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# COMA

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# **I. Definitions**

**A. Coma = a state of unconsciousness to environment and self in which the affected individual makes no appropriate response to external stimuli.**

**Simpler definition : pathologic loss of consciousness**

**B. Sleep = non-pathologic depression of consciousness from which the person can successfully be aroused to full responsiveness.**

## **II. DDX of Coma**

- A. Hysterical or psychogenic coma = feigned or assumed unresponsiveness. Clues are unusual posturing, resisting opening the eyelids, change in patient's position when left alone.**
- B. Global aphasia = unable to respond to verbal stimuli but can respond to non-verbal stimuli.**
- C. "Locked-in-syndrome" ("Count of Monte Cristo Syndrome") = due to disruption (via stroke or trauma) of all motor output pathways. Patient is alert, aware of self, and can respond to stimuli with vertical eye movement.**

# Required Elements for Coma to Occur

- A. Generally, bilateral cerebral hemisphere or RAS (reticular activating system in brainstem) dysfunction
- B. Specifically, one or more of these 3 must exist :
  1. Diffuse, bilateral, and widespread destruction or suppression of corticofugal neural pathways.
  2. Lesions causing ischemia, hemorrhage, or pressure on midbrain structures, or :
  3. Diffuse “subcellular or molecular” (metabolic) dysfunction of the brain.

# A. Classification of Coma

## 1. Structural

- a) Supratentorial (bilateral cerebral hemispheres affected)
- b) Subtentorial (brainstem affected)

## 2. Metabolic / toxic (Diffuse Effect)

- a) Ischemia / anoxia / shock
- b) Acidosis
- c) Drug intoxication / poisoning (see addendum below)
- d) Hypoglycemia / hyperglycemia
- e) Hyponatremia / hypernatremia
- f) Hypothermia / hyperthermia
- g) Hepatic / uremic encephalopathy
- h) Meningitis / encephalitis
- i) Subarachnoid hemorrhage (diffuse, non-focal)
- j) Endocrine disorders (adrenal insufficiency, myxedema, etc.)

## 3. Psychiatric

## **4. Main Clues to Type of Coma**

**If focal neuro sign → structural**

**No lateralizing signs, no altered pupil response, no abnormal oculoccephalic reflex  
→ toxic / metabolic**

**However, some toxic / metabolic causes can show focal signs (especially hypoglycemia)**



## **V. Drug Intoxication / Poisoning Causes of Coma**

- A. ETOH : most common**
- B. Barbiturates / benzodiazepines / other sedatives (Quaalude, PCP, etc.)**
- C. Narcotics**
- D. Carbon monoxide**
- E. Overdose of tricyclics / anticholinergics / phenothiazines**
- F. Heavy metals**

# VI. Glasgow Coma Scale

A. Not useful for Dx but used to follow patient's course and determine if improving or deteriorating

ITEM	SCORE	
Eye Opening		Sum = GCS (range 3 to 15)
Spontaneous	4	
To speech	3	
To pain	2	
None	1	
Best Motor Response		
Obeys commands	6	
Localizes to touch	5	
Withdraws to pain	4	
Abnormal flexion	3	
Abnormal extension	2	
None	1	
Best Verbal Response		
Oriented (Person, Place, Time)	5	
Confused	4	
Inappropriate words	3	
Incomprehensible sounds	2	
None	1	

## **VI. Workup and Rx of Patient with Coma in ED**

- A. If unknown Hx or any possibility of trauma → immobilize C-spine in collar and do not manipulate neck**
- B. Assess airway / respiratory status ; assisted mask ventilation if needed**
- C. Assess pulse and BP and temp, √ Chemstrip on fingerstick if available**
- D. Draw blood : send for glucose (most important), lytes, BUN, calcium, CBC, baseline clotting studies, T & C (if trauma or hypotensive), carboxyhemoglobin**  
**Optional blood work : ETOH level, drug/toxin screen, heavy metal screen, cortisol, thyroid battery, LFT' s, blood cultures**

## **VI. Workup and Rx of Patient with Coma in ED**

- E. Draw ABG (or at least get O<sub>2</sub> sat.) to assess oxygenation / acid-base**
- F. Start IV : fluid bolus LR or NS if signs of shock. TKO rate if suspect cerebral edema and BP OK**
- G. Narcan 2 mg IV (may need extra doses, ↑ amount for propoxyphene OD)**
- H. 1 amp (50 cc of 50 % in adults, or 1 cc/kg of 25 % in kids) dextrose IV if Chemstrip can't be quickly done or if Chemstrip value < 80 (± thiamine 100 mg IV)**

## **VI. Workup and Rx of Patient with Coma in ED**

- I. Physical exam : emphasis on pupil reactions, fundi, neuro exam, respiratory pattern**
- J. 2 view C-spine series (lateral, odontoid,  $\pm$  AP). May remove collar and do doll's eye maneuvers if C-spine series normal**
- K. Head CT scan if initial lab work normal and no response to Narcan / D50**
- L. EKG if not done yet**
- M. Intubate / ventilate if respiratory status inadequate after Narcan / D50**
- N. Temperature control if hypo or hyperthermic**

## **VI. Workup and Rx of Patient with Coma in ED**

**O. Foley**

**P. LP if CT OK and any possibility of SAH or meningitis / encephalitis**

**Q. Neurosurgery consult if structural etiology or SAH Dx' ed. Neurology consult if no structural etiology on CT and metabolic W/U negative. Medicine consult if metabolic etiology Dx' ed**

**R. EEG (non-emergent) after all of above steps**

**S. NG tube  $\pm$  lavage / charcoal if possible drug overdose**