Project: Ghana Emergency Medicine Collaborative

Document Title: Coma

Author(s): C. James Holliman (Penn State University), M.D., F.A.C.E.P. 2012

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

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<tr>
<th>ITEM</th>
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<tr>
<td><strong>Eye Opening</strong></td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td>To speech</td>
<td>3</td>
</tr>
<tr>
<td>To pain</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td><strong>Best Motor Response</strong></td>
<td></td>
</tr>
<tr>
<td>Obeys commands</td>
<td>6</td>
</tr>
<tr>
<td>Localizes to touch</td>
<td>5</td>
</tr>
<tr>
<td>Withdraws to pain</td>
<td>4</td>
</tr>
<tr>
<td>Abnormal flexion</td>
<td>3</td>
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<tr>
<td>Abnormal extension</td>
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<tr>
<td>None</td>
<td>1</td>
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<tr>
<td><strong>Best Verbal Response</strong></td>
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<tr>
<td>Oriented (Person, Place, Time)</td>
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</tr>
<tr>
<td>Confused</td>
<td>4</td>
</tr>
<tr>
<td>Inappropriate words</td>
<td>3</td>
</tr>
<tr>
<td>Incomprehensible sounds</td>
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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 $O_2$ 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, ± 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 + lavage / charcoal if possible drug overdose