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LECTURER

ICON

"Altered level of consciousness"

Introduction:

Consciousness is regarded as a state of awareness of self and surroundings. Impaired consciousness is due to disturbed arousal or content of mental function.

Many pathological processes may impair conscious level and numerous terms have been employed to describe the various clinical states which result, including obtundation, stupor, semicoma and deep-coma. These terms result in ambiguity and inconsistency when used by different observers. Recording conscious level with the *Glasgow coma scale* avoids these difficulties and clearly describes the level of arousal. With this scale:

COMA = NO SPEECH, NO EYE OPENING, NO MOTOR RESPONSE

An **altered level of consciousness** is any measure of arousal other than normal. **Level of consciousness** (**LOC**) is a measurement of a person's arousability and responsiveness to stimuli from the environment.

Definition:

- Scales and terms to classify the levels of consciousness differ, but in general, reduction in response to stimuli indicates an altered level of consciousness
- Consciousness can be defined as a state of awareness of one's self and the environment, and others, and assessed through set of responses to that environment. (Barker 2002).
- Unconsciousness is defined as a state of unawareness or an inability to respond as a result of reduced brain stem activity.

Continuum of consciousness:

Alert:Attends to the environment; responds appropriately to commands and questions with minimal stimulation

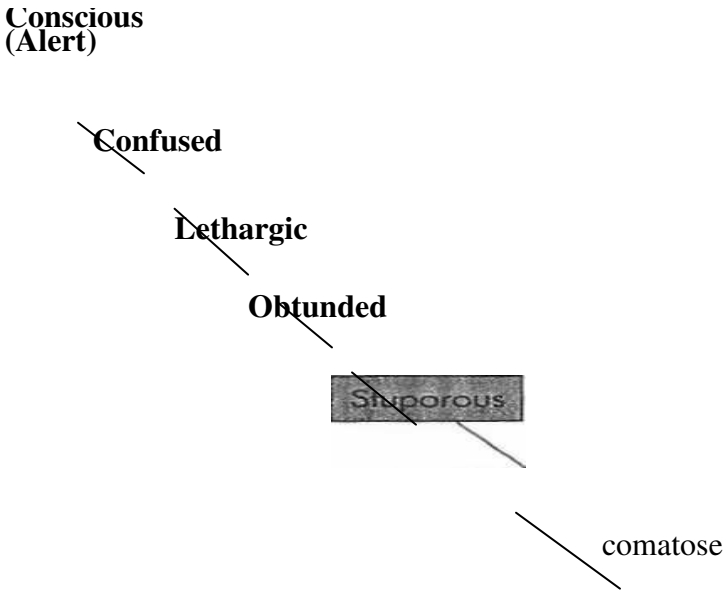
Confused*:* Disoriented to surroundings; may have impaired judgment; may need cues to respond to commands

Lethargic:Drowsy; needs gentle verbal or touch stimulation to initiate a tesponse

Obtunded: Responds slowly to external stimulation; needs repeated stimulation to maintain attention and response to the environment

Stuporous:Responds only minimally with vigorous stimulation; may only mutter or moan as a verbal response

Comatose:No observable response to any external stimuli



Three unique conditions of altered LOC illustrate the complexity of the physiology of consciousness. A **persistent vegetative state**is a condition that can develop after a severe brain injury.

Locked-in syndromeis a condition in which the motor pathways in the brainstem are destroyed but the RAS and higher cognitive functions remain intact.

Brain deathis the third unique alteration in LOC with specific physiologic features. Severely brain-injured patients are considered brain dead when they meet strict criteria set forth by state law. The laws governing brain death may vary by state, but most include criteria such as[5]:

- A known cause of coma so that reversible causes, such as drug overdose or hypothermia, can be ruled out
- Unresponsiveness to external stimuli

• Absent brainstem reflexes

• Absent tespiratory effort in the presence of hypercapneaThese criteria are crucial because they do not include the classic layperson's criterion for death—an absent heartbeat. The definition of brain death becomes particularly important in situations involving tissue and organ donation.

Impaired state of consciousness

There are **acute and chronic states** of impaired consciousness. Acute states are potentially reversible, whereas chronic states indicate underlying brain damage and hence are irreversible.

Acute states are generally caused by metabolic upsets, such as hypoglycaemia or drug intoxication, which alter brain function. The acute states are:

- ❖ Clouding of consciousness
- ❖ Delirium
- ❖ Illusions
- ❖ Hallucinations
- ❖ Delusions
- ❖ Stupor
- ❖ Coma

1. A **Clouding of Consciousness** suggests interference with the integrity of the RAS, with a resultant effect on the arousal response. This can cause unusual behaviour, ranging from irritability and confusion, to poor concentration and drowsiness (Pemberton 2000). The changes can be subtle at first and difficult to recognise.
2. **Delirium** is similar to clouding of consciousness, although a person who is delirious may also present with psychological manifestations, such as **illusions**, **hallucinations and delusions**. A shadow on the wall that takes the form of an animal, or a noise that is misinterpreted as a stranger coming to cause harm, are examples of illusional states. Hallucinations are defined as the sight or sound of something in the absence of any sensory stimuli, such as hearing voices or seeing objects that do not exist.
3. **Delusions**are more persistent misperceptions that are held to be real, however illogical they may seem.Illusions and Hallucinatary experiences are common in temporal lobe epilepsy.
4. **Lethargy** is characterised by slow and sluggish speech, mental processes and motor activities.
5. The **obtunded**patient may be readily reusable but can only respond verbally with a word or two, and can only follow simple commands.
6. **Stupor** describes a state of near unrousability that requires vigorous or repeated stimulus to illicit a response.
7. **Coma**is an impaired state where the patient is totally unaware of herself and her environment. The categorisation of the different graduations of coma is not universally

accepted. The difference between each definition is the degree and presentation of response to painful stimuli. However, terms such as semi-coma and deep coma are still used in clinical practice.

Chronic states of impaired consciousness

The chronic states are:

- Dementia
- Vegetative
- Locked in syndrome

Dementia

This condition is caused by a generalized and progressive loss of cortical tissue from the brain. Mental functions decline progressively. There is global deterioration of memory, thinking, motor performance, emotional responsiveness and social behavior, but arousal remains intact. Dementia is usually an irreversible condition.

Vegetative

Vegetative state is a term used to describe a condition that can occur following severe brain injury. It is often referred to as persistent vegetative state (PVS) and is sometimes described as a coma vigil or irreversible coma. The patient ha sleep/waking cycles and will open her eyes when awake. However, there is no awareness of self or the environment and no cognitive function. Physiologically, the brain stem is functioning but the cerebral cortex is not. Patients can survive for many years in this condition and require full-time care.

Locked-in Syndrome

This condition results in paralysis of voluntary muscles without interfering with consciousness and cognitive functions. The patient is unable to speak and is sometimes unable to breathe spontaneously. She is able to control vertical eye movements and blinking and may be able to use these movements to develop a simple communication system.

The pathological basis for this condition is damage to the pons in the brain stem, which may result from cerebral vascular disease or trauma. It is important to remember that the patient is aware of her surroundings even though she appears to be mentally and physically inert.

Causes:

1. Intracranial

a. Trauma

*Diffuse white matter injury

*Haematoma
- extradural
- subdural
- 'burst' lobe

b. Neoplastic

Tumour with oedema

c.Vascular

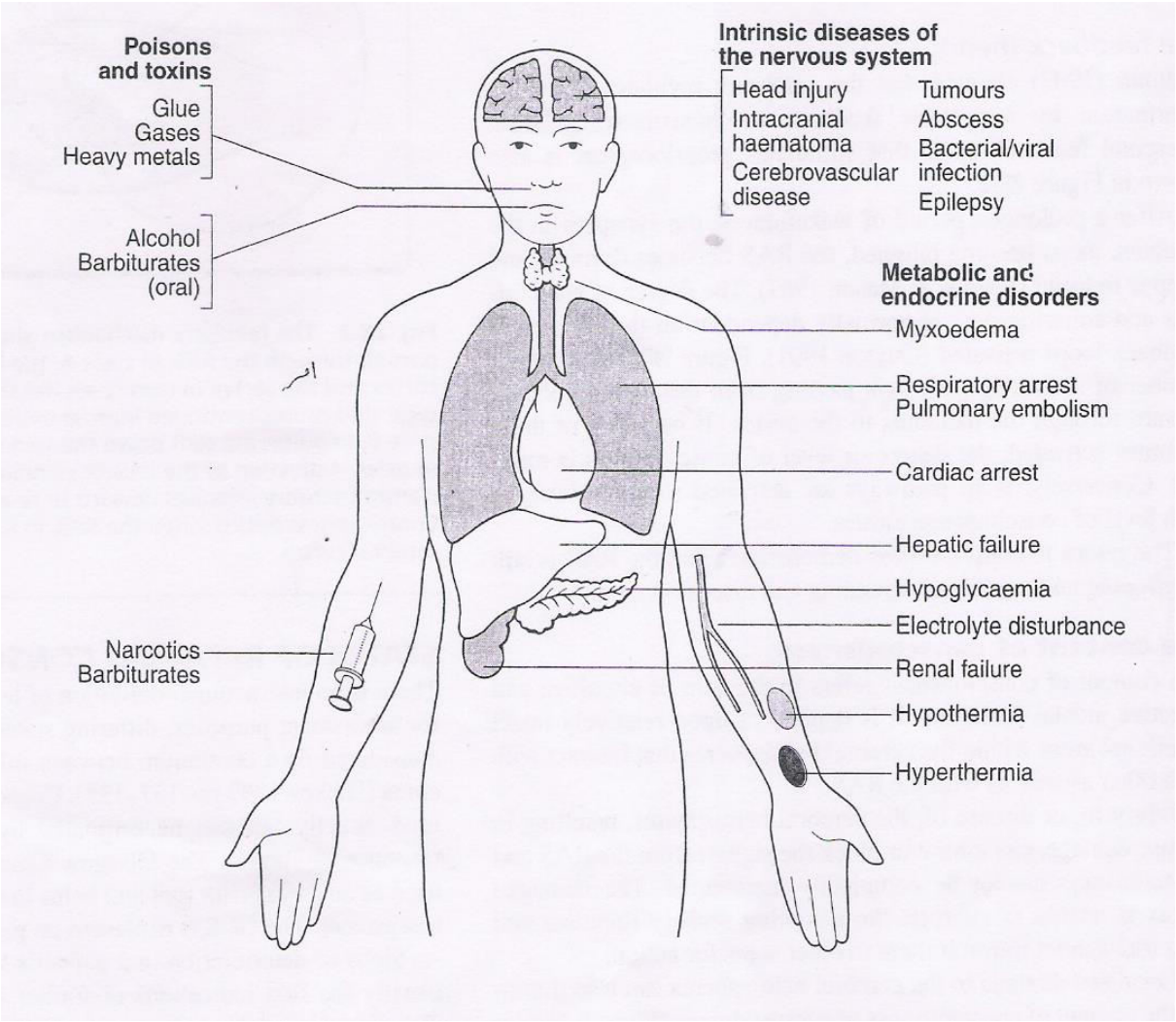
Subarachnoid haemorrhage 'Spontaneous' intracerebralhaematomaCerebral infarct with oedema and 'shift' Brain stem infarction or haemorrhage

d. **Infective**

Meningitis
Abscess
Encephalitis

e. Other

Epilepsy
Hydrocephalus



2.Extracranial

a. Metabolic

- Hypo/hypernatraemia
- Hypo/hyperkalaemia
- Hypo/hypercalcaemia
- Hypo/hyperglycaemia
- Diabetic ketoacidosis

b. Endocrine

- Diabetes Hypopituitarism
- Hypopituitarism
- Adrenal crisis (Addison's disease)
- Hypo/hyperparathyroidism
- Hypothyroidism

- Lactic acidosis
- Hypo/hyperthermia
- Uraemia
- Hepatic failure
- Porphyria
- Hypercapnia
- Hypoxia

c.Respiratory insufficiency

- Hypoventilation
- Diffusion deficiency
- Perfusion deficiency
- Anaemia

d. Arterial occlusion
Vertebral artery disease
Bilateral carotid disease

Reduced cerebral blood flow

e. Decreased cardiac output
Vasovagal attack
Blood loss

Valvular disease
Myocardial infarction
Cardiac arrhythmias
Hypotensive drugs

f. Drugs
Sedatives
Opiates
Antidepressants
Anticonvulsants
Anaesthetic agents

g. Toxins
Alcohol
Carbon monoxide
Heavy metals

h. Psychiatric disorders
Hysteria
Catatonia (mutism with decreased motor activity)
Fugue states

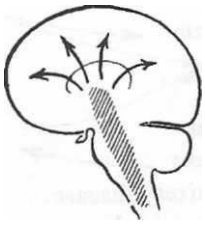
1. Altered Mental Status in Febrile Returning Traveler
2. Supratentorial Causes of ALOC or coma
    1. Unilateral hemispheric disease AND herniation
    2. Concussion or Contusion
    3. Meningitis or Encephalitis
    4. Seizure (post-ictal)
    5. Subarachnoid Hemorrhage
    6. Cerebrovascular Accident
3. Infratentorial Causes of ALOC or coma
    1. Basilar ArteryOcclusion
    2. Brainstem tumor
    3. Cerebellar hemorrhage
    4. Pontine hemorrhage
    5. Traumatic posterior fossa hemorrhage
4. Toxin Causes of ALOC or coma
    1. See Toxin Induced Altered Level of Consciousness Causes

5. Cardiopulmonary Cause of ALOC or coma
    1. Hypoxia
    2. Hypercarbia
    3. Congestive Heart Failure (CHF)
    4. Pulmonary Embolus
6. Gastrointestinal, Renal and Endocrine Causes of ALOC
    1. Hepatic Encephalopathy
    2. Renal insufficiency
    3. Electrolyte disturbance
    4. Adrenal Insufficiency
    5. Diabetes Mellitus
    6. Peritonitis
    7. Thyroid disease (Hypothyroidism)
7. Other Causes of ALOC or coma
    1. Heat Stroke
    2. Hypothermia
    3. Sepsis
    4. Vasculitis
    5. Hyperviscosity Syndromes
8. Mnemonic: AEIOU TIPS
    1. Alcohol or Abdominal Aortic Aneurysm
    2. Electrolytes, Encephalopathies, endocrine problems
    3. Insulin (Hypoglycemia)
    4. Opiates or Overdose
    5. Uremia
    6. Trauma, Temperature, or Toxemia
    7. Infections (Sepsis, Meningitis)
    8. Psychogenic or Pulmonary Embolus
    9. Space occupying lesions, Strokes, Shock, Seizure
9. Mnemonic: I WATCH DEATH
    1. Infection
    2. Withdrawal
    3. Acute metabolic causes
    4. Trauma
    5. CNS Causes
    6. Hypoxia
    7. Deficiencies (Nutritional)
    8. Endocrinopathies
    9. Acute Vascular Causes
    10. Toxins or Drugs

11. Heavy Metals

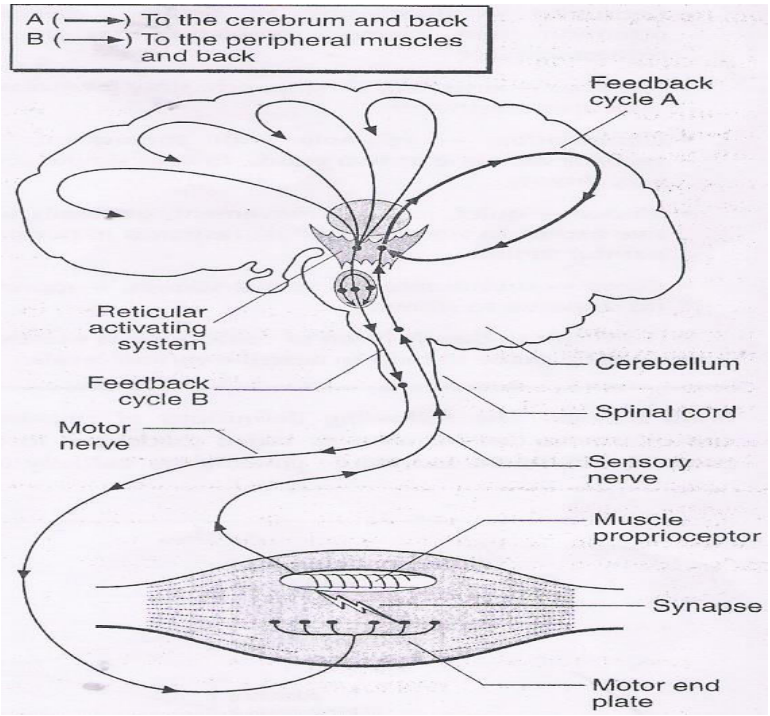
Pathophysiology:

A 'conscious' state depends on intact cerebral hemispheres, interacting with the ascending reticular activating system in the brain stem, midbrain, hypothalamus and thalamus. Lesions diffusely affecting the cerebral hemispheres, or directly affecting the reticular activating system cause impairment of conscious level



Full consciousness is a product of many delicate interactions within the nervous system. Arousal is a function of the RAS. Fibers from the upper brainstem, thalamus, and hypothalamus receive input from sensory pathways in the brain and peripheral nervous system. The RAS fibers stimulate the cerebral hemispheres to initiate and maintain arousal. When a person is aroused, or awake, he or she is ready to respond to the environment. The cerebral cortex also provides feedback to the RAS to modulate and regulate the information sent to the cortex.

The ability to consciously respond to the environment is a function of the cerebral hemispheres. The cerebral cortex, dien-cephalon, and upper brainstem act together to control voluntary motor functions, language, memory, and emotion. These higher-level cognitive functions represent the content portion of consciousness. A person needs both arousal, or wakefulness, and content to be considered fully conscious.

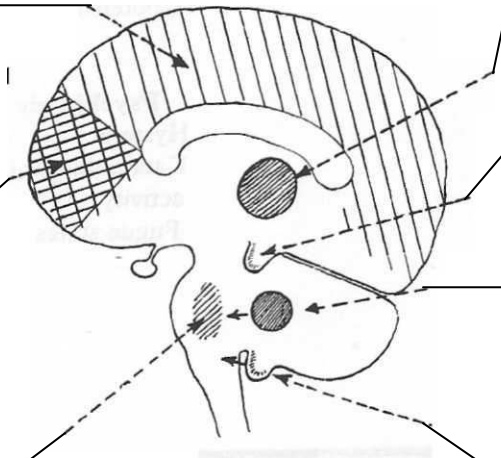


Diffuse hemisphere damage*eg:trauma, ischemia, hypoglycemia &hepatic or renal failure*

[Note: focal damage to part of the cortex does *not* affect conscious level]

brainstam involvement

-Ischaemia,
-heamorrhage,
-tumour,
-drugs (sedatives, hypnotics)



Bilateral thalamic involvement,e.g:astrocyt oma

Supratentorial mass causing transtentorialherniattion and

Brain stem compression – directly from infratentorial mass lesion

-or **indirectly** from *tonsillar herniation*

DIAGNOSTIC APPROACH

1. History — **Possible cause of coma/impaired conscious level**

- Head injury leading to admission → Diffuse shearing injury and/or intracranial haematoma
- Previous head injury (e.g. 6 weeks) → Chronic subdural haematoma
- Sudden collapse → intracerebralhaemorrhage / Subarachnoid haemorrhage
- Limb twitching, incontinence → Epilepsy/postictal state
- Gradual development of symptoms → Mass lesion, metabolic or infective cause

Previous illness

- *diabetes → Hypo- or (less likely) hyperglycaemia
- *epilepsy → Postictal state
- *psychiatric illness → Drug overdose
- *alcoholism or drug abuse → Drug toxicity
- *viral infection → Encephalitis
- *malignancy → Intracranial metastasis

General examination

Note the presence of:

- Laceration, bruising, CSF leak → Head injury
- Internal auditory meatus - bleeding
- pus ----- → Cerebral abscess/meningitis
- Enlarged head, Tense anterior fontanelle (In infant) → Raised intracranial pressure
- Neck stiffness, retraction → Tonsillar herniation
- Positive Kernig's sign → Meningitis
- Tongue biting ---------- → Epilepsy/postictal state
- Emaciation, hepatomegaly, lymphadenopathy → Intracranial metastasis
- Infection source (ears, sinus, lungs, valvulardisease) → Cerebral abscess, meningitis
- Pyrexia → Subarachnoid, intracerebral, pontinehaemorrhage

Neurological examination **causes**

1. Signs of raised intracranial pressure (ICP)
   - papilledema
   - tense anterior fontanelle (in infants)

   → Intracranial mass lesion, hydrocephalus

2. Neurological signs
   - unilateral, dilated, fixed pupil → Diffuse cerebral swelling,e.g.anoxia
   - bilateral dilated, fixed pupils → Diffuse cerebral swelling,e.g.anoxia; Drugs- anticholinergics, over dose sympathomimetics
   - pinpoint pupils → Drugs-opiates,parasympathomimetics; pontinehaemorrhage

- eye movements absent pupils fixed; (spontaneous or reflex)
  - pupil fixed → severe–heamorrhage,ischemia,traum
  - pupil reacting → drugs (transient effect); Hypoxic/ hepatic encephalopathy

- asymmetric limb response (i.e. hemi/monoparesis) → focal brain damage: tumour,trauma, Haemorrhage& encephalitis

- Symmetrical limb responses
- Reacting pupils
- Full eye movements

→ metabolic encephalopathy or drug toxicity

Subhyaloid/vitreous haemorrhage (on fundoscopy) → subarachnoid heamorrhage

The following diagnostic and laboratory studies are considered initially:

- Electrolyte panel including carbon-dioxide, chloride, potassium, sodium
- Complete blood count (CBC) and differential
- Drug screen for toxicology
- Blood urea nitrogen (BUN) and creatinine (Cr)
- Computed tomography (CT) or magnetic resonance imaging (MRI) scan of the head may be ordered to rule out cerebral hemorrhage, mass, or structural causes
- Electro oculogram (EOG)
- The Electroencephalogram (EEG)

  The EEG tests neuronal physiology and therefore is important in the diagnosis and follow-up of metabolic or drug-induced encephalopathies.

- Lumbar puncture (LP) with CSF analysis for infection or other findings

- Culture of body fluids (CBF) studies as needed
- The **type of neuro exam** you conduct depends on whether your patient can follow commands. If she can, your exam can be more comprehensive and should include evaluation of:
- level of consciousness (LOC)
- pupils
- cranial nerves I through XII
- motor response
- sensation.

1. **Evaluate ABCs and vital signs**

As with any patient, give top priority to assessing the ABCs—airway, breathing, and circulation. Ask yourself: Is the airway patent? If so, is the patient able to maintain it?
Next, check vital signs: Are her respirations adequate? Are her vital signs stable? Is her blood pressure high enough to perfuse the brain and other vital organs? Be aware that current or progressive injury to the brain and brain stem may make vital signs unstable, but this situation can be complex: Although unstable vital signs can reduce neurologic response, brain injury itself may cause unstable vital signs.

To appropriately assess the patient's peak neurologic status, be sure to evaluate oxygenation and circulation. Ideally, you should conduct the neuro exam when the patient's blood pressure, temperature, heart rate, and heart rhythm are normal. Be aware that a temporary decline in neurologic status caused by insufficient oxygenation or circulation still represents a neurologic change—and leads to permanent neurologic loss unless the underlying problem is corrected.

Vital Signs

Blood pressure and Pulse

The famous neurosurgeon Harvey Williams Cushing (1869-1939) noted that a rise in intracranial pressure (ICP) led to a rise in blood pressure (elevated systolic pressure and widening pulse pressure) and a slowing pulse 'Cushing's response' does not occur until the later stages of raised ICP, however, and the Glasgow Coma Scale will show evidence of deterioration much earlier.

Changes in the blood pressure and pulse can indicate injury or disease elsewhere in the body; for example, failing blood pressure and a rapid and weak pulse are indicative of hemorrhage and shock.

Respiration

Conditions that impair consciousness may also cause respiratory changes. The pattern and rate or respiration may be directly affected by brain damage. The rate of respiration is

recorded on the char, but is also important for the nurse to observe the depth, rhythm and characteristics of respiration. Deep lesions in the cerebrum tend to produce a periodic pattern such as Cheyne-Stokes respiration. Lesion affecting the pons and medulla cause more irregular patterns. If the patient is being artificially ventilated, abnormal respiratory patterns will not be evident.

Temperature

Impaired brain function seldom causes significant changes in the body of temperature unless there has been direct damage to the temperature-regulate centre in the hypothalamus when temperature can rise rapidly. A gradual elevation is likely to be an early sign of infection in the lungs or urinary tract, or in a wound. Each rise in the degree of temperature increases the brain's metabolic rate, and therefore hyperthermia must be treated to prevent further neurological deterioration.

2. **Level Of Consciousness**
   - The Glasgow Coma Scale (GCS) is a standardized, objective, reliable instrument for the assessment of level of consciousness.
   - The scale measures three areas of observable behavioral responses (verbal, motor, and eye). Patient responses are graded by the degree of dysfunction. The patient's best response in each of the three areas is recorded. The combined score of the three areas is the "consciousness level" score.
   - Recording and/or graphing the scores on a flow sheet permits easy tracking of the patient's status.
   - **Response scale.**

Eye response

4 points--eyes open spontaneously.
3 points--eyes open in response to sound.
2 points--eyes open in response to painful stimuli.
1 point--eyes do not open in response to any stimuli.

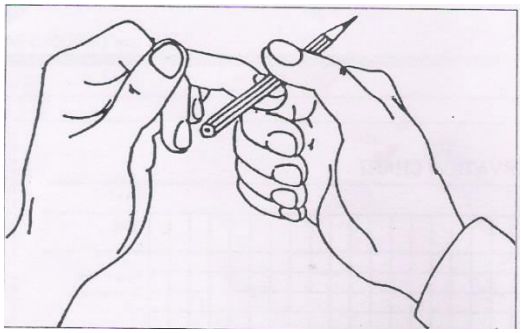
Verbal response

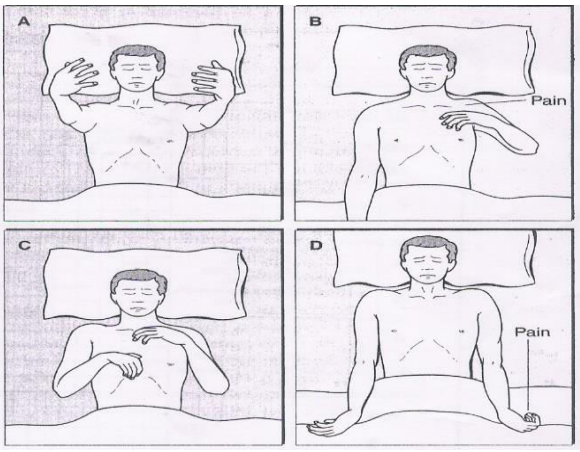
5 points--the patient is oriented to person, place, and time.
4 points--the patient is confused but is able to communicate.
3 points--the patient speaks in a disorganized manner. (Inappropriate speech.)
2 points--the patient's response is moaning or groaning sounds. (Incomprehensible sounds.)
1 point--the patient does not respond.

Motor response

6 points--the patient obeys commands appropriately and moves all extremities equally and spontaneously.

5 points--the patient "localizes" to the stimulus (pain). Attempts to locate the source of the pain and move the limb away from the stimulus.
4 points--the patient attempts to withdraw from the source of the (painful) stimuli in a less than purposeful movement. (Flexor withdrawal.)
3 points--the patient flexes an extremity abnormally. (Decorticate response.)
2 points--the patient extends an extremity abnormally. (Decerebrate response.)
1 point--the patient has no motor response. (Flaccid.)





<u>Abbreviated Response Scale</u>.

Eye Opening	
Spontaneous To sound To pain None	4 3 2 1
Best Verbal Response	
Oriented Confused Inappropriate words Incomprehensible sounds None	5 4 3 2 1
Best Motor Response	

Obeys commands Localizes stimulus Withdrawal from stimulus Abnormal flexion (decorticate) Abnormal extension (decerebrate) Flaccid	6 5 4 3 2 1
TOTAL SCORE POSSIBLE	3 through 15

The accuracy of the GCS is dependent on the assessor using and interpreting it correctly. The nurse must become familiar with the tool and studies suggest that its use should be taught in detail to ensure accuracy of rating by nurses. The reader should refer to the referenced literature for more information and seek to gain practical experience in the clinical environment.

3. Evaluate pupils

Pupil evaluation includes assessment of pupil size, shape, and equality before and after exposure to light. Normally, pupils are equal in size and about 2 to 6 mm in diameter, but they may be as large as 9 mm. Also, the pupils may be pinpoint, small, large, or dilated. Normal pupil shape is round; variations include irregular, keyhole, and ovoid. (See Visualizing a keyhole pupil.)

To assess the patient's pupils, hold both eyelids open and shine a light into the eyes. The pupils should constrict immediately and equally bilaterally; after you remove the light, they should immediately dilate back to baseline. Document the response: Is it brisk, sluggish, nonreactive, or fixed? Immediately report any changes from baseline. In many cases, a change in pupillary response, such as unequal or dilated pupils, results from a progressive neurologic condition.

Fixed and dilated pupils are an ominous sign that warrant immediate physician notification (unless the patient's pupils have just been dilated chemically). For true changes in pupillary response, expect the physician to order further diagnostic tests, such as a CT scan.

4. Assess cranial nerves

Findings from cranial nerve (CN) assessment can tell much about the patient's midbrain, pons, and medullary functions. Although some nurses find this assessment intimidating, it's not that difficult.

Cranial Nerves Assessment Form for Nurses

Cranial Nerve		Function	Method Conscious clients	Method Unconscious client	Normal Findings	Clie- -nt's Respo nses
I	Olfactory Sensory	Smell reception and interpreta- -tion	Ask client to close eyes and identify different mild aromas such alcohol, powder and vinegar.	Cannot be tested	Client should be able to distinguish different smells	
II	Optic sensory	Visual acuity and fields	Ask client to read newsprint and determine objects about 20 ft. away	Cannot be tested (vision) directly. Indirectly by testing pupils (CN III)	Client should be able to read newsprint and determine far objects	
III	Oculomo tor motor	Extraocular eye movements, lid elevation, papillary constrictions lens shape	Assess ocular movements and pupil reaction	Is ptosis present? Pupil size, shape, position, reaction to light Doll's eye reflex	Client should be able to exhibit normal EOM and normal reaction of pupils to light and accommodation	
IV	Trochlear motor	Downward and inward eye movement	Ask client to move eyeballs obliquely	Doll's eyes reflex (oculocephalic reflex) After r/o of neck injury- holding the patient's eyes open and briskly turn his head to one	Client should be able to move eyeballs obliquely <u>Unconscious:</u> A negative response occurs when the eyes move opposite the	

				side	turn	
V	Trigeminal Both sensory & motor	Sensation of face, scalp, cornea, and oral and nasal mucous membranes. Chewing movements of the jaw	Elicit blink reflex by lightly touching lateral sclera; to test sensation, wipe a wisp of cotton over client's forehead for light sensation and use alternating blunt and sharp ends of safety pin to test deep sensation Assess skin sensation as of ophthalmic branch above Ask client to clench teeth	<u>corneal reflexes</u> touch the unconscious patient's corneas gently with a wisp of cotton	Client blinks whenever sclera is lightly touched; able to feel the wisp of cotton over the area touched; able to discriminate blunt and sharp stimuli Unconscious Movement of the lid (blinking) is a normal response and indicates an intact reflex arc between nerves V and VII Client is able to sense and distinguish different stimuli Client should be able to clench teeth	
VI	Abducens motor	Lateral eye movement	Ask client to move eyeball laterally	Dolls eye reflex	Client should be able to move eyeballs laterally	

VII	Facial Both sensory & motor	Taste on anterior 2/3 of the tongue Facial movement, eye closure, labial speech	Ask client to do different facial expressions such as smiling, frowning and raising of eyebrows; ask client to identify various tastes placed on the tip and sides of the mouth: sugar, salt and coffee	Observe for facial droop & facial movements such as grimacing	Client should be able to do different facial expressions such as smiling, frowning and raising of eyebrows; able to identify different tastes such as sweet, salty and bitter taste	
VIII	Acoustic (vestibulocochlear) sensory	Hearing and balance	Assess client's ability to hear loud and soft spoken words; do the watch tick test	Doll's eye reflex (the vestibular system provides positional information about the head and correlates head & eye movements with somatic muscle activity)	Client should be able to hear loud and soft spoken words; able to hear ticking of watch on both ears	
IX	Glossopharyngeal Both sensory and motor	Taste on posterior 1/3 of tongue, pharyngeal gag reflex, sensation from the eardrum and ear canal. Swallowing and phonation muscles of the pharynx	Apply taste on posterior tongue for identification (sugar, salt and coffee); ask client to move tongue from side to side and up and down; ask client to swallow and elicit gag reflex through sticking a clean tongue depressor into client's	Assess gag reflex	Client should be able to identify different tastes such as sweet, salty and bitter taste; able to move tongue from side to side and up and down; able to swallow without difficulty, with (+) gag reflex	

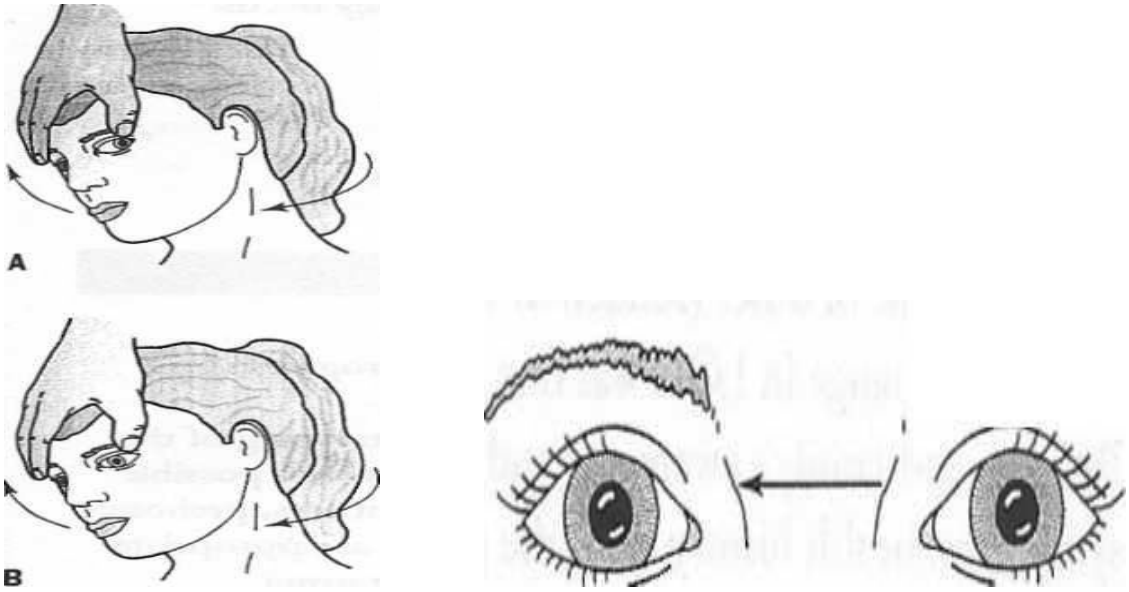
			mouth			
X	Vagus Both sensory & motor	Sensation from pharynx, viscera, carotid body and carotid sinus	Ask client to swallow; assess client's speech for hoarseness	Assess gag reflex	Client should be able to swallow without difficulty; has absence of hoarseness in speech	
XI	Spinal accessory motor	Trapezius and sternocledo mastoid muscle movement	Ask client to shrug shoulders and turn head from side to side against resistance from nurse's hands	Cannot be tested	Client should be able to shrug shoulders and turn head from side to side against resistance from nurse's hands	
XII	Hypoglos sal motor	Tongue movement for speech, sound articulation and swallowing	Ask client to protrude tongue at midline, then move it side to side	Is the tongue deviated? Are fasciculations (involuntary twitching or contractions) or atrophy noted?	Client should be able to protrude tongue at midline and move it side to side	

5. <u>Physician's examination</u>

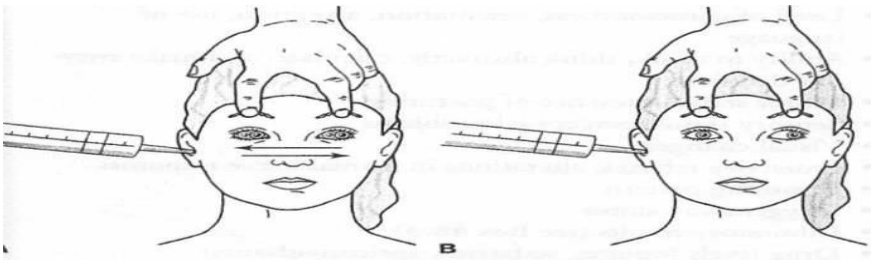
The**oculocephalic**(doll's eye) and oculovestibular (cold caloric) tests, which reveal brain stem function, are performed only by physicians on patients who don't respond to the exam methods described above. These tests aid prognosis of severely brain-injured patients.

The *oculocephalic* test evaluates extraocular muscle movements (controlled by CNs III and VI). The examiner moves the patient's head from side to side forcefully and quickly; in an abnormal response (an ominous sign), the eyes remain stationary. This exam is contraindicated in patients with suspected cervical spinal cord injury.

Oculocephalic reflex testing.a, **Normal response: eyes move to the left as head is briskly rotated to the right.** b, **Abnormal response: eyes do not move as head is turned, but passively follow the head.**



Oculovestibular testing also evaluates CNs III and VI, along with CN VIII. The physician instills iced saline solution into the ear canal and observes for nystagmus (involuntary rapid eye movements). In a normal response, the eyes show conjugate movement and nystagmus in the direction of the irrigated ear, indicating an intact brain stem. Absence of nystagmus is an abnormal response signifying a decrease in consciousness with severe brain stem injury. The oculovestibular test is contraindicated in patients with ruptured tympanic membranes or otorrhea; results may be false-positive in patients who are on ototoxic drugs (including phenytoin) or who have Ménière's disease.



Test for oculovestibular reflex response (caloric ice /ater test). a, **In normal response, individual's eyes slowly move oward side being irrigated, followed by rapid conjugate eye move-lentsto opposite side.** b, **Dysconjugate, or asymmetric, eye move-lents would be abnormal.**

6. Limb Movement

Disturbances of limb movement indicate localized or focal brain damage and vary according to the site and extent of the damage; for example, the right arm and leg will be

affected by a lesion in the left cerebral hemisphere. More diffuse brain damage will result in a greater disturbance of movement.

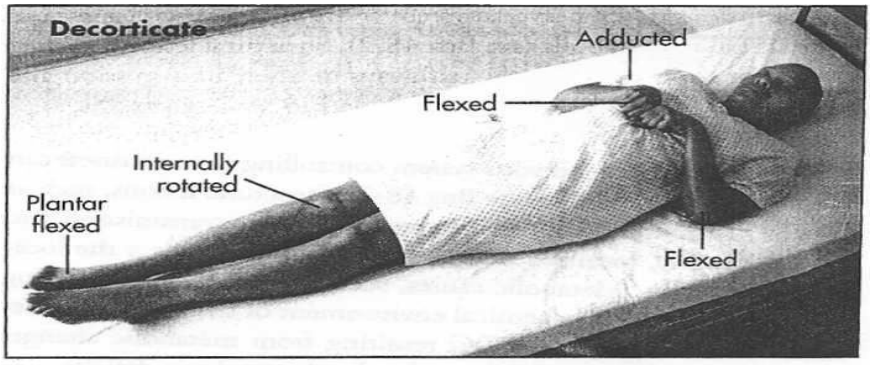
When a localized brain damage is suspected, such as in metabolic or drug coma, the best motor response on the coma scale is usually sufficient for monitoring responses. When localized brain damage is suspected, an additional detailed assessment of each limb is necessary.

The nurse examines the arms and legs for movement and strength, and compares the right and left sides. When the two sides are same, recordings are made in the standard manner. When differences exist, right and left are recorded independently, using 'R' for right and 'L' for left. Responses can be elicited by verbal commands, such as asking the patient to grip the nurse's hands tightly as possible, to lift her arms or to bend her knees. To test strength, the nurse may need to provide some form of resistance, such as pressing down on the patient's knee when the patient is trying to bend it.

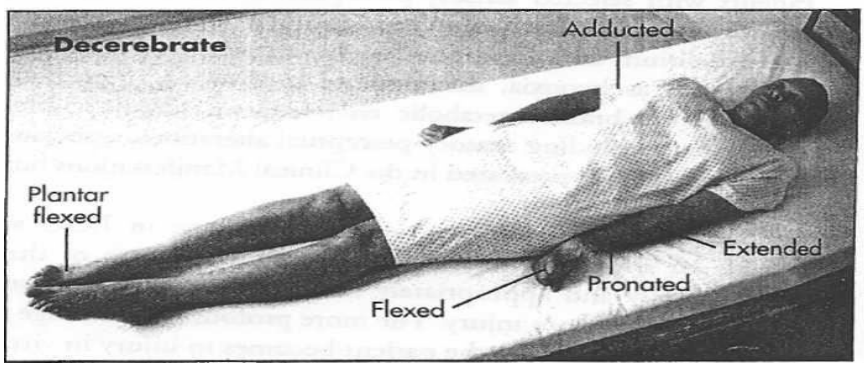
Painful stimuli may be applied to the appropriate limb if verbal comments fail to elicit a response.

Lesions in the cerebral hemispheres below the primary motor cortex can cause pathologic motor responses and abnormal flexor or extensor posturing. Abnormal flexion of the arms at the elbows, wrists, and hands with concurrent extension of the legs is called ***decorticate posturing***. Lesions in the motor pathways of the midbrain or upper pons may cause abnormal extension of the arms with hyperpronation of the forearms, which is called ***decerebrate posturing***.

Types of posturing.a, Decorticate. b, Decerebrate.



A



B

Document and follow up on findings

By following these guidelines, you can quickly and easily perform a neuro exam on the unconscious patient. Establish your patient's baseline early, and make sure you know how to differentiate normal and abnormal neurologic findings. Remember that changes can be subtle and should be documented and reported promptly. Most importantly, use your nurse's "sixth sense"—that gut feeling most of us have when something just isn't right.

LevelsofCognitiveFunctioning (RanchoLosAmigosScale)

I. **No response:***Patient is completely unresponsive to any stimuli.*

II. **Generalized response**: *Patient reacts inconsistently and nonpur-posefully to stimuli in nonspecific manner.*

III. **Localized response:***Patient reacts specifically but inconsistently to stimuli.*

IV. **Confused—agitated:***Patient is in heightened state of activity with severely decreased ability to process information. . .*

V. **Confused—inappropriate:***Patient appeals alett and is able to respond to simple commands fairly consistently.*

VI. **Confused—appropriate**: *Patient shows goal-directed behavior but depends on external input for direction.*

VII. **Automatic—appropriate:***Patient appears appropriate and oriented within hospital and home setting, goes through daily routine automatically with minimal to absent confusion, and has shallow recall of actions.*

VIII. **Purposeful**—appropriaterVztisnt*is alert and oriented, is able to recall and integrate past and recent events, and is aware of and responsive to culture.*

Mini-MentalState Examination(SampleItems)

Orientation to Time_____

"What is the date?"

Registration _____

"Listen carefully, I am going to say three words. You say them back after I stop. Ready? Here they are ... HOUSE (pause), CAR (pause), LAKE (pause). Now repeat those wotds back to me." (Repeat up to five times, but score only the first trial.)

Naming ____

"What is this?" (Point to a pencil or pen.)
Reading _____
"Please read this and do what it says." (Show examinee the words on the stimulus form.) CLOSE YOUR EYES

Grady Coma Scale

		Responds appropriately to:		
Grade	**State of awareness**	**Calling name**	**Light pain**	**Deep pain**
I	Confused, drowsy, lethargic, indifferent and/or uncooperative; does not lapse into sleep when left undisturbed	Yes	Yes	Yes
II	Stuporous; may be disoriented to time, place, and person; will lapse into sleep when not disturbed; or belligerent and uncooperative	No	Yes	Yes
III	Deep stupor; requires strong pain to evoke movement	No	No	Yes
IV	Exhibits decorticate or decerebrate posturing to a deep pain stimulus	No	No	No
V	Does not respond to any stimuli; flaccid	No	No	No

Treatments. There are no specific treatments for patients with altered LOC.

Treatment depends on the degree of decrease in consciousness and its underlying cause. Initial treatment often involves the administration of dextrose if the blood sugar is low as well as the administration of naloxone and thiamine.

Medical management. Medications'are used in the treatment of altered LOC to correct the underlying disease process or to control specific symptoms. Naloxone may be given to reverse rhe effects of opioid overdose. Flumazenil is a benzodiazepine antagonist used to reverse the effects of overdoses of drugs such as diazepam (Valium) or lorazepam (Ativan). If seizures are

the cause of decreased LOC, anticonvulsants are administered to treat actual seizures and prevent future ones. A variety of other medications may be administered to treat increased intracranial pressure (ICP), a common cause of altered LOC.

DIET,A patient's swallowing ability is carefully assessed before any decision is made about diet. Patients with decreased gag and cough reflexes, oral motor weakness, or decreased LOC may be candidates for placement of an enteral feeding tube to more safely deliver nutrients and medications.

surgical management. If the cause of the patient's altered LOC is a space-occupying lesion, surgical removal of the mass may improve the patient's condition. For example, a patient with a subdural hematoma becomes more alert and able to follow commands after the hematoma is evacuated. If the lesion has been present long enough to damage the surrounding tissue, however, some residual deficits may remain. See sections on Craniocerebral Trauma and Intracranial Tumors for further discussion of surgical managemenr of neurologic problems.

Nursing Management:

Patient with Altered Level of Consciousness

Health History.Assess for:

- Date and type of onset (sudden or slowly progressive)
- When the change in LOC was first noticed
- Patient's and family's awareness and understanding of the symptoms; health history from the patient when possible but also from family members, significant others, prehospital care providers, and home care providers as appropriate
- Recent history of falls, infection, or other trauma
- Medications in use—prescription and over-rhe-counrer drugs, alcohol, nutritional supplements, herbal preparations
- Other comorbid health problems, treatment regimen
- Related symptoms—pain, headache, fever, nausea

Physical Examination.Assess for:

- Level of consciousness, orientation, attention, use of language
- Ability to think, think abstractly, calculate, and make everyday decisions
- Motor status, presence of posturing
- Sensory status, perceptual problems
- Visual changes
- Protective reflexes, alterations in cranial nerve responses
- Breathing pattern
- Oxygenation status
- Laboratory results

- Drug levels (opiates, sedatives, anticonvulsants)

Nursing Diagnosis*:*

*Ineffective Breathing Pattern
*Self-care Deficit: R/T Immobility and unconsciousness

*Impaired Gas Exchange: R/T immobility

*Cardiac output, Altered: R/T immobility

*Altered peripheral tissue perfusion: R/T immobility

*Altered cerebral tissue perfusion: R/T immobility

*Risk for impaired skin integrity: R/T immobility

*Risk for impaired tissue integrity(corneal): R/T immobility

*Altered oral mucous membrane: R/T dryness, decreased saliva

*Impaired physical mobility: R/T immobility and underlying neurological problems causing paresis, paralysis or rigidity

*Risk for trauma: stress fracture and joint dislocation

*Altered urinary elimination: R/T immobility; incontinence, retention, or large residual urine

*Risk for infection: R/T immobility: urinary tract infection

*Altered bowel elimination: R/T immobility

*Hyperthermia: R/T underlying neurological problems or infection

*Sensory/perceptual alterations: R/T unconsciousness

*Altered nutrition: less than body requirements: R/T unconsciousness

*Fluid volume deficit: R/T unconsciousness.

Nursing intervention:

Airway and breathing

- Maintain a patent airway by proper positioning of the patient. Whenever possible, position the patient on his side with the chin extended. This prevents the tongue from obstructing the airway.
- This lateral recumbent position is often referred to as the "coma position."
- It is the safest position for a patient who is left unattended.

- Suction the mouth, pharynx, and trachea as often as necessary to prevent aspiration of secretions.
- Reposition the patient from side-to-side to prevent pooling of mucous and secretions in the lungs.
- Administer oxygen as ordered.
- Always have suction available to prevent aspiration of vomitus.

Nutritional need

- A patient who is unconscious is normally fed and medicated by gavage.
- Always observe the patient carefully when administering anything by gavage.
- Do not leave the patient unattended while gavage feeding.
- Keep accurate records of all intake. (Feeding formula, water, liquid medications.)
- When gavage feeding an unconscious patient, it is best to place the patient in a sitting position (Fowler's or semi-Fowlers) and support with pillows.
- This permits gravity to help move the feeding or medication.
- The chance of aspiration of feeding into the airway is reduced.
- Keep accurate records of IV intake and urine output
- Observe the patient for signsw of dehydration or fluid overload
- Fluids are maintained by IV therapy.

Skin care

- The unconscious patient should be given a complete bath every other day. (This prevents drying of the skin.) The patient's face and perineal area should be bathed daily.
- Examine the scalp for abrasions, pressure ulcers (especially in the occiput region), and edema. Treat any bruised or broken area. Comb the hair; long hair can be braided or pulled to the side with an elastic band.
- The skin should be lubricated with moisturizing lotion after bathing.
- The nails should be kept short, as many patients will scratch themselves.
- Provide oral hygiene at least twice per shift. Include the tongue, all tooth surfaces, and all soft tissue areas. The unconscious patient is often a mouth breather. This causes saliva to dry and adhere to the mouth and tooth surfaces.
- Always have suction apparatus immediately available when giving mouth care to the unconscious patient.
- Apply petrolatum to the lips to prevent drying.
- Keep the nostrils free of crusted secretions. Prevent drying with a light coat of lotion, petrolatum, or water-soluble lubricant.
- Check the eyes frequently for signs of irritation or infection. Neglect can result in permanent damage to the cornea since the normal blink reflex and tear-washing mechanisms may be absent. Use only cleansing solutions and eye drops ordered by the

physician. One such solution, methyl cellulose (referred to as "artificial tears") may be ordered for instillation at frequent intervals to prevent irritation.

- If the patient is incontinent, the perineal area must be washed and dried thoroughly after each incident.
- Change the bed linen if damp or soiled.
- Observe the skin for evidence of skin breakdown.
- Skin care should be provided each time the patient is turned.
- Examine the skin for areas of irritation or breakdown.
- Apply lotion, prn.
- Gently massage the skin to stimulate circulation.

Elimination

- The bowel should be evacuated regularly to prevent impaction of stool.
- Keep accurate record of bowel movements. Note time, amount, color, and consistency.
- A liquid stool softener may be ordered by the physician to prevent constipation or impaction. It is generally administered once per day.
- Assess for fecal impaction. The patient may be incontinent of stool, yet never completely evacuate the rectum. Small, frequent, loose stools may be the first signs of an impaction as the irritated bowel forces liquid stools around the retained feces.
- If enemas are ordered, use proper technique to ensure effective administration and effective return of feces and solution.
- The bladder should be emptied regularly to prevent infection or stone formation.
- Adequate fluids should be given to prevent dehydration.
- Keep accurate intake and output records.
- Report low urine output to professional nurse.
- Provide catheter care at least once per shift to prevent infection in catheterized patients.

Positioning

- When positioning the unconscious patient, pay particular attention to maintaining proper body alignment. The unconscious patient cannot tell you that he is uncomfortable or is experiencing pressure on a body part.
- Limbs must be supported in a position of function. Do not allow flaccid limbs to rest unsupported.
- When turning the patient, maintain alignment and do not allow the arms to be caught under the torso.
- Change the patient's position to a new weight-bearing surface every two hours. This decreases the likelihood of complications such as decubitus ulcers, orthostatic pneumonia, and thrombophlebitis.

- Utilize a foot board at the end of the bed to decrease the possibility of foot drop.
- When joints are not exercised in their full range of motion each day, the muscles will gradually shrink, forming what is known as a contracture. Passive exercises must be provided for the unconscious patient to prevent contractures.
- Exercises with a range of motion (ROM) are performed under the direction of the physical therapist.
- Nursing personnel must be proficient in ROM exercises.
- Physical therapy personnel will not always be available.
- It is a nursing care responsibility to maintain the patient's range of motion.
- Precautions must be taken to prevent the development of pressure sores.
- Utilize a protective mattress such as a flotation mattress, alternating pressure mattress, or eggcrate mattress.
- Change the patient's position at least every two hours.
- Unless contraindicated, get the patient out of bed and into a cushioned, supportive chair.
- Protect the patient from injury.
- Keep siderails up.
- Pad the rails with pillows or folded blankets.
- Keep stray objects out of the bed.
- Use draw sheets for easier turning.
- Keep suction equipment available at the bedside for emergencies.
- Restraints.
- Use restraints only with physician's order.
- Use "mitten" restraints to prevent the patient from pulling at catheters, IV lines, his hair, and so on. (Patients not in deep coma may scratch or pick at themselves.)
- The restless, confused patient will actively resist restraint and thrash about more when not permitted some freedom of movement of the arms and legs.
- Take precautions to prevent restraint from becoming restricting. Do not cut-off circulation. Do not irritate the skin.

Nosocomial infections

- Unconsciousness is related to high risk for infection for several reasons. Serious illness, often involving multiple body systems, challenges the body’s immune system.
- Invasive procedures (e.g., surgery) and invasive equipment (e.g., central lines and urinary catheters) can lead to infection. Moreover, the use of antibiotics may result in opportunistic infections.
- Follow the centers for Disease Control and Prevention (CDC) standards for body substance isolation.

- When it is anticipated that contact with a patient could result in splashing of clothing, the skin, or face of the caregiver with secretions, blood or body fluids, a protective gear that includes gloves, a plastic apron, a mask and goggles is worn.
- Proper disposal of contaminated material will isolate infections material. The most effective method to prevent spread of infectious agents continues to be hand washing.

Pain management

- Ongoing assessment and treatment of pain and anxiety aid in the prevention of secondary brain injury.
- Pain or anxiety can elevate intracranial pressure, heart rate, and systolic blood pressure, resulting in further physiologic damage.
- Recognizing pain and anxiety behaviors may include grimacing, rigidity, wincing, brow furrowing, moaning, and restlessness.
- Pain induced reflex responses may alter respiratory mechanics, increase cardiac demands, and cause contraction of skeletal muscles, muscle spasms, and rigidity.
- Reassessment of pain and intervention efficacy ensures that patient is progressing as expected and the chosen interventions are effective.

Psychosocial considerations

- Although unconscious patients appear to be completely unaware of their environment, it is impossible to determine whether they are aware of any stimulus in the immediate environment.
- Many patients have regained consciousness and given accurate accounts of what happened and what was said to them when they were supposedly unconscious; therefore, it is important to maintain a positive attitude in the presence of these patients and assume that some stimuli do penetrate the complexities of unconsciousness.
- Caring for patients with depressed states of consciousness includes not only caring for the patient, but for the patient's family as well.
- Relatives of these patients have been reported to experience a range of emotional reactions including shock, grief, anxiety, guilt, depression, and hostility toward caregivers.
- Family members may experience unexpected role changes such as assuming the role of primary caregiver or becoming the sole wage earner of the family while concurrently having lost a main source of emotional support.
- Psychological distress in family members can be exacerbated when relatives of the same patient experience different reactions. For example, an adult patient's partner may have different expectations for outcomes that the patient's parents.
- It is important for health care organizations to be aware of the potential psychological stressors of illness and have protocols in place for support such as social workers, psychologists and counselors.

The care environment

- A safe and therapeutic care environment contributes to healing and recovery.
- The care environment is important for all patients, but particularly for those with depressed states of consciousness who are completely dependent on others for survival.
- A restorative care environment provides for the physical, emotional and spiritual needs of the patient.
- Providing physical space that is clean, safe from hazards, and pleasing aesthetically increases the comfort levels of both patients and their families.
- Creating an environment for re-establishment of sleep wakefulness cycles and other circadian rhythms is often challenging.
- Newer architectural designs provide for therapeutic environments with control of temperature, light, sound and air quality. The sleep/rest periods should not be filled with nursing activity.

Therapeutic communications

- Therapeutic communications encompass a wide range of competencies. Communication skills facilitate imparting information and obtaining information.
- In a patient with a decreased level of consciousness, nonverbal cues and clinical findings may be the only source of assessing the patient's needs.
- For a patient with impaired consciousness, therapeutic touch combined with kind and soothing words can be a valuable means of providing reassurance and comfort.
- Although unconsciousness patients appear to be completely unaware of their environment, it is impossible to determine whether they are aware of any stimulus in the immediate environment.
- Many patients have regained consciousness and given accurate accounts of what happened and what was said to them when they were supposedly unconscious; therefore, it is important to maintain a positive attitude in the presence of the patient and assume that stimuli do penetrate the complexities of unconsciousness.
- In providing care, the patient should be oriented to person, place, time and the environment and told what you will be doing.

Controlling body temperature

- Body temperature must be maintained within a s relatively constant range to sustain life, i.e., 36-36.7ºC. It is controlled by the heat regulating centre in the hypothalamus, which acts likea thermostat.
- Pyrexia, an abnormally high temperature, is more commonly seen in the unconscious patient than is hypothermia, an abnormally low temperature
- Pyrexia may be due to the heat-regulating centre in the hypothalamus or to an infective process or metabolic disorder.

- The danger is that for each degree of temperature over the normal range, a proportionately greater amount of oxygen is utilized from the patient's often diminishing reserves, which may have serious implications for recovery.
- The nursing interventions remain similar irrespective of the cause of pyrexia.

Regaining consciousness

Awakening from unconsciousness is usually a gradual process that has some degree of variability among patients over seconds, minutes, hours or days. With improvement in the level of consciousness, the patient will be assessed for rehabilitation needs.

Dying

Some patients in apnoeic coma can suffer severe and irreversible brain damage but continue to have their blood pressure, heartbeat and respirations artificially maintained for a period of time by ventilation, drug therapy and other life support interventions. However, some of these patients will never recover and the brain stem death criteria have been developed to identify those patients, in order that therapy can cease

Related nursing Theory in care of unconscious patient

There are so many nursing theories each have some implications over nursing practice.

In care of unconscious patient, here we will discuss 2 theories Nightingale's environment model theory and orem'sself care theory

Nightingale's environment model

Formulated by Florence nightingale (1874)

This theory mainly insists on the role environment in improvement of health status. According to this theory, conducive environment will improve the healing process. Nurses could control the environmental factors that affects the patient's health for example- ventilation, warmth, light, noise, variety, bed and bedding, cleanliness of rooms and walls, nutrition. So the nurse should take into consideration of all these environmental factors while planning the care

for the clients.

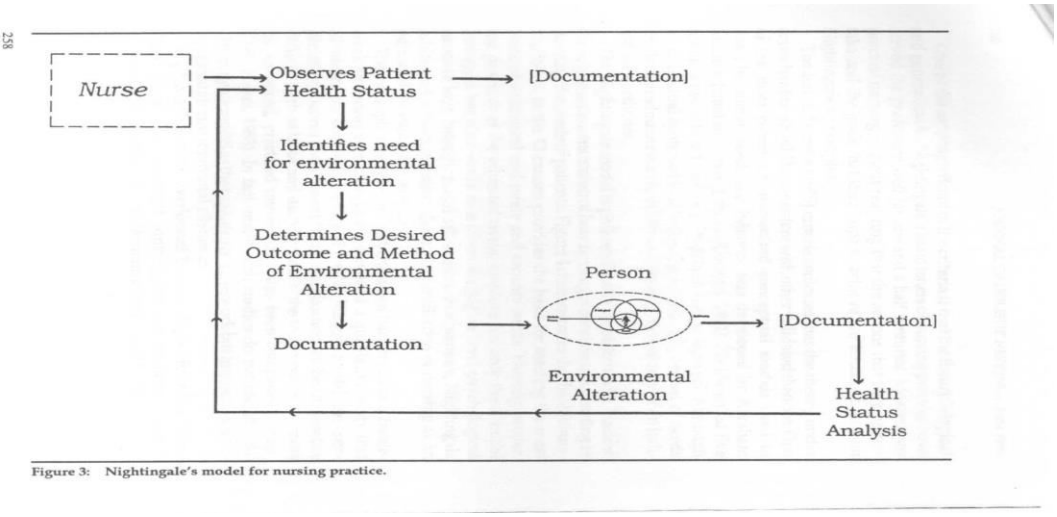


Figure 3: Nightingale's model for nursing practice.

Health Promotion and Prevention. No specific measures

can be recommended to prevent altered LOC that has a structuralcause. Metabolic causes, however, frequently have a preventable component such as electrolyte imbalances or glucose abnormalities. It is important for health care providers to be knowledgeable about the link between the problems outlined in Box 48-2 and the development of altered LOC so that problems can be averted where possible, and promptly identified and treated when they occur.

9. CONCLUSION

Disorders of consciousness may involve either a loss of arousal or responsiveness (e.g., coma) or loss of one or more cognitive functions (e.g., attention, memory and executive activities). Various types of trauma, brain attack or stroke, tumors, infections, degenerative conditions, and metabolic imbalances may produce a decrease in arousal or cognition. The patient's age, severity and site of the pathologic condition often determine whether arousal is decreased or only cognitive functions are impaired. The onset of decreased arousal or impaired cognitive function may be abrupt and sudden, sub-acute and develop over a few days, or slowly progressive over weeks or months. Older patients are particularly at risk for impaired cognitive function. Many patients do not recover from coma. Helping the family and significant others cope with the devastating illness and comatose state of loved one, which may end in death, requires the resources of the multidisciplinary neuroscience team.

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