Delirium

A comprehensive review

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ABSTRACT

يعتبر الهذيان من أكثر الأمراض العصبية الشائعة التي يمكن منع حدوثها في عدد كبير من المرضى، وخصوصاً لدى المنوَمين منهم في العناية المركزة والمرضى الكبار السن. قد يأتي مريض الهذيان بأعراض كثيرة ومختلفة مما قد يسبب القلق للمريض وأسرته، وقد يطيل الهذيان من مدة البقاء في المستشفى مما قد ينذر بسوء حالة المريض في المستقبل. يحتاج الطبيب إلى حدس سريري عالٍ لاكتشاف أسباب الهذيان وتشخيصه، ويشمل ذلك أخذ تاريخ مَرَضي مفصل عن الحالة، وفحصاً سريرياً شاملاً ودقيقاً، وإجراء فحوصات متعددة. إن هذه المراجعة هي مراجعة شاملة للهذيان تشمل التعريف، والمظاهر السريرية، والتغيرات الوظيفية والمرضية، والتشخيص التفريقي، والفحوصات، والتدبير والعلاج، وما قد يحدث للمريض في المستقبل.

Delirium is among the most common potentially preventable neurological disorders encountered in diverse patient populations, especially in critical care units and the elderly. It may present with highly variable clinical features, prolong hospital stay, and herald a poor prognosis. It is also a source of distress for patients and their caregivers. A high degree of clinical suspicion is required for detecting delirium and a detailed history, physical examination, and targeted investigations are necessary to determine the underlying etiology and ensure proper management. The following article is a comprehensive review outlining the various aspects of delirium.

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Delirium is among the most common and potentially preventable neurological disorders encountered in patients with medical conditions, particularly patients in critical care units and those who are 65 years of age or older.[1] Physicians have been aware of this disorder since antiquity, and patients with symptoms consistent with delirium are described throughout ancient medical writings. Hippocrates referred to it as phrenitis, the origin of the word "frenzy," to describe a syndrome marked by confusion and restlessness that fluctuated unpredictably and was associated with physical, often febrile, illness.[2] Unfortunately, delirium is often under-recognized and under-treated due to the presence of more prominent symptoms that obscure the detection of the cognitive decline. It has widely and falsely been considered as an unavoidable side effect of severe illness or hospital stay. Delirium has been called by psychiatrists "the great imitator" since it has been frequently mistaken for depression, mania, psychosis, or anxiety.[3] The development of delirium is often the beginning of a downward spiral, which leads to the loss of independence, higher risk of morbidity and mortality, and increased health care costs.[4] Systematic studies and clinical trials are difficult to perform in patients with cognitive impairment, and recommendations for evaluating and treating delirium are based primarily upon clinical observation, case series, and expert opinion.[5] Herein, we present a review of a common and potentially curable disorder.

Definition. Delirium is an acute disturbance of consciousness and cognition with reduced ability to focus, sustain, or shift attention, along with diminished speed, clarity, and coherence of thought.[5,6] It is a reversible disorder, with relatively rapid onset and a fluctuating course. More than 30 terms and synonyms - some inappropriate or vague - have been used

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interchangeably in medical literature, including acute confusional state, acute brain failure, toxic psychosis, clouded state, intensive care unit (ICU) psychosis, ICU syndrome, global cognitive impairment, cerebral insufficiency, encephalopathy, pseudodementia, and twilight states.[7] The critical care literature has recently conformed to the recommendations of the American Psychiatric Association (APA) and other experts that the term 'delirium' be used uniformly to describe this syndrome of brain dysfunction.

Epidemiology. The prevalence of delirium in the community is 1-2% in adults and increases with age (0.4% in those over the age of 18, 1.1% in those over the age of 55, and 13.6% in those over 85).[7,8] Studies estimate that 10-20% of general medical inpatients are delirious at any given time.[9] Postoperative delirium occurs in 15-53% of patients,[9] rising to 70-87% of those in intensive care.[10] The incidence of delirium increases during hospitalization (up to 56% among general hospital populations).[11] Delirium occurs in up to 60% of patients in nursing homes or post-acute care settings,[12,13] and up to 83% of all patients at the end of life.[14] Some diagnostic groups have a high prevalence of confusion: cardiac surgery (32%), surgery for hip fracture (45–55%), and bacteremia (70%).

Causes and risk factors. Delirium is a consequence of either a primary brain lesion or cerebral involvement secondary to systemic illness, including those cases caused by exogenous substances such as drugs and poisons (**Table 1**). It is increasingly recognized that most patients have multiple causes for delirium, and consequently there may be several factors to be considered in diagnosis and management. It is important to stress that in the elderly, delirium may be the sole presentation of a serious acute illness, such as myocardial infarction or sepsis. Although most cases of the clinical syndrome present little difficulty in determining a cause, as high as 5-20% of elderly delirious patients never receive an etiological diagnosis.[15] Several risk factors have been identified which include increased severity of physical illness, old age, dementia, stroke, Parkinson's disease, and depression. Medications (anticholinergic drugs, psychoactive medications, opioids, steroids, antihistamines) and metabolic derangements resulting from organ failure – renal, hepatic or pulmonary – are also common precipitating causes. The prevalence of delirium superimposed upon dementia ranges from 22-89%. and in many occasions the onset of delirium unmasked the underlying dementia.[16]

Clinical presentation. The cardinal features of delirium are the recent onset of impairment of memory with inability to maintain selective attention to the environment and mental processes.[5,17] Delirious patients often are disoriented to time and place, but oriented to person. Changes in level of arousal are common, ranging from agitation with increased alertness to somnolence. Prodromal symptoms can develop abruptly or over hours to days, with resolution occurring in days to weeks. Hour to hour fluctuations of mental status are common. A reliable history from family members or friends provides the most valuable piece of information, since they are best acquainted with the patient's usual behavior. In the absence of such history, or if the delirium develops in hospital, collateral history from allied health workers and the primary physician, as well as close observation of the patient in the ward may be helpful. The history should be taken in a quiet room with minimal distractions or interruptions. Note whether the patient follows a logical progression of

Table 1 - Causes of acute confusional state.

Metabolic and systemic illnesses
Sepsis (septic encephalopathy)
Acute uremia
Hepatic encephalopathy
Hypoglycemia
Hypomagnesemia/hypermagnesemia
Cardiac failure
Hypoxia
Pulmonary disease (especially pneumonia and pulmonary embolism)
Hyponatremia
Hypercalcemia and hypocalcemia
Porphyria
Carcinoid syndrome
Endocrinopathies
Thyroid dysfunction
Parathyroid tumors electrocution
Adrenal dysfunction sleep deprivation
Pituitary dysfunction
Hyperosmolar coma
CNS infections
Meningitis, brain abscess, empyema encephalitis, neurosyphilis,
Lyme neuroborreliosis, cerebritis, systemic infections with septicemia
Intracranial lesions
Head trauma
Acute lesions (right parietal, bilateral occipital, or mesial frontal)
Subdural hematoma
Nutritional deficiencies
Thiamine (Wernicke's)
Niacin
Vitamin B12
Folate
Intoxications
Drugs (especially anticholinergics in elderly)
Alcohols
Metals
Industrial agents
Biocides
Withdrawal syndromes
Alcohol
Drugs
Hypertensive encephalopathy
Miscellaneous
Heat stroke
Electrocution
Sleep deprivation

thoughts. Understanding the pre-morbid functioning of patients may assist in the diagnosis and prognosis, especially if the patient has an underlying structural pathologic condition. A comprehensive review of the medications administered prior to the onset of delirium must be carried out, especially those recently introduced, discontinued, or altered.

Examination of vital signs is important since it may herald a medical emergency. Hypotension from dehydration, sepsis, and cardiac causes such as arrhythmia, myocardial infarction, or congestive heart failure must be recognized and controlled. Tachycardia should alert the clinician towards the possible underlying causes, such as infection, cardiac abnormality, hyperthyroidism, dehydration, withdrawal states, and intoxication with sympathomimetic drugs. Hypoxia or hypercapnia may be caused by pneumonia or drug overdose. Fever may result from infection, withdrawal states, and hyperthyroidism. Hypothermia is associated with sepsis, myxedema, Wernicke's encephalopathy, and barbiturate overdose. The mini-mental state examination (MMSE) can be used to identify problems with attention and cognition. Although the MMSE is mainly used as a screen for dementia, it is also reasonably sensitive (although not specific) for delirium. Scores of less than 24 have been used as a threshold for the diagnosis of delirium in cancer patients. Fayers and colleagues[18] have shown that 4 items from the MMSE: the current year (item 1), date (item 4), backward spelling (item 12), and copy design (item 20) served as an effective screening tool, and could replace the full MMSE. This seems a practical tool for nurses and junior staff who are on the "front lines" for patient admissions and continued care. More detailed testing and confirmation should follow when the screen is positive.

Detecting delirium in critically ill and mechanically ventilated patients is often challenging. Instruments such as the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) and Intensive Care Delirium Screening Checklist (ICDSC) have better feasibility and serve as useful tools in these circumstances.[19,20] The CAM-ICU has an excellent sensitivity, specificity, and inter-rater reliability.

Delirious patients are frequently unable to form new memories because of their inability to sustain attention with subsequent failure of registration. Hallucinations, either visual or auditory, occur in half of cases but are prominent in only 20%. Illusions and delusions are prominent. Abnormalities of cognitive processing and problem solving are common with marked emotional lability and inappropriate emotional responses. The verbal output of delirious patients tends to be rambling and incoherent. The sleep/wake cycle is almost always disturbed, and patients may remain awake for most of the day and night with only brief naps or may reverse their normal sleep pattern. The nocturnal exacerbation of confusion ("sundowning") is common. Types of clinical presentation of delirium include hyperactive, hypoactive, or mixed type. The hyperactive form is characterized by fluctuating increased motor activity and agitation. Patients are frequently angry or euphoric, and they rapidly come to the attention of health care workers due to their disruptive, incongruous, or anxious behavior. Hypoactive delirium is more difficult to diagnose as patients may appear depressed or unmotivated. The key features that differentiate hypoactive delirium from depression are the cognitive and attentional disturbances accompanying the former. It is important to identify such patients, as hypoactive delirium is associated with poorer outcomes. Patients with a mixed delirium present with fluctuating features typical of both hyperactive and hypoactive delirium.

The clinical examination of a delirious patient could be difficult, unreliable (for example, sensory testing), or may reflect chronic rather than acute CNS conditions. Assessment of the cranial nerves and motor deficits is important to identify individuals with a higher likelihood of focal neurologic disease. Patients with metabolic/toxic delirium may present with multifocal myoclonus, asterixis, and postural-action tremor. Papilledema is a sign of increased intracranial pressure (ICP) or hypertensive encephalopathy. Fixed and dilated pupils occur with anticholinergic (for example, atropine and scopolamine) intoxication. Enlarged, but reactive pupils occur with increased sympathetic activity such as intoxication with amphetamines or cocaine, and therapeutic use of epinephrine and norepinephrine as pressor agents. Midposition unreactive pupils can be caused by glutethimide overdose or focal midbrain dysfunction, often from distortion by an expanding supratentorial mass. Use of opioids is associated with constricted pinpoint pupils (<2 mm). Patients with Wernicke's encephalopathy may present with selective loss of the vestibular-ocular reflex, or nystagmus with unexplained ocular palsies that spare pupillary reactivity to light.

Careful observation of the patient's general appearance may provide a clue to the underlying systemic disease, for example, the dusky appearance seen with chronic pulmonary disease and jaundice plus other stigmata of chronic liver disease. Examine for signs of meningeal irritation, for example, nuchal rigidity, and Kernig's sign, which may occur with CNS infection and subarachnoid hemorrhage (SAH). In all cases of confusion, there should be a search for evidence of head trauma, such as scalp laceration, Battle's sign, depressed skull fracture, or hemotympanum. Examine the nares for purulent drainage, palpate the sinuses for tenderness

Table 2 - Comparison of delirium and dementia.

Feature	Delirium	Dementia
Onset	Abrupt	Usually insidious, abrupt in some trauma and strokes
Course	Fluctuates	Slow decline
Duration	Hours to days	Months to years
Attention	Impaired	Intact early, often impaired late
Sleep-wake	Disrupted	Usually normal
Alertness	Impaired	Normal
Orientation	Impaired	Intact early, impaired late
Behavior	Agitated, withdrawn/ depressed (or both)	Intact early
Speech	Incoherent, rapid/slowed	Word finding problems
Thoughts	Disorganized, delusions	Impoverished
Perception	Hallucinations, illusions	Usually intact early

(sinusitis), and inspect the eardrums for immobile tympanic membranes (otitis media). The nasal septum should be examined for erosions due to cocaine use. The skin should be examined for hydration status, cyanosis, hirsutism, hyperpigmentation, and scaly dermatitis. Also, inspect the skin of all patients for the presence of track or "pop" marks, which imply intravenous drug use. The breath may smell of alcohol, fetor hepaticus, uremic fetor, or ketones. A bitten tongue or dislocation of the shoulder suggests a seizure. Subhyaloid or retinal hemorrhages raise the possibility of SAH, usually from a ruptured intracranial aneurysm. Examination of the heart can reveal murmurs and irregular rhythms that predispose patients to cerebral circulatory compromise. Decreased or absent breath sounds can be caused by congestive heart failure or pneumonia, the resulting hypoxia potentially contributing to delirium. Patients with abdominal tenderness should be evaluated for intra-abdominal infection. Patients with a ventriculoperitoneal shunt can have shunt infection that manifests as peritonitis.

Delirium versus dementia. Delirium can be misdiagnosed as dementia, depression, or a functional psychosis such as mania or schizophrenia, and hence is a frequent cause for psychiatric consultation in the general hospital. The history provides the most important diagnostic clues and usually requires good third-party information from relatives or nurses (**Table 2**).

Pathophysiology. The pathogenesis of delirium in general remains unknown and several theories have been proposed (**Table 3**). Studies carried out in the 19th century showed that the brains of patients who have died from delirium show no obvious macroscopic or microscopic changes. A leading theory regarding the pathogenesis of delirium suggests that the abnormalities are functional with disturbance in neurotransmitter balance.[20] It is theorized that because the neurons most vulnerable to oxidative stress are the dopaminergic and cholinergic ones, oxidative stress results in a state of hyperdopaminergia (due to release of endogenous dopamine) and hypocholinergia (due to loss of cholinergic transmission or from a reduction in the endogenous synthesis of acetylcholine). The cholinergic hypothesis emerged following the observation that anticholinergic agents can be associated with delirium.[21] Acetylcholine

Table 3 - Possible mechanisms in the development of delirium.

Mechanism	Explanation
Altered neurotransmitters	Relative dopamine excess and cholinergic deficit. Other neurotransmitters: serotonin, noradrenaline, GABA, glutamate
Inflammatory	Cytokine production, for example, interleukin-1, 6, and 8
Physiological stress	Altered limbic-hypothalamic-pituitary-adrenal axis
Cellular signaling	Abnormal intraneural signal transduction. Altered neurotransmitter synthesis and release
Oxygen supply	Oxidative stress with decreased oxidative metabolism. Disturbs neurotransmitter balance resulting in cerebral dysfunction. Reduced cerebral perfusion during periods of delirium
Altered sleep-wake cycle	Altered melatonin secretion
Genetic	Candidate genes include apolipoproteins, dopamine signaling
Anatomical	Acute infarction of the left (or bilateral) posterior cerebral artery territory, most specifically of the medial occipital-temporal gyri, leads to confusion and delirium (interruption of the inferior longitudinal fasciculus will interrupt neural signals between the medial temporal lobe and visual areas, resulting in visually specific memory deficits)
Other mechanisms	Alterations to the blood–brain barrier

GABA - gamma-aminobutyric acid

is the primary neurotransmitter of the reticular activating system that governs alertness and attention. Deficiency of this neurotransmitter leads to impaired alertness and attention, which is the hallmark of delirium. Studies using serum anticholinergic activity estimates, based on a receptor-binding assay, have associated higher serum anticholinergic activity with more severe delirium.[22] Excess dopamine results in hallucinations and agitation (because dopamine potentiates the action of the excitatory neurotransmitter glutamate). Multiple factors influence endogenous acetylcholine function since its synthesis depends on the presence of adequate precursors, glucose, and normal function of enzymes that require thiamine for function.[23] To maintain normal cognitive functions the cholinergic and monoaminergic neurotransmitter systems, which are anatomically and functionally related, should work in concert. Serotonin, norepinephrine, and dopamine disturbances will also alter cholinergic balances and manifest as the syndrome of delirium.

Investigations. For laboratory investigations, targeted testing is the best strategy, but the following are reasonable as screening for most patients: serum electrolytes, creatinine, glucose, calcium, complete blood count, liver function tests, and urinalysis.[24] Drug levels should be ordered where appropriate and toxicology screen of blood and urine should be obtained from patients with acute delirium or confusion when a cause is not immediately obvious. Urinalysis and urine culture should be obtained in elderly patients. Blood gas determination is often helpful, and chest x-ray is performed in most patients. Further testing should be based upon the history and clinical examination. A report of slow cognitive decline over several months, for example, increases the importance of evaluating thyroid function and vitamin B12 levels. An EEG might be useful in categorization of the underlying etiology, for example, seizures, sedative-hypnotic toxicity, and metabolic encephalopathy. Non-convulsive status epilepticus (NCSE) may cause continuous or fluctuating impairment of consciousness, and EEG is the only method that can confirm the diagnosis of "spike and wave stupor."[25] Some patients may show facial myoclonus, but most often the EEG is the only test that confirms the diagnosis. One report evaluated 198 EEGs performed for the indication of altered consciousness without convulsions, and found definite or probable nonconvulsive status epilepticus in 37%.[26] In metabolic encephalopathy, EEG findings are generalized slowing to the theta-delta range. In sedative-hypnotic toxicity, the EEG shows low voltage rapid beta activity. The EEG is also useful in grading the severity of the encephalopathy. The EEG should be normal in depression and mania.

Neuroimaging is an important tool in the search for the causes for delirium (**Figures 1, 2, & 3**). Indications for imaging include the presence of focal findings on examination, positive history, or evidence of trauma, and if a reasonable medical cause cannot be identified. Neuroimaging may also be useful if the neurologic examination is confounded by diminished patient responsiveness or cooperation, and if the delirium does not improve despite appropriate treatment of the underlying medical problem. Occasionally, bilateral subdural hematomas can cause a fluctuating impairment of consciousness without lateralizing signs.

Lumbar puncture. Elderly patients with bacterial meningitis are more likely to present with delirium compared with younger patients who usually present with the classic triad of fever, headache, and signs of meningeal irritation.[24] Lumbar puncture should be performed in patients in whom there is suspicion of meningitis, encephalitis, or SAH with a negative CT scan of the head. These include all febrile, or septic-appearing patients with delirium, unless an infectious focus outside the CNS is identified or suspected. Lumbar puncture should be considered in the latter patient group as well. Neuroimaging should be performed prior to lumbar puncture when an intracranial mass or another source of increased intracranial pressure is suspected.

Treatment. Management of delirium includes treatment of the underlying condition, control of the delirious behavior, and prevention of complications. Attention must be paid to supportive therapy, such as maintenance of basic fluid and electrolyte balance, adequate nutrition, and vitamin supplementation. Drugs should be used only when necessary, taking renal and hepatic function into account for the dosage schedule. All nonessential drugs should be stopped. To prevent drug withdrawal reactions, it is best to taper, rather than to withdraw abruptly, medications that have been used for some time, especially monoamine oxidase inhibitors, clonidine, narcotics, barbiturates, and antiepileptic drugs. Medication may be necessary if the patient's behavior is potentially dangerous, interferes with medical care, or causes the patient profound distress (**Table 4**). Haloperidol (0.5-1.0 mg intravenously q12 hours with dose escalation only if required) is the safest and most useful drug. The use of haloperidol is favored because it has fewer sedating and anticholinergic side effects than other antipsychotics, and it can be administered intravenously.[27] The most feared result of intravenous haloperidol is QT prolongation (>450 msec) and the risk of arrhythmia including ventricular fibrillation or torsades de pointes.[28,29] The risk may be increased in patients with a history of cardiac events, conduction abnormality, or when combined with other QT prolonging medications. Although most patients

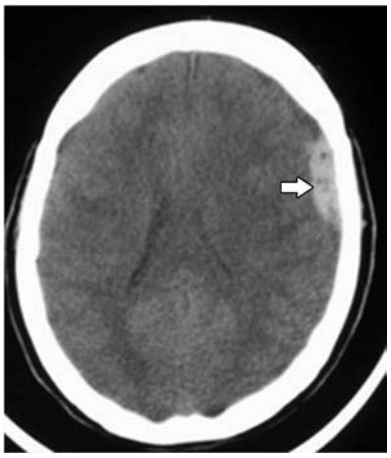

Figure 1 - Computed tomography scan of a 39-year-old woman with Good posture syndrome and chronic renal failure on dialysis who presented with partial motor seizures, fever, headache, confusion, and vomiting. It shows hyperdense extra-axial collection that was proved to be staphylococcal subdural empyema after surgical evacuation.

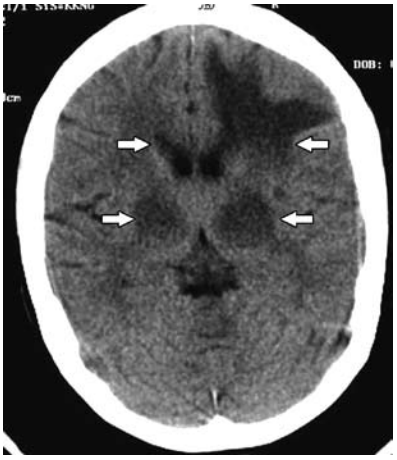

Figure 3 - Computed tomography of a young HIV positive patient with CNS toxoplasmosis showing hypodense areas in the basal ganglia and frontal lobes with surrounding areas.

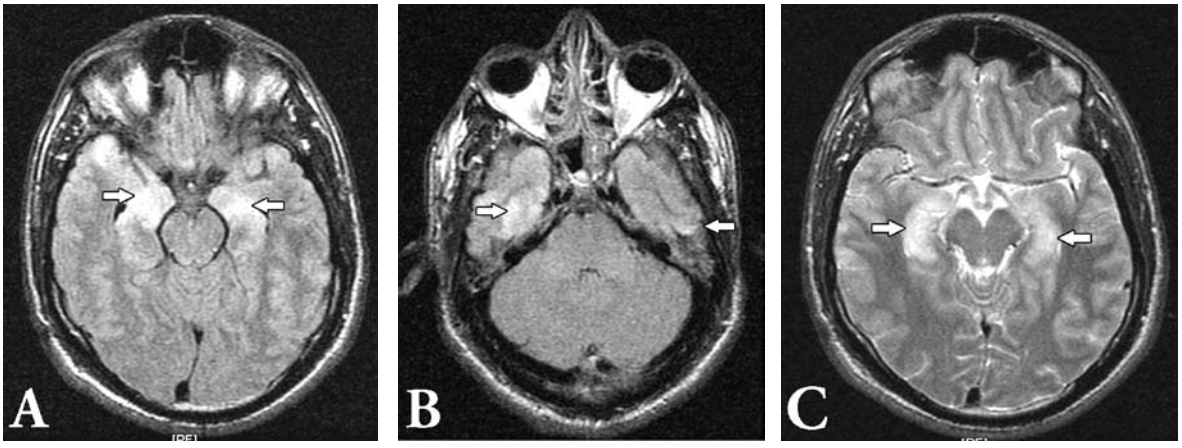

Figure 2 - Magnetic resonance imaging of the brain of a young female with herpes encephalitis. It showed bilateral asymmetrical temporal lobe high signal intensities on FLAIR images (**A** and **B**) and T2 image (**C**).

will only require short-term antipsychotic use, it is important to be aware of the risk and monitor for a prolonged QT interval and torsades de pointes. The atypical antipsychotics at low doses may be better alternatives. These include risperidone (starting at 0.25-0.5 mg twice daily, which may be increased up to 3-4 mg per day), olanzapine (2.5-5.0 mg at bedtime, increased if needed to up to 20 mg daily), and quetiapine (starting at 25-50 mg twice a day and increasing to 200 mg per day if necessary).

Other important, but less frequently encountered side effects when using antipsychotics include extrapyramidal side effects (usually dose related), neuroleptic malignant syndrome (idiosyncratic), metabolic syndrome, and increased mortality rates when antipsychotics are used in patients with dementia.[30] Comorbidities must also be considered; for example, patients with Lewy body dementia or Parkinson's disease are specifically at risk for the extrapyramidal side effects associated with antipsychotics (quetiapine is favored in these patients). Barbiturates should be avoided. Lonergan et al[31] showed increased sedation and decreased effectiveness in treating delirium using benzodiazepines compared with antipsychotics, and the literature does not support the use of benzodiazepines alone. If pain is associated with agitation, narcotics are usually necessary. It is

Table 4 - Pharmacologic treatment of delirium.

Agent and class	Dose	Adverse effects	Comments
Haloperidol (antipsychotic)	0.5–1.0 mg twice daily orally, with additional doses every 4 hrs as needed (peak effect, 4-6 hr) 0.5-1.0 mg intramuscularly; observe after 30-60 min and repeat if needed (peak effect, 20-40 min)	Extrapyramidal symptoms, especially if dose is >3 mg per day, prolonged corrected QT interval on electrocardiogram. Avoid in patients with withdrawal syndrome, hepatic insufficiency, neuroleptic malignant syndrome	Usually agent of choice, relatively non-sedating, with few hemodynamic effects. Effectiveness demonstrated in randomized, controlled trials. Avoid intravenous use because of short duration of action
Risperidone (atypical antipsychotic)	0.5 mg twice daily	Extrapyramidal effects equivalent to or slightly less than those with haloperidol. Prolonged corrected QT interval on electrocardiogram	Tested only in small uncontrolled studies, associated with acute cardiovascular events with chronic use. Associated with increased mortality rate among older patients with dementia
Olanzapine (atypical antipsychotic)	2.5-5.0 mg once or twice daily, orally or sublingually, to maximum 20 mg	Same as risperidone	Same as risperidone
Quetiapine (atypical antipsychotic)	12.5-25 mg bd po, increased daily if needed, to 100 mg or greater	Same as risperidone	Same as risperidone, hypotension is often problematic
Lorazepam (Benzodiazepine)	0.25-1.0 mg po/iv every 4 hrs prn	Paradoxical excitation, respiratory depression, oversedation	Second-line agent, associated with prolongation and worsening of delirium symptoms demonstrated in clinical trial, reserve for use in patients undergoing sedative and alcohol withdrawal, those with Parkinson's disease, and those with neuroleptic malignant syndrome
Trazodone (antidepressant)	25-150 mg orally at bedtime	Sedation is the main side effect	Tested only in uncontrolled studies

hrs - hours, min - minutes, bd - twice daily, po - per mouth, iv - intravenous, prn - as required

also sometimes necessary to briefly use neuromuscular blocking agents in agitated, ventilated delirious patients if other measures have failed. In 2007, Pandharipande et al[32] piloted an approach employing a new sedation protocol with dexmedetomidine (a highly selective alpha-2 agonist) versus lorazepam in medical and surgical ICU patients.[32] Individuals treated with dexmedetomidine spent fewer days in coma and more time neurologically "normal" (defined as without coma or delirium) than their counterparts sedated via lorazepam. This preliminary work suggests a need for larger trials to prove alpha-2 receptor agonists (for example dexmedetomidine, clonidine) to be alternative sedatives agents less likely to cause delirium than the benzodiazepines.

Monitoring of cognitive functions is important because of the high risk of mortality. This is achieved by establishing baseline cognitive functions and recent changes followed by regular formal assessments.

Environmental interventions. Evidence suggests that reorientation and reducing unfamiliarity using clocks, calendars, hearing, and visual aids, family pictures, and personal objects are effective interventions in delirium.[17,33] A quiet and calm nocturnal environment may also help restore disturbances in sleep-wake cycles. Staff changes, and the number of visits from strangers should be minimized.[17] Other suggestions include limitation of ambient noise and providing a radio or a television set, a night-light, and where necessary eyeglasses and hearing aids. Provide soft music and warm baths and allow the patient to take walks when possible. Proper communication and support are critical with these patients. As much as possible, everything should be explained and delusions and hallucinations should be neither endorsed nor challenged. Patients should receive emotional support, including frequent family visits. They also benefit from frequent reorientation to place, time, and situation. Restraints may add to patients' agitation and are best avoided unless absolutely necessary.

Prognosis. Development of delirium in elderly patients has a significant impact upon their health including prolonged hospitalizations and functional decline. Although it is considered potentially reversible, it could be the harbinger of future problems for frail elderly persons. Elderly patients who develop delirium have been shown to be at increased risk for developing dementia over the 2 years subsequent to hospital discharge. Signs of delirium may persist for 12 months or longer, particularly in those with underlying dementia. Mortality associated with delirium is high. This was illustrated in a report of pooled results from several

studies, which estimated the one and 6 month mortality to be 14 and 22%, approximately twice that of patients without delirium.[34] Mixed delirium is considered to have the poorest prognosis with respect to treatment response while patients presenting with hyperactive delirium respond more favorably to treatment.

In conclusion, delirium is an acute decline in attention and cognition, and is a common, life-threatening, and potentially preventable clinical syndrome. The development of delirium is often the beginning of a downward spiral, which leads to the loss of independence, higher risk of morbidity and mortality, and increased health care costs. The key to treating delirium is to promptly identify and ameliorate any causal or contributing medical conditions. The use of psychoactive drugs, especially benzodiazepines, should be minimized, although low-dose antipsychotics can be used to decrease psychomotor agitation if indicated. Delayed delirium treatment and prolonged duration of delirium are associated with increased mortality. Delirium prevention includes recognizing the interaction of predisposing and precipitating factors.

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