Altered Mental Status in Older Emergency Department Patients

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Mental status abnormalities are a common reason for older patients to visit the emergency department (ED). The general term “mental status change” has numerous synonyms, including confusion, organic brain syndrome, change in mental status (\(\Delta\ MS\)), decreased level of consciousness (\(\downarrow\ LOC\)), or simply “not acting right.” These terms are applied to a broad spectrum of conditions that are encompassed in the disease category of mental status abnormalities. Patients presenting to the ED with an altered mental status generally require an extensive work-up, including a detailed history that is difficult to obtain from the individual patient. For emergency physicians, this translates into a time consuming evaluation talking with patient families and caregivers, reviewing old medical records, obtaining laboratory and radiologic studies, and possibly specialty consultations. Often there is still diagnostic uncertainty after the ED evaluation and inpatient observation, and further testing is required to make a definitive diagnosis.

Emergency physicians can expect that older patients will make up an increasing number and proportion of their patients over the next 30 years [1]. Currently patients older than age 64 years account for 15\% of ED visits nationally [2]. In 30 years, ED visits for elderly patients are predicted to increase to 25\% to 30\%. At least 25\% of all ED patients over age 65 years have some form of altered mental status [3–6], and this percentage increases with age. The effects on patient care are substantial: from the need for rapid
evaluation of comatose patients, to the recognition and management of delirium, to the recognition that older patients who have dementia may not follow discharge instructions. Adopting an organized approach to the evaluation of mental status is therefore important for the evaluation of all older ED patients.

This article reviews the significance of altered mental status in older ED patients. Specific diagnoses are discussed, including delirium, stupor and coma, and dementia, with a focus on delirium. Finally, an approach to all older patients is suggested that should result in increased clinician comfort with older patients, improved ability to communicate with other physicians, increased quality of care, and improved patient and family satisfaction.

Background

There are two main components to the category of altered mental status. The first consists of the level of consciousness, or arousal. The second consists of the content of consciousness, or cognition [7]. The distinction between these two components is important, because impairments of the content of consciousness are not necessarily accompanied by impairments in level of consciousness. This may help lead the physician to the appropriate diagnosis.

Determinations of the level of consciousness, or arousal, often can be made by simple observation of the patient during routine history and examination. A normal level of consciousness consists of a patient who is awake and attentive. This level of arousal depends on an intact reticular activating system, cerebral cortex, and communication between the two [7]. Coma is at the other end of the spectrum. Comatose patients have no response to external stimuli or awareness of the external environment [7]. In between these two extremes are the abnormalities of consciousness noted more commonly, including hyperalert or vigilant patients, lethargic patients, and stuporous patients.

Hyperalert or vigilant patients have a heightened level of awareness of their external environment [8]. They may have difficulty following normal conversation because of inattention and are excessively aware of external stimuli. For instance, the beeping of a monitor may occupy their attention, even when asked to ignore it. The sheets, gowns, and monitor leads may fascinate the patient. Often there is excessive psychomotor stimulation. These patients may be at increased risk for harming themselves by getting out of bed unattended.

Lethargic patients are those who are not awake and alert, but who can be prompted to awaken with minimal stimuli [8]. This group includes patients who seem to be asleep each time the physician enters the room, but with shaking their shoulder or speaking their name, they awaken. The patient then regresses to a sleeping level of consciousness when conversation ceases.

Stupor consists of a level of consciousness from which the patient can be aroused only with maximal stimuli [7,8]. This may consist of loud verbal
stimuli, shaking, or noxious stimuli. The patient may not awaken to a normal level of consciousness, however, and conversation therefore may be impossible. Without continued application of the stimuli, the patient’s level of consciousness regresses [7].

Attention is another component of the level of consciousness. Patients with a normal state of consciousness are attentive during the history and examination; they are able to focus, sustain, and shift attention appropriately [9]. Patients who are inattentive may be hyperalert or lethargic. As discussed later, inattention is a clue to the diagnosis of delirium [9].

The level of consciousness, especially in delirium, may be fluid. Patients at times may be awake and inattentive, then progress to a hyperalert state requiring constant supervision, and later may be lethargic. Although delirium may progress to stupor or coma, however, and the etiologies are similar, stupor and coma are exclusive diagnoses [9].

Content of consciousness, or cognition, can be measured using multiple tools, which are discussed later.

**Epidemiology**

Numerous studies have evaluated the epidemiology of cognitive impairment in older ED patients. Although the overall proportions of cognitively impaired patients in the studies vary somewhat, it is clear that cognitive impairment is common in this population. Approximately 10% to 20% of community dwelling persons have cognitive impairment [10,11], as do 48% of nursing home residents [12]. This increases with age, reaching a prevalence of nearly 50% in those over age 85 years [11]. Cognitively impaired persons may visit the ED more frequently, however, because up to 40% of ED patients are found to be cognitively impaired without delirium [3].

In a study of ED patients 65 years old and older with no prior history of dementia, Gerson and colleagues found that 34% of the patients had moderate cognitive impairment, and an additional 26% had minimal impairment, leaving only 40% of patients cognitively intact [3]. Naughton and colleagues performed two studies of ED patients aged 70 years or older [4,5]. Subjects were evaluated with the Glasgow coma scale, the Mini-Mental Status Examination (MMSE), and the Confusion Assessment Method (CAM, a validated delirium screening tool). In the first study, 8.5% of patients had impaired consciousness (stupor or coma), 9.6% of patients had delirium, 22% had cognitive impairment without delirium, and 60% were cognitively intact [4]. In the second study, 4.8% had impaired consciousness, 17% had delirium, 38% had cognitive impairment without delirium, and 40% were cognitively intact [5].

**Delirium**

Delirium is an acute, fluctuating change in cognition, accompanied by impaired attention and consciousness [9,13]. Delirium represents the most
serious cause of altered mental status seen in older ED patients [14]. Approximately 10% of ED patients over age 65 years present with delirium [4–6,14–16]. Most often, however, these patients are not diagnosed by the emergency physician [6,14–16].

Epidemiology

Numerous studies have evaluated the epidemiology of delirium in older ED patients, with remarkably similar results. In addition to the two studies noted by Naughton [4,5], Lewis and colleagues found a prevalence of delirium of 10% [6], Elie 9.6% [15], Hustey 12% [16], and Kakuma 8.4% [14].

The mortality associated with delirium changes depending on whether or not the diagnosis is made in the ED (or in hospital). Lewis found a 3-month mortality rate in those patients discharged to home with delirium of 14% versus 8% for those without delirium, though this difference was not statistically significant (P = .2) [6]. Kakuma found a statistically significant association between delirium and mortality even after adjusting for confounders [14]. Subjects whose delirium was undetected in the ED had a 3-month mortality of 31%, which was significantly higher than that of those whose delirium was detected (12%), and non-delirious subjects (14%) [14]. These sobering statistics on mortality are consistent with other studies on the prognosis of delirium. The mortality rate for elders who develop delirium during hospitalization is 22% to 76%, and the 3-month mortality rate of delirium is 14 times higher than for other affective disorders [9]. Although many patients who have delirium recover fully, elderly patients are prone to a prolonged recovery period with increased likelihood of persistent cognitive deficits [9].

Diagnosis of delirium

Diagnostic criteria for delirium were first presented in the Diagnostic and Statistical Manual of Mental Disorders (DSM), 3rd Edition, in 1980 [17]. In 1987 the revision of the DSM-III expanded these to nine diagnostic criteria [17]. DSM-IV further refined and simplified the diagnostic criteria, making them easier to use, even by nonpsychiatric-trained professionals [13]. The DSM-IV criteria for delirium are:

A. Disturbance of consciousness (ie, reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.
B. A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established, or evolving dementia.
C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day [13].
The fourth criterion in the DSM-IV involves the etiology of delirium (caused by a general medical condition, substance induced, multiple etiologies, or not otherwise specified) [13].

The first criterion, disturbance in consciousness, may involve lethargy that does not reach the level of stupor or coma, inattention, or psychomotor stimulation (hyperalert). Overall approximately 25% of patients are lethargic, termed “hypoactive” delirium. Another 25% are hyperalert, termed “hyperactive” delirium. Approximately 35% of cases are mixed, with alterations between hyperactive and hypoactive. Finally, approximately 15% of patients who have delirium have normal psychomotor activity [18,19].

The second criterion involves cognition. The first deficit to appear is generally impairment of short-term memory, which is nearly universal in patients who have delirium [13]. Inouye and colleagues found impaired memory to be 100% sensitive and 33% specific for delirium [8]. Memory impairment can be tested easily with three-item recall. Disorientation to time or place may occur, though disorientation to self is uncommon [13]. The same study noted earlier found disorientation to be 89% sensitive and 63% specific [8]. Perceptual disturbances may include delusions, illusions, misperceptions, or frank hallucinations. Visual hallucinations are most common, though auditory, tactile, gustatory, or olfactory illusions or hallucinations may occur [9]. Overall, perceptual disturbances are less common than memory disturbances, occurring in only 23% of patients who have delirium. They are more specific for delirium, however (90% specific) [8].

The third criterion involves the rapidity of onset and fluctuation in impairment. Delirium occurs abruptly and is usually apparent within hours to days of onset [13]. Patients may have a prodrome of restlessness, impaired attention, and sleep disturbance that can last several days before the onset of frank delirium [9]. It is this criterion that differentiates delirium from dementia. It is important for the emergency physician to use all available data sources in confused elders to determine the onset of symptoms, because this has a major bearing on the workup, treatment, and disposition. When patients present from home, it is helpful to discuss the changes noted by family or caregiver. Live-in family may be able to provide a clearer history of the duration of symptoms than others who haven’t seen the patient in many months. In nursing home patients, it is often helpful to contact the nurse who sent the patient to help determine the duration of symptoms. From clinical experience, it seems safe to assume that the duration of onset is acute if someone was concerned enough to have the patient seen in the ED.

Fluctuating course is sometimes difficult to evaluate during the ED stay. If family or other surrogates are available, one may be able to determine fluctuation from their history. These surrogates may describe, for example, that the patient seemed normal for the last 2 days but was anxious and confused at night. Occasionally one can determine fluctuation directly in the ED, especially in patients who have mixed symptoms. In these cases, one may have to wake the patient to do a history and examination, and later
be told by the nurse that the patient is trying to climb out of bed or has pulled out the IV. Again, it would seem prudent to suspect delirium in the ED if the other criteria are present and fluctuation cannot be demonstrated by history or examination.

**The Confusion Assessment Method (CAM)**

The CAM was first described by Inouye in 1990 [8]. In developing this tool, the investigators operationalized the DSM-III criteria for delirium, to “enable nonpsychiatrically trained clinicians to identify delirium quickly and accurately in both clinical and research settings” [8]. This original study found a sensitivity of 96% and a specificity of 93%. The CAM has become one of the most widely used screening tools for delirium and has been studied extensively. Reports of the CAM’s sensitivity and specificities have varied widely, with sensitivities ranging from 13% to 100% and specificities ranging from 89% to 100% [20]. Although frequently used in research studies on older ED patients [4–6,15,16], only one study has evaluated the use of the CAM by lay-interviewers in the ED compared with a gold-standard CAM assessment. In this study, the agreement between raters was substantial (kappa 0.91), as were the sensitivity (86%) and specificity (100%) [21].

The CAM requires the presence of acute onset and fluctuating course and inattention, and either disorganized thinking or altered level of consciousness [8]. Memory impairment and disorientation are not incorporated into the CAM, though they performed well in the CAM validation study. Disorganized thinking is defined as “rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject” [8]. This criterion is more subjective than memory impairment and disorientation (when measured using validated scales), though the authors of the original study found perfect agreement between different raters (albeit academic geriatricians) on this item [8].

Despite the CAM’s relative simplicity, recommendations for its use in textbooks of emergency medicine [22,23], and use in clinical research in emergency medicine [4–6,15,16], the overall sensitivity of ED physician diagnosis for delirium has not changed substantially since it has become widely recommended. In a study conducted in 1992, Lewis found that ED physicians correctly identified delirium in 17% of older patients in whom it was present [6]. In a study done in 2001, Hustey found that ED physicians correctly identified delirium in 16% of older patients in whom it was present [16]. Two studies from academic EDs in Canada do show higher rates of detection (25% and 56%) [14,15].

**Differential diagnosis**

The primary differential diagnosis for patients who have delirium is dementia, because both may cause impaired cognition. One of the key
elements of the history is the onset of the symptoms; in delirium the symptoms are acute, whereas in dementia the onset is longer and more subtle. Additionally, patients who have dementia generally do not have impairment in their level of consciousness [18]. Delirium may be superimposed on dementia in 22% to 89% of patients who have dementia [24]. To detect these cases, the physician must quantify changes in cognition and their onset. Again, physicians must be aware that those who know the patient well, such as family or nursing home staff, can better detect a change in the patient’s cognition than the physician can. One therefore should take these complaints seriously in patients who have dementia.

Other differential diagnoses for patients presenting with delirium include primary psychiatric disorders, such as acute psychosis. The term “pseudodelirium” has been suggested to identify this condition [18]. This diagnosis, however, should be made only in patients without a prior history of psychiatric disease after extensive evaluation, rather than in the ED [18].

Other symptoms of delirium

In addition to the diagnostic criteria listed previously, patients may manifest other symptoms of delirium. Altered sleep–wake patterns occur in 60% to 70% of patients [25]. This usually is manifested as daytime drowsiness and nighttime agitation and disorientation, often referred to as sundowning. This symptom in particular may be trying for caregivers, who become exhausted from caring for patients at night or are concerned about the patient’s safety. Emotional disturbances may occur and may fluctuate from anxiety, fear, irritability, and anger to depression and apathy. Nonfocal neurologic deficits may occur, such as speech and language deficits (dysarthria, dysnomia, dysgraphia, or aphasia) [9].

Many of the physical signs and symptoms that can occur are associated with specific etiologies of delirium. For example, asterixis is associated with hepatic and renal disease. Nystagmus and cerebellar abnormalities may suggest alcohol or drug intoxication. Pupillary abnormalities also can suggest drug intoxication (eg, miosis with narcotics). Alcohol or sedative–hypnotic withdrawal is associated with coarse tremors, tachycardia, and low-grade fever. Because of the frequency of anticholinergic medications causing delirium, one should be alert for symptoms consistent with an anticholinergic toxidrome (dry mouth, urinary retention, tachycardia, fever).

Etiology

Delirium is a manifestation of various medical disorders of cerebral metabolism or neurotransmission, and as such the etiologies are broad [17,18]. The etiologies can be divided into four categories: (1) primary intracranial diseases, (2) systemic diseases that affect the brain secondarily, (3) exogenous toxins, and (4) withdrawal from substances [18]. Within these broad categories there are numerous causes, as noted in Table 1. In the elderly
Table 1
Common and serious etiologies of delirium in older patients

| Primary CNS disease                      | Cerebrovascular accident |
|                                       | Acute or chronic subdural hematoma |
|                                       | Encephalitis               |
|                                       | Meningitis                 |
|                                       | Seizures                   |
|                                       | Nonconvulsive status epilepticus |
|                                       | Postictal state            |
|                                       | Hypertensive encephalopathy |
| Systematic diseases                   | Infections                |
|                                       | Pneumonia                  |
|                                       | Urinary tract infections   |
|                                       | Skin and soft tissue infections |
| Cardiopulmonary disorders            | Acute myocardial infarction |
|                                       | Congestive heart failure   |
|                                       | Arrhythmia                 |
|                                       | Cardiogenic shock          |
|                                       | Acute or chronic respiratory failure |
|                                       | Hypoxia                    |
|                                       | Hypercarbia                |
|                                       | Uremia                     |
|                                       | Hepatic encephalopathy     |
|                                       | Fluid or electrolyte abnormalities |
|                                       | Dehydration                |
|                                       | Hypernatremia              |
|                                       | Hypoglycemia               |
|                                       | Hyper- or hypocalcemia     |
| Medications                           | Anticholinergic medications |
|                                       | Antihistamines             |
|                                       | Antiemetics                |
|                                       | Antiparkinsonian medications |
|                                       | Antispasmodics (gastrointestinal) |
| Withdrawal                            | Alcohol                    |
|                                       | Sedative–hypnotics         |

patient, determination of a single etiology may be difficult, and often more than one etiology contributes to the delirium [18].

Common etiologies in elderly patients include infections, medications, and primary CNS disorders. One study of delirium in community-dwelling elders implicated infections in 43% of cases, primary intracranial diseases in 25%, cardiovascular disorders in 18%, and medications in 12% [26].

Many medications can cause delirium, including medications available over the counter and those commonly prescribed to elders. The most common category of medications to cause delirium is drugs with anticholinergic properties: antihistamines, antiemetics, antipsychotics, antiparkinsonian drugs, antidepressants, and gastrointestinal antispasmodics [27]. Antihistamines particularly should be searched for, because often they are combined in over-the-counter medications, such as cold tablets and sleep aids. Patients
and families should be questioned about these medications in the case of acute delirium without a clear etiology. Medications with more obvious CNS activities include narcotics, sedative–hypnotics, and alcohol. Meperidine has toxic metabolites that may accumulate, leading to delirium in older patients, especially those who have renal disease [27]. Older patients are also susceptible to delirium from fentanyl patches because of accumulation of active drug over time [27]. Other medications in common use and implicated in causing delirium in the elderly patient include corticosteroids, antibiotics (fluoroquinolones, beta-lactams, trimethoprim-sulfamethoxazole), muscle relaxants, antihypertensives, and H2 blockers [27]. Although this medication list is extensive, additional medications may cause delirium. Consequently a thorough history of new medications, including over-the-counter medications, is essential. It is imperative to review the side-effect profile of any new medication and to assume that new medications may have precipitated the patient’s symptoms if alternative explanations are not available.

Diagnostic testing

Diagnostic testing in patients who have delirium is directed at discovering the etiology of the patient’s symptoms. Given the large number of causes of delirium, the workup of an older patient who has delirium can be extensive. Sometimes a presumed etiology can be determined from the history and physical examination. This may be difficult, however, if a history from a surrogate is not available and the patient is unable to cooperate with the examination. Also, the possibility of multiple etiologies of delirium exists [9]. Consequently algorithms for diagnostic testing are not available, and the evaluation in each patient may be different. The work-up of the individual patient should be based on a careful clinical assessment and tailored diagnostic tests rather than a shotgun approach [28].

Most older patients who present to the ED with delirium require at least a complete blood count, electrolytes, BUN, creatinine, glucose, and EKG. Because infections are a common cause of delirium in older patients and because these infections may present without fever or elevated WBC count [29], additional work-up for infection may be helpful. Common infections in older patients include pneumonia and urinary tract infections; chest radiograph and urinalysis therefore may be helpful. Lumbar puncture should be performed if signs of meningitis are present. If the EKG shows new abnormalities, cardiac enzymes should be measured. Hepatic function tests and serum ammonia levels can be reserved for those patients who have a history of hepatic problems or those who have physical findings of hepatic disease (scleral icterus, jaundice, asterixis). Patients who have a history of chronic lung disease and who present with delirium should have an arterial blood gas study performed, because hypercarbia caused by respiratory failure may present with delirium.
The routine use of computed tomography (CT) of the brain in patients who have delirium is not recommended [9,28]. Naughton and colleagues studied the use of CT in delirious ED patients aged 70 years and older. They found substantial inconsistency in the use of CT by emergency physicians in the evaluation of delirium. Furthermore, only 15% of the scans had acute findings, and all but one of these was in patients who had substantially impaired consciousness or new focal neurologic findings [5]. It is therefore appropriate to limit initial CT scanning to those who have stupor, coma, or new focal neurologic findings. If no plausible etiology of the delirium has been determined after a thorough history, examination, and the laboratory studies mentioned, however, CT should be considered in other patients who have delirium.

Treatment

Treatment of delirium usually is directed at the underlying cause of the delirium. Some patients who have delirium, however, require interventions aimed at treating the symptoms of delirium. These may involve environmental interventions, such as turning off the lights, bringing families to the bedside, or providing the patient with glasses or hearing aids to reduce sensory impairments [9]. Physical restraints should be avoided if possible, because they may increase the patient’s agitation and the severity of the delirium. When physical restraints are used, the patient should be observed closely to reduce the risk for injury from the restraints, and the restraints should be removed as soon as possible.

Pharmacologic treatment of the symptoms of delirium is preferred over physical restraint. Of the available drugs to treat the symptoms of delirium in older ED patients, the antipsychotic haloperidol is recommended most frequently [9,18,30]. Although antipsychotic drugs are implicated in causing delirium, haloperidol has limited anticholinergic effects [18]. Doses of haloperidol for this indication are lower than for other patients in need of chemical restraint; the usual recommended doses are 0.5 to 1.0 mg orally, intramuscularly, or intravenously [18,31]. This can be repeated every 30 minutes until the desired effect is achieved [32]. Droperidol also has been used successfully for delirium; however, it is more likely to cause hypotension, sedation, and extrapyramidal effects [32]. Furthermore, given the recent controversy over the black box warning because of prolongation of the QT interval and arrhythmia [33], haloperidol seems to be a safer choice. Newer generation antipsychotics, such as risperidone and olanzapine, also have been studied to treat the symptoms of delirium in older patients [30].

Benzodiazepines, especially lorazepam, are used commonly to treat the symptoms of delirium [31]. They are especially beneficial for specific conditions, such as the treatment of delirium caused by alcohol or sedative hypnotic withdrawal or seizures [9,30]. The risk for paradoxic central nervous system reactions that may worsen the patient’s condition, however, is higher.
in older patients [32]. One randomized trial found that lorazepam was ineffective at reducing delirium symptoms, whereas haloperidol produces rapid improvement in symptoms [9]. The American Psychiatric Association Practice Guideline for the Treatment of Delirium recommends avoiding benzodiazepines except in the conditions noted previously [30].

Disposition

Delirium has many causes; all are potentially serious. The mortality associated with delirium is high, especially if unrecognized [14]. Furthermore, delirious patients are at risk for injuring themselves and require continuous supervision to prevent injury. Consequently older ED patients should be admitted to the hospital for evaluation unless there is a single, clear, and reversible etiology of the delirium, such as intoxication from a short-acting medication. In the latter case, the patient should be observed until the symptoms of delirium have resolved and be discharged with family or friends who can observe the patient.

Tests for cognitive impairment

Cognitive impairment from dementia or delirium is common, yet frequently it is not diagnosed by emergency physicians. Given the complexity of evaluating older patients who have even simple complaints, emergency physicians must maintain a high index of suspicion for cognitive impairment in older ED patients. When cognitive impairment is relevant to the reason a patient is in the ED, an evaluation of their mental status is warranted. The standard mental status screen since 1975 has been the Mini Mental Status Exam (MMSE) [34]. This 20-question test is familiar to most emergency physicians. It is comprehensive, testing orientation, registration, recall, calculation, and ability to follow commands. Certain features, however, make it undesirable for routine ED use. First, it is not memorized or scored easily, making the use of instructions and scoring sheets a must. Furthermore, it requires intact vision, hearing, and the ability to write. Any of these may be limited in older ED patients, who may have left their glasses at home or who may be unable to write because of the presence of IVs or injuries in the writing arm. Finally, it takes a median of 6 minutes and a maximum of 14 minutes to complete [35]. These issues limit the suitability of the MMSE for routine ED use.

Many other mental status screens have been developed and validated. Screens studied for ED use include the Orientation Memory Concentration Test (OMCT), the Clock-Drawing Test (CDT), the Mini-Cog, and the Six-Item Screener (SIS).

Orientation Memory Concentration Test

The OMCT has been used in ED-based research studies to evaluate mental status in older ED patients [3,16]. Consisting of six questions, including
temporal orientation, counting backward from 20, saying the months in reverse order, and short-term memory, the test takes 2 to 5 minutes to perform. The scoring is weighted, and the memory phrase is somewhat awkward, making a scoring sheet or pocket card a must for administration. Recently, Huff and colleagues evaluated this tool in the ED using a different weighting system and have published norms for this scoring system [36,37].

Clock-Drawing Test

The CDT uses a different approach than the other tests. The CDT evaluates many different cognitive functions, including long-term memory, concentration, and abstract thinking [38]. There is no uniformity in the instructions for or scoring of the CDT. One simple approach, however, is to instruct patients to draw the face of a clock, placing the hands at 10 minutes after 11. The clinician then evaluates the clocks for four features: (1) a complete circle, (2) numbers correctly placed, (3) one hand larger than the other, and (4) hands read the correct time. If any of these features are absent, the CDT is scored as abnormal [39]. Using this simple approach, the CDT takes a median of 2 minutes to perform [35]. Although the scoring is somewhat subjective, studies have shown that emergency physicians with only brief training in scoring agree on whether the CDT is normal or abnormal [35]. Similar to the MMSE, however, the CDT requires intact vision and the ability to write, which, as noted, may be limited in ED patients. Fig. 1 shows the results of clock tests in older ED patients.

Mini-Cog

The Mini-Cog was developed as a brief screen for use in primary care settings [40]. It incorporates a clock-drawing test with three-item recall. Patients are first given a three-item recall list (such as “pencil, car, boat”) and then are asked to draw the face of a clock and place the hands at ten after eleven. The clock is normal if all numbers are present in the correct order and position, and the hands show the correct time. After drawing the clock, the patients are asked to repeat the three items. One point is given

Fig. 1. Clock-drawing tests in older ED patients.
for each correct answer. Normal cognition consists of a score of 3 or a score of 1 or 2 with a normal clock. Abnormal cognition is defined as a score of 0 or a score of 1 or 2 with an abnormal clock [40]. In a recent ED study, the authors found the Mini-Cog to be 77% sensitive and 85% specific for cognitive impairment when compared with the MMSE as gold standard [41].

Six-Item Screener

The SIS is a rapid, easily remembered, and easily scored mental status test [42]. The SIS consists of three-item recall and temporal orientation (Fig. 2); scoring is the sum of correct answers. The SIS was developed and validated on two patient samples, a community sample and an Alzheimer patient clinic sample. Overall sensitivity and specificity were very good when compared with the MMSE. The authors recently studied the SIS in ED patients 65 years and older and found the SIS (using a cutoff of 4 abnormal/5 normal) had a sensitivity of 94% and a specificity of 85% when compared with the MMSE as gold standard (with a 23/24 cutoff) [41]. The SIS takes a median of 1 minute to administer [35] and can be incorporated into the physical examination, so it is unlikely to substantially increase the time to evaluate an older patient. Furthermore, its simplicity makes it easy to remember and score without scoring sheets or pocket cards. Finally, the SIS tests two core components of cognition: short-term memory and orientation. Both of these are important to evaluate for delirium and represent early cognitive deficits (memory) and later deficits (orientation) [13].

Instructions for the patient: I would like to ask you some questions that ask you to use your memory. I am going to name three objects. Please wait until I say all three words, then repeat them. Remember what they are because I am going to ask you to name them again in a few minutes. Please repeat these words for me: APPLE – TABLE – PENNY. (May repeat names 3 times if necessary, repetition not scored.)

Did the patient correctly repeat all three words? Yes No

1. What year is this? _________ (1)
2. What month is this? _________ (1)
3. What is the day of the week? _________ (1)

What are the three objects I asked you to remember?
4. Apple _________ (1)
5. Table _________ (1)
6. Penny _________ (1)

Total Score: _________ (6)

Fig. 2. Six-item screener. From Callahan CM, Unverzagt FW, Hui SL, et al. Six-item screener to identify cognitive impairment among potential subjects for clinical research. Med Care 2002;40(9):771–81; with permission.
Stupor and coma

As noted, the impairment in consciousness in patients who have delirium does not reach the level of stupor or coma [9]. Delirium, however, if untreated, may progress to stupor, coma, and eventually death. Most cases of coma (85%) are caused by systemic disease rather than by primary CNS abnormalities, and the etiologies are similar to those of delirium [43]. Consequently there is substantial overlap between the discussion of delirium and that of stupor or coma. Although comatose patients require a more rapid evaluation, the evaluation is similar to that of delirious patients.

It is helpful to use validated scales to evaluate the level of consciousness in patients who have stupor and coma. Two scales commonly are used. The first can be remembered by the mnemonic AVPU, which stands for alert, responsive to verbal stimuli, responsive to painful stimuli, or unresponsive [44]. This classification is overly simplistic, however, because it doesn’t include the level of response to the stimuli. For instance, patients who respond to painful stimuli by answering a question differ substantially from those whose response is posturing. To improve the description of the level of consciousness, the Glasgow Coma Scale (GCS) may be used. The GCS rates eye opening and motor response to verbal and painful stimuli, and verbal response. Patients who have coma do not open their eyes, obey commands, or have understandable conversation [4]. Rather than focus on the overall score, it is important to document the patient’s response to stimuli.

Dementia

Dementia is characterized by the gradual and progressive development of multiple cognitive deficits, especially memory [13]. It is rare for an emergency physician to be confronted with the need to diagnose dementia. Most patients who have a gradual cognitive decline without acute change can be referred for evaluation as an outpatient. Chronic cognitive impairment, however, may affect the patient’s ED care in many ways, from limiting the reliability of the medical history to reducing his or her understanding of and compliance with discharge instructions [45]. Consequently it is important to recognize this chronic impairment so that appropriate measures can be undertaken to improve the history and the patient’s treatment.

General approach

Based on all of this information, a general approach to evaluating mental status in older ED patients can be developed. This approach should be used to evaluate mental status in all older ED patients, because the recognition of delirium is difficult [6,14–16] and the consequences of missed delirium are serious [14]. To be used this widely, however, the approach must be rapid, simple, and easy to incorporate into the routine history and examination, without substantially increasing the time needed to evaluate the patient.
The first item to assess is the level of consciousness, which corresponds to item A of the DSM-IV-R criteria for the diagnosis of delirium [13]. Normal consciousness is alert and attentive. Abnormal levels of consciousness include alert and inattentive, hyperalert, lethargic, stuporous, or comatose. In patients who have stupor or coma, it is important to document the patient’s response to verbal and painful stimuli by the AVPU scale or the GCS. This information can be obtained during the routine history and examination, though the physician must observe the patient’s level of attention during the interview.

The second item assessed is cognition. Rather than rely on orientation alone, short-term memory should be tested to improve the recognition of cognitive impairment. The use of validated scales is recommended. The most rapid and simplest scale is the SIS (Fig. 2). The advantages include its simplicity; it is easy to memorize and score. A cut-off of three or more errors had similar sensitivity and specificity for a diagnosis of dementias as did a cut-off score of 23 on the MMSE [42]. Furthermore, it tests temporal orientation and short-term memory, which correspond to item B of the DSM-IV-TR criteria [13]. Finally, it takes a median of 1 minute to perform in the ED [35] and can be incorporated into the history and examination, so the time needed to evaluate the patient is not prolonged. An alternative is the OMCT, which also assesses memory and orientation [3]. Cognition should be assessed in all patients who are not in stupor or coma. If uncertainty exists about the patient’s cognitive status, the clock drawing test can be added (see Fig. 1).

After assessing these two items, patients can be termed “normal mental status” if their level of consciousness is normal and their cognition is normal. Patients who are stuporous or comatose are diagnosed as such, and evaluation of the etiology and treatment proceeds. If the patient has impaired consciousness or impaired cognition or both, evaluation of the acuity of onset of the symptoms must be investigated. All possible sources of information, including family, friends, and nursing home staff, should be used. For those whose onset of symptoms is acute (hours to days), delirium should be the working diagnosis and further testing is warranted. If the symptoms are chronic and progressive, however, dementia is more likely.

Using this approach allows emergency physicians to improve their ability to recognize delirium and to communicate their findings to other physicians without substantially altering the time to evaluate the patient. Recognition of cognitive impairment should improve the quality of patient care [46].

Summary

Mental status abnormalities are common in older emergency department patients and may be present in up to 40% of ED patients. These abnormalities may be chronic, from dementia, or acute, from delirium. Making the diagnosis of delirium in the ED is challenging and requires a systematic
approach to patients who have an altered mental status. Gerson and colleagues found that 60% of geriatric ED patients had some degree of cognitive impairment. The challenge is to identify those geriatric patients who have acute changes. The mortality for patients who have delirium that is not diagnosed in the ED or in the hospital is significantly higher than the mortality for patients in whom the delirium is diagnosed. Consequently the recognition of delirium is essential for the provision of quality emergency department care. An approach to older ED patients that focuses on appropriately categorizing mental status impairment without substantially increasing the time to evaluate the patient has been presented in this article, and it is hoped that adoption of this approach should result in improvement in the care of older ED patients.

References


