

Sample Topic

Coma



The Medical Disability Advisor: Workplace Guidelines for Disability Duration

Fifth Edition

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Coma

Related Terms

- Comatose
- Loss of Consciousness

Medical Codes

- ICD-9-CM: 780.01, 780.02, 780.03, 780.09
- ICD-10: R40, R40.2

Definition

Coma is a loss of consciousness involving unawareness of self, others, the external world, and the passage of time. The individual in a coma is unable to respond to external events or basic needs such as eating or drinking. Automatic reflex movements or abnormal body positions (posturing) may be evident in response to pain or other stimuli. Unless interrupted by damage to specific parts of the brain, involuntary functions such as heartbeat and breathing continue, although changes in pulse and respirations may provide clues to the cause of coma.

Coma can result from mechanical destruction of crucial areas of the brain stem or cerebral cortex (anatomic coma) or from widespread (global) disruption of brain metabolic processes (metabolic coma). Structural causes of coma include bleeding in or around the brain (e.g., hemorrhagic stroke, subarachnoid hemorrhage, subdural or epidural hematomas, or a ruptured aneurysm), major stroke with death of brain tissue (cerebral infarction), and brain tumors. Coma can result from blunt head trauma or a gunshot to the head.

Metabolic causes of coma include conditions that deprive the brain of oxygen (hypoxia), such as respiratory failure, asphyxiation, or heart failure, and massive blood loss from trauma resulting in an inadequate blood supply to the brain. Carbon monoxide poisoning interferes with the delivery of oxygen to the brain. Coma can be caused by an overdose of prescription or illegal drugs or alcohol. Failure of the lungs, kidneys, or liver may produce coma due to the accumulation of waste products toxic to the brain. Very low or high blood sugar, extremely high or low body temperature, and fluid or electrolyte imbalances may also produce coma. Certain bacteria and viruses can infect the brain and result in coma.

Head trauma, drug use, epilepsy, and brain infections are the most common causes of coma in individuals less than 40 years of age. Cardiovascular disease (especially stroke) and metabolic disorders (e.g., diabetes mellitus, hypoglycemia, coma from liver failure, electrolyte disorders, and uremia) are common causes in those over 40.

Risk: Risk varies with the type of coma.

Incidence and Prevalence: Incidence varies with the type of coma.

Diagnosis

History: Details of the individual's medical history and circumstances surrounding the onset of coma and subsequent events may be gathered from the individual's family members or emergency attendants. Reported history may include head injury, convulsions, or drug use (legal or illegal). Reported symptoms may include fever or headache before the onset of coma, if coma is related to brain infection. High blood pressure and the sudden development of severe headache and vomiting just before loss of consciousness may suggest intracranial hemorrhage. A medical history of diabetes, epilepsy, liver disease, kidney disease, or cancer may also suggest specific causes of coma.

Physical exam: A variety of breathing disturbances such as rapid, deep respirations (hyperventilation) or slow, irregular respirations may be evident. Different breathing patterns point to damage at different levels of the brain or brain stem. In response to painful stimuli, purposeful movement such as withdrawing a limb is a likely indication that the sensory and motor nervous pathways are intact. Abnormal body posturing (decorticate or decerebrate) in response to pain suggests more serious damage to the brain. No movement in response to painful stimuli suggests serious damage at the level of the brain stem. Asymmetry in movement or reflexes may indicate structural damage to one side of the brain.

The presence of a single, dilated pupil (anisocoria) is a serious sign and may indicate increased pressure within the skull (intracranial pressure) that causes the brain to swell (brain herniation). Tiny pupils that respond to light tend to occur in metabolic derangements. Some structural brain lesions such as blood clots or tumors can cause the eyes to be positioned to one side or in a downward gaze. Other examinations of eye movement include the "doll's head" eye response, in which the individual's head is rotated from side to side. Under normal conditions, the eyes stay fixed and centered. With brain damage, the eyes move abnormally. Another test of eye movement involves irrigating an ear with cold water (cold water calorics). Individuals with an intact brain stem will produce a reflex (oculovestibular reflex) eye movement to one side. This reflex is absent or asymmetrical if there are brain stem lesions.

The vital signs are also important in the initial evaluation of coma. A low body core temperature (hypothermia) can produce coma and a slow pulse (bradycardia).

The Glasgow Coma Scale is a practical and standardized system for assessing the degree of coma. It also aids in predicting the duration and ultimate outcome, especially in individuals with head trauma. The three determinants of the system are the opening of the eyes, verbal response, and motor response. Each item has a numerical score and is the sum of the numeric values. If the patient gets a score of 13 to 15, it correlates with a minimal impairment such as a concussion; 9 to 12 correlates with a medium level of impairment, and a score lower than 8 signifies a more serious impairment.

Tests: Blood tests should be done for metabolic causes of coma, including low or high blood sugar, electrolyte disturbances,

liver and kidney function, and drug blood levels. A CT or MRI is indicated for the diagnosis of anatomic causes of coma. A lumbar puncture (spinal tap) may be done if a CT or MRI shows no lesions or tumors. The cerebrospinal fluid obtained from the lumbar puncture can help diagnose an infection or hemorrhage in the brain. An electroencephalogram (EEG) may determine if an individual's coma is secondary to seizures. The pattern of electrical activity can sometimes suggest an infectious or vascular cause.

Treatment

The immediate goal in the management of coma is to prevent further brain damage. Any evidence of low blood pressure, inadequate oxygenation, low blood sugar, or low body temperature is treated promptly. If the cause is hypoglycemia, intravenous sugar is administered, because coma due to low blood sugar may improve rapidly when sugar is given. Thiamine is a B vitamin and may be given with the sugar in alcoholics or others in a malnourished state.

Low blood pressure (hypotension) is usually treated with fluids or with medications.

Insertion of an artificial airway and the use of mechanical ventilation may be needed in cases of inadequate ventilation. If intracranial pressure has increased, reducing carbon dioxide by raising the respiratory rate (hyperventilation) helps decrease intracranial pressure. In some cases, surgical insertion of an intracranial pressure monitor may be needed. If intracranial pressure is raised because of brain swelling, steroids or mannitol may help decrease it.

In cases of hypothermia, restoring normal body temperature may reverse coma.

The cause of the coma usually determines the therapy. Once a diagnosis is made, surgery (craniotomy) may be indicated to remove any masses, stop hemorrhage, or decrease pressure on the brain. Treatment of infectious or metabolic causes of coma is directed at correcting the underlying cause. The individual's neurologic and medical status needs to be monitored continuously in intensive care situations.

Prognosis

The outcome from coma depends primarily on the cause. About 40% of people do not survive liver failure (Jones); 25% to 36% of the seriously brain injured die 6 months after trauma (Olson). Those individuals with coma secondary to drug ingestion generally have a good outcome if prompt, effective emergency care is received.

Differential Diagnoses

- Catatonic schizophrenia
- Chronic nephritis
- Congestive heart failure
- Delirium
- Dementia
- Hypothermia
- Locked-in syndrome
- Nephrotic syndrome
- Neurasthenia
- Overdose
- Pulmonary edema
- Septic shock

Specialists

- Critical Care Internist
- Neurologist
- Neurosurgeon

Rehabilitation

Rehabilitation should begin almost immediately in acute coma, with passive range of motion and frequent turning to avoid limb contractures and bedsores. Sensory stimulation in the forms of music, massage, or speaking and reading to the individual may help speed recovery, although the effects cannot be measured. Negative comments should never be made around individuals in a coma because some who recover may report fleeting recollection of events while in the unresponsive state.

All individuals in a coma longer than a week will most likely require some sort of long-term care and rehabilitation. The type of rehabilitation is based on the degree of functional impairment. Those with severe functional impairments will usually require admission to a rehabilitation or extended care facility. Such facilities can provide ongoing medical care and physical therapy, administer nutrition, and provide grooming. On occasion, physically stable individuals in a coma can be cared for at home.

In some cases, there is good recovery from coma with only mild functional and intellectual impairments. In these circumstances, outpatient neurological rehabilitation may be appropriate. The type and frequency of therapy will be dictated by the type and degree of impairments and may include occupational, physical, and/or speech therapy.

Comorbid Conditions

- Brain tumor
- Cancer
- Drug/alcohol abuse
- Heart and lung disease
- Liver failure
- Stroke

Complications

Complications may include lung damage from prolonged artificial ventilation, urinary infection from prolonged use of urinary catheters, dehydration, overhydration, blood chemistry imbalance, vitamin deficiency, or malnutrition from prolonged dependence on intravenous solutions for nourishment. Skin damage or limb contractures can result from being immobile. Other complications such as seizures or paralysis are determined by the cause of the coma and the length of time the individual is comatose. Deep coma can become a permanent condition (persistent vegetative state).

Factors Influencing Duration

The underlying cause, the degree and location of injury (if any), and associated complications will all influence the length of disability. Some individuals are permanently disabled in one or more neurologic functions. In general, the elderly have poorer outcomes than younger comatose individuals. The outcome is often not good for individuals in poor health before the coma.

Length of Disability

Duration depends on cause. Disability may be permanent, or full recovery may occur. Contact physician for additional information.

Return to Work

The individual in a coma is disabled and unable to work. Those who recover from coma may have persistent impairments of physical and intellectual function and so may require appropriate reassignment of job responsibilities and possible job retraining.

Failure to Recover

Regarding diagnosis:

- Was a diagnosis of coma based on a thorough history and physical exam?
- Was the underlying cause of the coma determined with diagnostic tests?
- Would individual benefit from consultation with specialists in the treatment of the underlying cause (neurologist, neurosurgeon, radiologist, internist, endocrinologist, critical care specialist, infectious disease specialist)?

Regarding treatment:

- Was there any extended delay between the onset of symptoms and treatment?
- Was necessary life-saving support (airway, breathing, cardiac compressions) provided as appropriate?
- Was treatment appropriate for the underlying condition?
- Was surgery required?
- Was rehabilitation started promptly?
- Did the rehabilitation intervention include sensory stimulation?

- Would individual benefit from consultation with a physiatrist or specialist in neurological rehabilitation?

Regarding prognosis:

- Considering the underlying cause and the presence of comorbid conditions, what was the expected outcome for individual (full recovery, partial disability, persistent coma (persistent vegetative state)?
- Did individual suffer any complications that may affect the length of disability?
- Has individual been evaluated for long-term care and rehabilitation? If so, has individual been receiving appropriate long-term care and rehabilitation?
- Are there barriers preventing access to care and rehabilitation (i.e., lack of insurance coverage, lack of local facilities)?
- Have all rehabilitation and long-term care options been explored?
- Are family members and significant others receiving appropriate support and guidance in coping with the individual's condition (i.e., social services, head injury support groups, behavioral counseling, financial counseling)?

Cited References

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