2012;13(1):17-25. doi:10.5811/westjem.2011.9.6864. **(Guideline)**
 74. Cole MG. Delirium in elderly patients. *Focus (Madison).* 2005;3(2):320-332. doi:10.1176/appi.ajgp.12.1.7. **(Review)**
 75. Price O, Baker J. Key components of de-escalation techniques: a thematic synthesis. *Int J Ment Health Nurs.* 2012;21(4):310-319. doi: 10.1111/j.1447-0349.2011.00793.x **(Literature review; 11 papers)**
 76. Holloman GH, Zeller SL. Overview of Project BETA: Best practices in evaluation and treatment of agitation. *West J Emerg Med.* 2012;13(1):1-2. doi:10.5811/westjem.2011.9.6865. **(Guideline)**
 77. Fishkind AB. Calming agitation with words, not drugs: 10 commandments for safety. *Curr Psych.* 2002;1(4):32-39. **(Review)**
 78. Isbister GK, Calver LA, Page CB, et al. Randomized controlled trial of intramuscular droperidol versus midazolam for violence and acute behavioral disturbance: the DORM study. *Ann Emerg Med.* 2010;56(4):392-401. doi:10.1016/j.annemergmed.2010.05.037. **(Prospective; 91 patients)**
 79. Downey LVA, Zun LS, Gonzales SJ. Frequency of alternative to restraints and seclusion and uses of agitation reduction techniques in the emergency department. *Gen Hosp Psychiatry.* 2007;29(6):470-474. doi:10.1016/j.genhosp-psych.2007.07.006. **(Survey; 391 emergency departments)**
 80. Schmidt P, Snowden T. The effects of positional restraint on heart rate and oxygen saturation. *J Emerg Med.* 1999;17(5):777-782. **(Prospective; 18 participants)**
 81. Stratton SJ, Rogers C, Brickett K, et al. Factors associated with sudden death of individuals requiring restraint for excited delirium. *Am J Emerg Med.* 2001;19(3):187-191. doi:10.1053/ajem.2001.22665. **(Review)**
 82. Coburn VA, Mycyk MB. Physical and chemical restraints. *Emerg Med Clin North Am.* 2009;27(4):655-667. doi:10.1016/j.emc.2009.07.003. **(Review)**
 83. Flaherty JH, Little MO. Matching the environment to patients with delirium: lessons learned from the delirium room, a restraint-free environment for older hospitalized adults with delirium. *J Am Geriatr Soc.* 2011;59 Suppl 2:S295-S300. doi:10.1111/j.1532-5415.2011.03678.x. **(Retrospective; 2 hospitals)**

84. Aizawa K-I, Kanai T, Saikawa Y, et al. A novel approach to the prevention of postoperative delirium in the elderly after gastrointestinal surgery. *Surg Today*. 2002;32(4):310-314. **(Prospective; 40 patients)**
85. Mouzopoulos G, Vasiliadis G, Lasanianos N, et al. Fascia iliaca block prophylaxis for hip fracture patients at risk for delirium: a randomized placebo-controlled study. *J Orthop Traumatol*. 2009;10(3):127-133. doi:10.1007/s10195-009-0062-6. **(Prospective; 219 patients)**
86. Rubin FH, Williams JT, Lescisin D, et al. Replicating the hospital elder life program in a community hospital and demonstrating effectiveness using quality improvement methodology. *J Am Geriatr Soc*. 2006;54(6):969-974. doi:10.1111/j.1532-5415.2006.00744.x. **(Prospective; 4763 patients)**
87. Naughton BJ, Saltzman S, Ramadan F, et al. A multifactorial intervention to reduce prevalence of delirium and shorten hospital length of stay. *J Am Geriatr Soc*. 2005;53(1):18-23. **(Prospective; 374 patients)**
88. Sanon M, Baumlin KM, Kaplan SS, et al. Care and Respect for Elders in Emergencies program: a preliminary report of a volunteer approach to enhance care in the emergency department. *J Am Geriatr Soc*. 2014;62(2):365-370. doi:10.1111/jgs.12646. **(Review)**
89. Wilson MP, Pepper D, Currier GW, et al. The psychopharmacology of agitation: consensus statement of the American Association for Emergency Psychiatry Project BETA psychopharmacology workgroup. *West J Emerg Med*. 2012;13(1):26-34. doi:10.5811/westjem.2011.9.6866. **(Guideline)**
90. Thomas H, Schwartz E, Petrilli R. Droperidol versus haloperidol for chemical restraint of agitated and combative patients. *Ann Emerg Med*. 1992;21(4):407-413. doi:10.1016/S0196-0644(05)82660-5. **(Prospective; 68 patients)**
91. Chase PB, Biros MH. A retrospective review of the use and safety of droperidol in a large, high-risk, inner-city emergency department patient population. *Acad Emerg Med*. 2002;9(12):1402-1410. **(Retrospective)**
92. Ballard C, Grace J, McKeith I, et al. Neuroleptic sensitivity in dementia with Lewy bodies and Alzheimer's disease. *Lancet*. 1998;351(9108):1032-1033. doi:10.1016/S0140-6736(05)78999-6. **(Review)**
93. McKeith I, Fairbairn A, Perry R, et al. Neuroleptic sensitivity in patients with senile dementia of Lewy body type. *BMJ*. 1992;305(6855):673-678. doi:10.1136/bmj.305.6855.673. **(Retrospective; 41 patients)**
94. Weintraub D, Hurtig HI. Presentation and management of psychosis in Parkinson's disease and dementia with Lewy bodies. *Am J Psychiatry*. 2007;164(10):1491-1498. doi:10.1176/appi.ajp.2007.07040715. **(Review)**
95. Cummings JL, Street J, Masterman D, et al. Efficacy of olanzapine in the treatment of psychosis in dementia with Lewy bodies. *Dement Geriatr Cogn Disord*. 2002;13(2):67-73. **(Post-hoc subgroup analysis)**
96. Currier GW, Chou JC-Y, Feifel D, et al. Acute treatment of psychotic agitation: a randomized comparison of oral treatment with risperidone and lorazepam versus intramuscular treatment with haloperidol and lorazepam. *J Clin Psychiatry*. 2004;65(3):386-394. **(Prospective; 162 participants)**
97. Chan EW, Taylor DM, Knott JC, et al. Intravenous droperidol or olanzapine as an adjunct to midazolam for the acutely agitated patient: a multicenter, randomized, double-blind, placebo-controlled clinical trial. *Ann Emerg Med*. 2013;61(1):72-81. doi:10.1016/j.annemergmed.2012.07.118. **(Multicenter randomized double-blind placebo-controlled trial; 336 participants)**
98. Battaglia J. Pharmacological management of acute agitation. *Drugs*. 2005;65(9):1207-1222. **(Review)**
99. Pandharipande P, Shintani A, Peterson J, et al. Lorazepam is an independent risk factor for transitioning to delirium in intensive care unit patients. *Anesthesiology*. 2006;104(1):21-26. **(Retrospective)**
100. Nobay F, Simon BC, Levitt MA, et al. A prospective, double-blind, randomized trial of midazolam versus haloperidol versus lorazepam in the chemical restraint of violent and severely agitated patients. *Acad Emerg Med*. 2004;11(7):744-749. **(Prospective; 111 participants)**
101. Loneragan E, Luxenberg J, Areosa Sastre A. Benzodiazepines for delirium. *Cochrane Database Syst Rev*. 2009 Oct 7;(4):CD006379. doi: 10.1002/14651858.CD006379.pub3. **(Systematic review; 1 trial)**
102. Amato L, Minozzi S, Vecchi S, et al. Benzodiazepines for alcohol withdrawal. *Cochrane Database Syst Rev*. 2010 Mar 17;(3):CD005063. doi: 10.1002/14651858.CD005063.pub3. **(Meta-analysis; 64 studies, 4309 participants)**
103. Roberts JR, Geeting GK. Intramuscular ketamine for the rapid tranquilization of the uncontrollable, violent, and dangerous adult patient. *J Trauma*. 2001;51(5):1008-1010. **(Review)**
104. Hopper AB, Vilke GM, Castillo EM, et al. Ketamine use for acute agitation in the ED. *J Emerg Med*. 2015;48(6):712-719. **(Retrospective; 27 patients)**
105. Rund DA, Ewing JD, Mitzel K, et al. The use of intramuscular benzodiazepines and antipsychotic agents in the treatment of acute agitation or violence in the emergency department. *J Emerg Med*. 2006;31(3):317-324. doi:10.1016/j.jemermed.2005.09.021. **(Systematic review)**
106. Battaglia J, Moss S, Rush J, et al. Haloperidol, lorazepam, or both for psychotic agitation? A multicenter, prospective, double-blind, emergency department study. *Am J Emerg Med*. 1997;15(4):335-340. **(Prospective; 98 patients)**
107. Gillies D, Sampson S, Beck A, et al. Benzodiazepines for psychosis-induced aggression or agitation. *Cochrane Database Syst Rev*. 2013 Sep 18;9:CD003079. doi:10.1002/14651858.CD003079.pub4. **(Meta-analysis; 21 trials, 1968 participants)**
108. D'Onofrio G, Jauch E, Jagoda A, et al. NIH Roundtable on opportunities to advance research on neurologic and psychiatric emergencies. *Ann Emerg Med*. 2010;56(5):551-564. doi:10.1016/j.annemergmed.2010.06.562. **(Guideline)**
109. Schrijver EJ, de Vries OJ, Verburg A, et al. Efficacy and safety of haloperidol prophylaxis for delirium prevention in older medical and surgical at-risk patients acutely admitted to hospital through the emergency department: study protocol of a multicenter, randomised, double-blind, placebo-controlled clinical trial. *BMC Geriatr*. 2014;14:96. doi:10.1186/1471-2318-14-96. **(Study protocol)**
110. Hare M, Arendts G, Wynaden D, et al. Nurse screening for delirium in older patients attending the emergency department. *Psychosomatics*. 2014;55(3):235-242. doi:10.1016/j.psym.2013.08.007. **(Prospective; 320 patients)**
111. Hustey FM, Meldon SW, Smith MD, et al. The effect of mental status screening on the care of elderly emergency department patients. *Ann Emerg Med*. 2003;41(5):678-684. doi:10.1067/mem.2003.152. **(Prospective; 784 participants)**
112. Lewis LM, Miller DK, Morley JE, et al. Unrecognized delirium in ED geriatric patients. *Am J Emerg Med*. 1995;13(2):142-145. doi:10.1016/0735-6757(95)90080-2. **(Prospective; 385 patients)**
113. Kakuma R, Galbaud du Fort G, Arsenaault L, et al. Delirium in older emergency department patients discharged home: effect on survival. *J Am Geriatr Soc*. 2003;51(4):443-450. **(Prospective; 268 patients)**
114. Han JH, Bryce SN, Ely EW, et al. The effect of cognitive impairment on the accuracy of the presenting complaint and discharge instruction comprehension in older emergency department patients. *Ann Emerg Med*. 2011;57(6):662-671. doi:10.1016/j.annemergmed.2010.12.002. **(Prospective; 202 patients)**

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- Which of the following is NOT a diagnostic criterion for delirium?
 - Inattention
 - Disorganized thinking
 - Acute or fluctuating course
 - Motor disturbance
- The best estimate of the incidence of delirium in elderly patients presenting to the ED is:
 - 5%
 - 10%
 - 30%
 - 50%
- The psychomotor subtypes of delirium are:
 - Hypoactive, hyperactive, and mixed
 - Catatonic, agitated, and mixed
 - Sedated, agitated, and mixed
 - Sedated, combative, mixed
- Patients presenting with excited delirium syndrome are most at risk for death secondary to which etiology?
 - Chemical intervention
 - Arrhythmia
 - Metabolic acidosis
 - Renal failure
- Delirium and dementia are most reliably differentiated by their:
 - Abrupt onset
 - Memory loss
 - Alterations in perception
 - Thought content
- According to the The Confusion Assessment Method (CAM), which of the following features are required for the diagnosis of delirium?
 - Acute onset or fluctuating course
 - Inattention
 - Altered level of consciousness
 - A and B
- Which of the following tests has the highest yield in ED patients presenting with delirium?
 - Head CT
 - Electrocardiogram
 - Urinalysis
 - Electroencephalogram
- The primary pharmacological aim in the treatment of delirium is to:
 - Treat the underlying cause
 - Reverse the neurotransmitter imbalance
 - Sedate the hyperactive psychomotor subtype
 - Prevent further precipitants
- Which of the following interventions has been shown to be effective in the prevention of delirium in the ED population?
 - Fascia iliaca block
 - Geriatric consultation
 - Improved sleep hygiene
 - Medication interventions to decrease polypharmacy and the use of psychoactive agents
- The estimated mortality for delirious elderly patients discharged from the ED is approximately how many times greater when compared to matched nondelirious patients?
 - 1 time
 - 2 times
 - 5 times
 - 10 times



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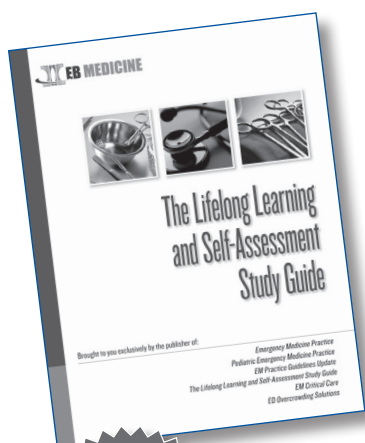
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