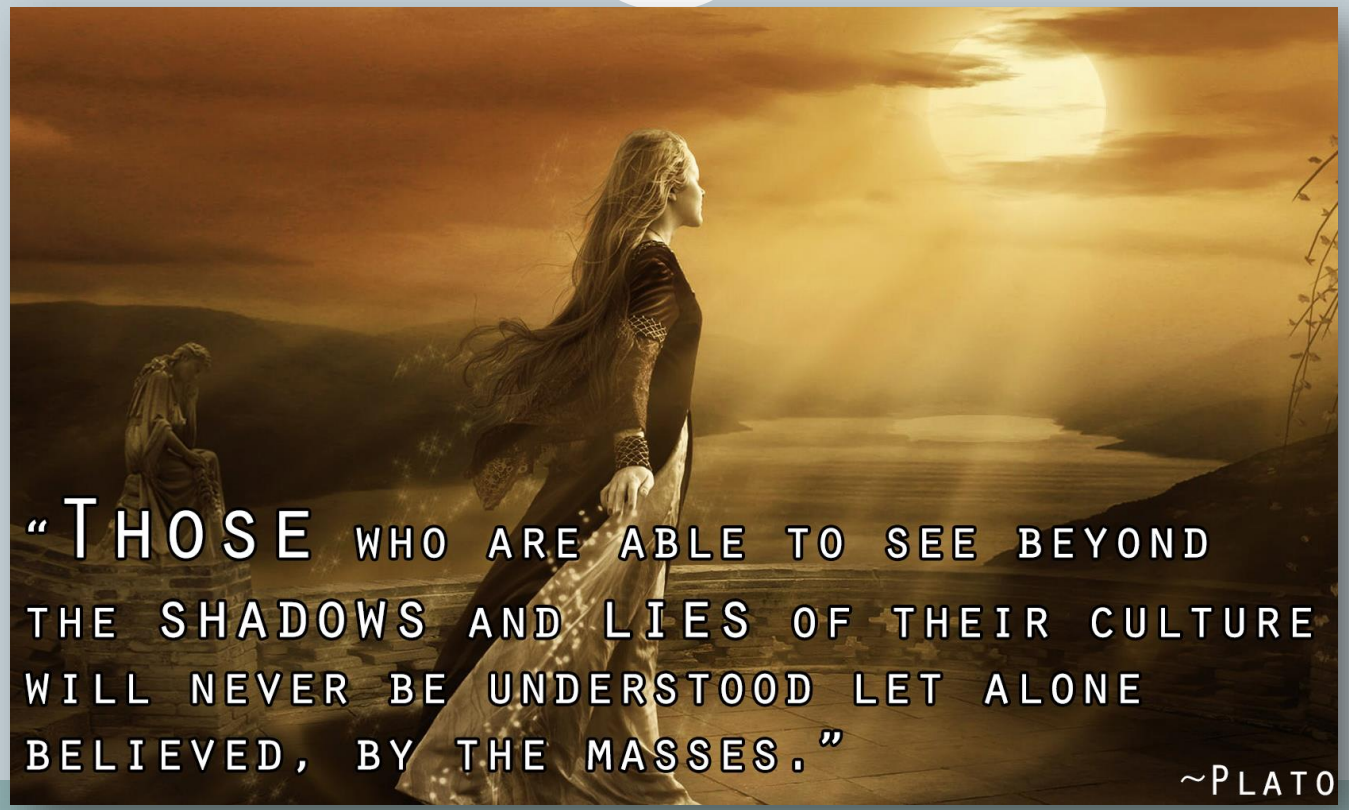
Intelegerea mortii



Apparently easy…But…

- Not uniformly defined between institutions
- Not one universally accepted standard

- Not one universally and consistently applied algorithm for determination

- "If one subject in health law and bioethics can be said to be at once well settled and persistently unresolved, it is how to determine that death has occurred." Rosenbaum, S. Ethical conflicts. Anesthesiology 1999;91:3-4

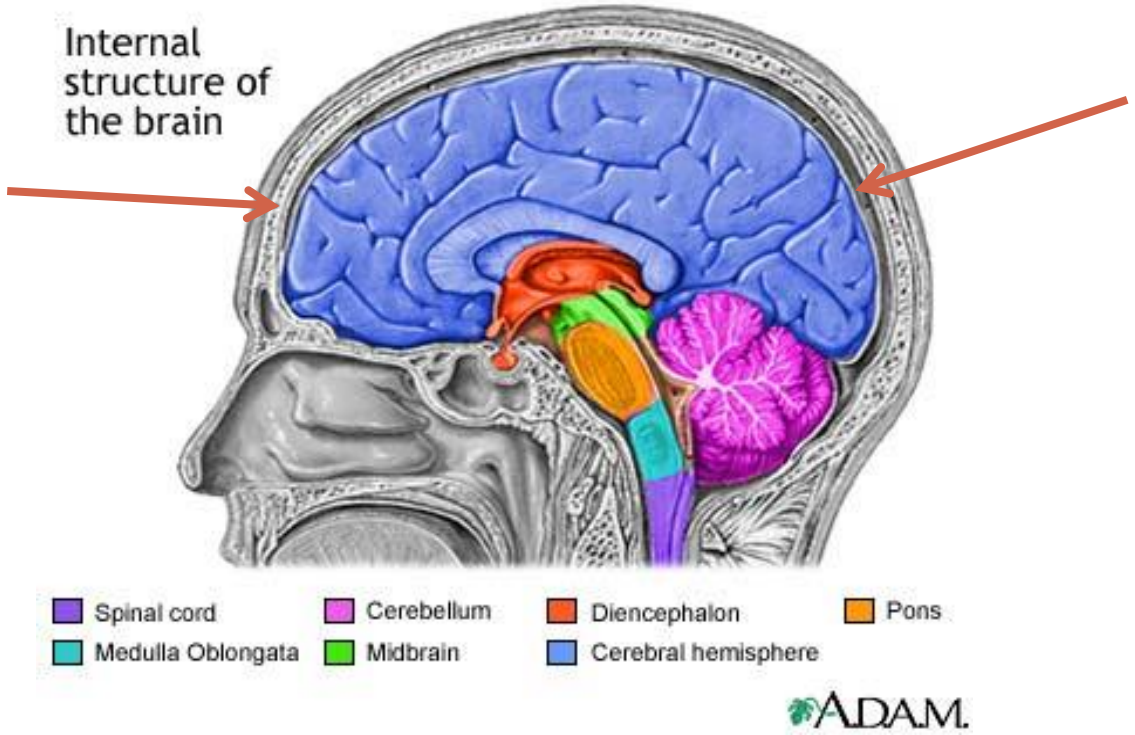
Death: traditional cardiopulmonary definition

- Asystole

AND

- Apnea

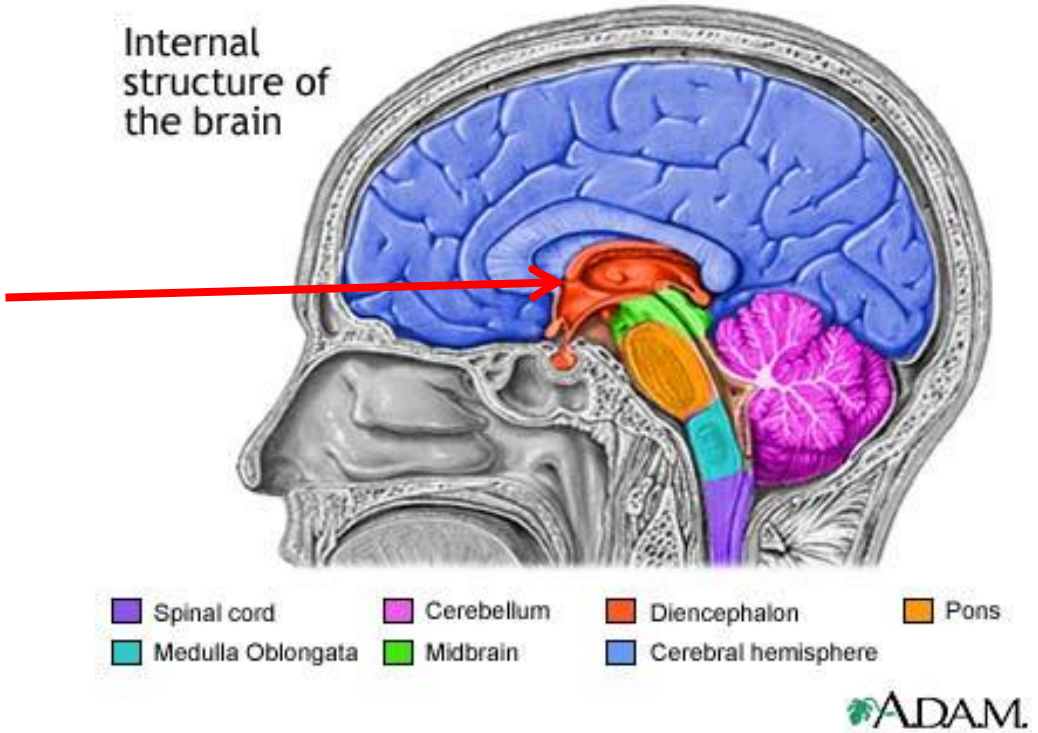
Parts of the brain



Cerebral hemispheres:

- Conscious part of the brain
- Controls thought and memory
- Feels sensations
- Directs conscious movements

Parts of the brain



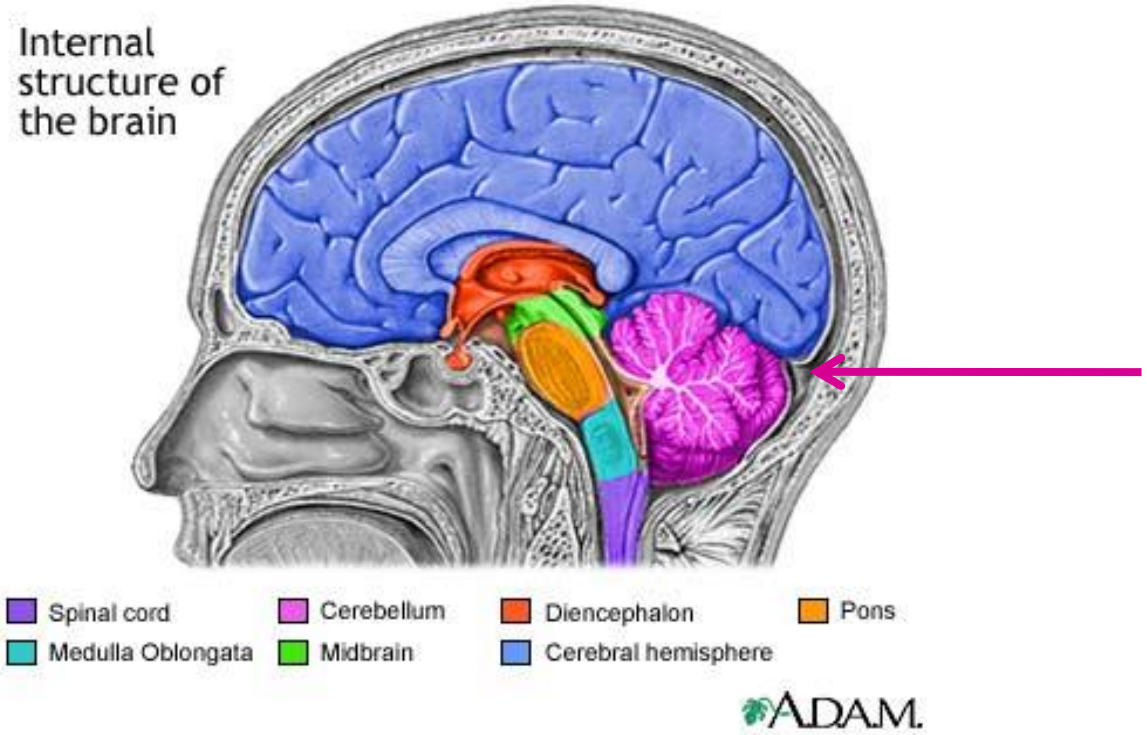
Thalamus

- Relay station for sensory information to go to the brain

Hypothalamus

- Temperature control, controls hormone systems, food intake, emotions

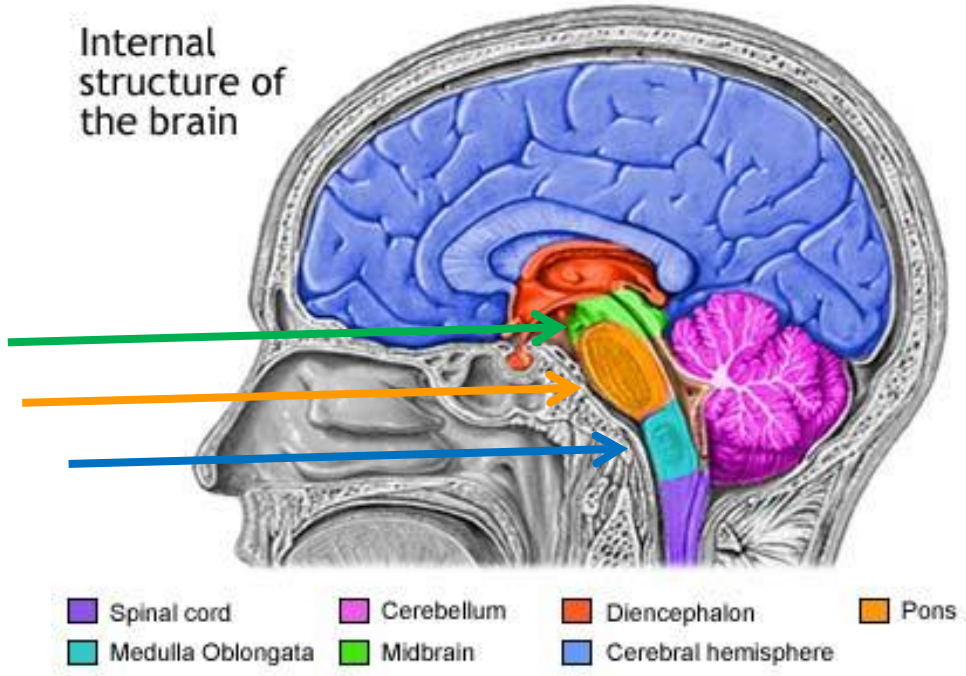
Parts of the brain



Cerebellum:

- Balance
- Coordination

Parts of the brain



Brain stem: Midbrain + Pons + Medulla

- Attention, arousal & consciousness
- Cranial nerve reflexes
- Control of breathing
- Control of blood pressure, heart function

Brainstem function is vital for preservation of life!

Coma vs. Brain Death

Coma

- Profound state of unconsciousness
- Person is not arousable
- Fails to respond normally to pain, light or sound
- No voluntary actions

Reversible or irreversible –

Depends on cause and severity

Coma vs. Brain Death

Brain Death

- Irreversible cessation of all brain activity
- Brain is not capable of maintaining life without advanced life support
- Brainstem death is considered equivalent to brain death, because brainstem is essential to maintain life
- **Heartbeat may continue!**

What happens to patients in coma?

- Some recover
- Some enter persistent vegetative state
- Some become brain dead

Harvard Criteria

Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death. A definition of irreversible coma. JAMA 1968;205:337-340

"An organ, brain or other, that no longer functions and has no possibility of functioning again is for all practical purposes dead."

- A. **determine presence of "a *permanently* nonfunctioning brain."**
  - 1. ***Unreceptivity* and *Unresponsitivity***: "total unawareness to externally applied stimuli…even the most intensely painful stimuli evoke no vocal or other response, not even a groan, withdrawal of a limb, or quickening of respiration."
  - 2. ***No Movements or Breathing***: no spontaneous movements or spontaneous respiration (turn off respirator for 3 minutes; prior to trial breathing room air for ≥10 minutes and pCO_2 normal) or response to pain, touch, sound or light for an hour.

Harvard Criteria

Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death. A definition of irreversible coma. JAMA 1968;205:337-340

- *3. **No reflexes: pupils fixed, dilated and absence of:***
  - Pupillary response to bright light
  - ocular movement to head turning and ice water irrigation of ears
  - blinking
  - postural activity (decerebrate or other)
  - Swallowing, yawning, vocalization
  - Corneal reflexes
  - Pharyngeal reflexes
  - Deep tendon reflexes
  - Respnse to plantar or noxious stimuli

Harvard Criteria

Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death. A definition of irreversible coma. JAMA 1968;205:337-340

- B. **confirmatory data**
  - ***4. isoelectric EEG*** (specifies technique; "At least 10 full minutes of recording are desirable, but twice that would be better." [!])
    - EEG: "when available it should be utilized"
    - If EEG unavailable, "the absence of cerebral function has to be determined by purely clinical signs…or by absence of circulation as judged by standstill of blood in the retinal vessels, or by absence of cardiac activity."

- A and B all need to be ***repeated 24 hours later with no Δ*** AND in the ***absence of hypothermia*** (<32.2˚C) ***or CNS depressants,*** such as barbiturates, and ***determined only by a physician***

Guidelines for the Determination of Death JAMA 11/13/1981;246(19),2184-2186: Criteria

- A. “An individual with irreversible cessation of circulatory and respiratory functions is dead.”
  - 1. ***Cessation*** is recognized by an appropriate clinical examination….at least absence of responsiveness, heartbeat, and respiratory effort….may require the use of…ECG.”
  - 2. ***Irreversibility*** is recognized by persistent cessation of functions during an appropriate period of observation and/or trial of therapy.”

Guidelines for the Determination of Death

JAMA 11/13/1981;246(19),2184-2186

- B. “An individual with irreversible cessation of all functions of the entire brain, including the brain stem, is dead….”
  - *1*. **Cessation** is recognized when evaluation discloses findings of a *and* b:
    - a. **Cerebral functions are absent**, and…”
      - Deep coma (unreceptivity and unresponsivity)
      - “Medical circumstances may require the use of confirmatory studies such as an EEG or blood-flow study.”
    - b. “**Brainstem functions are absent**” determined by testing pupillary light, corneal, oculocephalic, oculovestibular, oropharyngeal, and respiratory (apnea) reflexes;

Guidelines for the Determination of Death

JAMA 11/13/1981;246(19),2184-2186

- "2. ***Irreversibility*** is recognized when evaluation discloses findings of a *and* b *and* c" *or* by absence of blood flow to the brain ≥10 minutes, shown by angiography :
  - a. The cause of coma is established and is sufficient to account for the loss of brain functions, and…
  - b. the possibility of recovery of any brain functions is excluded, and…" (i.e. rule out sedation, hypothermia <32.2˚C core temp, neuromuscular blockade, and shock)
  - "c. the cessation of all brain functions persists for an **appropriate period of observation and/or trial or therapy**" (6 hours; 12 hours if no confirmatory tests; 24 hours if anoxic injury)

How do we establish brain death?

Procedure according to Transplantation of Human Organs Act 1994

- Brain death certification to be done by a team of 4 doctors
- One of them should be a neurologist or neurosurgeon
- One of them should be on a panel of doctors approved for brain death testing by the appropriate authority
- The other members are the treating physician and member of hospital administration
- Certification to be repeated after 6 hours interval

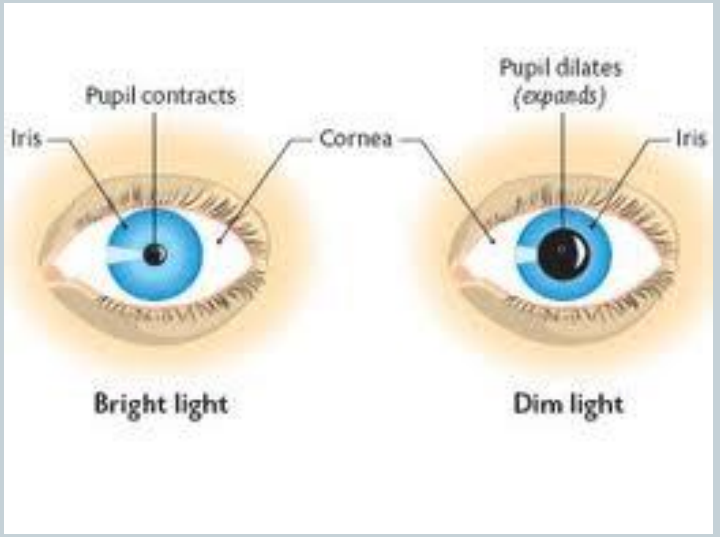
How do we establish brain death?
1. Previous state

- Patient comatose, on ventilatory support.
- Cause of irreversible structural brain damage known.
- Reversible causes ruled out:
  - No hypothermia (temperature < 35°C)
  - No metabolic or endocrine disturbances
  - No CNS depressant drugs in body – alcohol, sedatives
  - No muscle relaxants
  - No circulating therapeutic levels of any drug that could cause coma

How do we establish brain death?
2. Cranial nerve reflexes

- Absence of pupillary reflex response to light
- Absence of corneal reflexes
- Absence of vestibulo-ocular reflex
- Absence of cranial nerve response to pain
- Absence of gag and cough reflexes
- Absence of facial grimacing (cranial nerve) in response to painful stimulation (anywhere on body)

How do we establish brain death?
Pupillary reflex



- Shining a bright light causes pupil to constrict
- Pupils are fixed and dilated in brain death.
- Reflex path – optic nerve and oculomotor nerve

How do we establish brain death?
Corneal reflex

- Cornea touched with cotton swab rolled into ball
- No corneal reflexes in brain death.
- Reflex path: Trigeminal nerve and facial nerve

How do we establish brain death?
Vestibulo-ocular reflex

Doll's eye movements

- Head rotated from side to side
- Both eyes should move in opposite direction
- Absence in brain death
- Reflex path: III, VI and VIII cranial nerves

How do we establish brain death? Vestibulo-ocular reflex

Cold Caloric test

- Otoscopy – check eardrum
- Inject 20 ml ice cold saline into ear
- Nystagmus, fast component to opposite side (COWS Cold Opposite,Warm Same)
- Absence in brain death
- Reflex path: III, VI and VIII cranial nerves

How do we establish brain death?
Gag and Cough reflexes

- Insertion of suction catheter into oropharynx, for gag reflex
- Movement of endotracheal tube, for cough reflex
- No reflex response in brain death.
- Reflex path: Glossopharyngeal and Vagus nerves

How do we establish brain death?
Apnea testing

- Measure ABG before starting test
- On ventilator, 100% oxygen for 5 minutes
- Disconnect from ventilator
- Watch for any respiratory efforts, monitoring SaO2 and BP.
- After 10 minutes, repeat ABG
- ***No respiratory efforts despite PaCO2 >60 mmHg or rise >20 mmHg – positive apnoea test***
- Stop test if there is hypoxia, hypotension or arrhythmia

Practice parameters for determining brain death in adults: (summary statement) NEUROLOGY 1995;45:1012-1014:
Confirmatory laboratory tests (Options)(specific criteria described for all)

- **A. Conventional Angiography**
- **B. EEG: no electrical activity over ≥30'**
- **C. Transcranial Doppler U/S**
- **D. Technetium-99m HMPA brain scan**
- **E. Somatosensory evoked potentials**

Bolnavul acut/urgenta

DEFINITION OF CRITICALLY ILL

- Critical illness is any disease process which causes physiological instability leading to disability or death within minutes or hours.

- A critically ill patient is one at imminent risk of death; the severity of illness must be recognized early and appropriate measures taken promptly to assess, diagnose and manage the illness.

Clinical observations

Patient category	Appearance	Neurological	Respiratory	Cardiovascular
Not critically ill	Normal	Alert Cooperative	Normal RR >8 <20 b/min pattern	HR 60–100b/min SBP > 90 mmHg UO > 0.5 ml/kg/hr
Potential critical illness	SWEATY	CONFUSED ACCESSORY MUSCLE USE	RR-30/MIN	HR>120/MIN
Critically ill	Grey Blue Mottled skin	Unresponsive or eyesopen to pain only Fitting	Silent chest RR < 8 > 30 b/min Agonal respirations	HR < 50 b/min HR > 150 b/min SBP < 60 mmHg
Cardiac arrest or death				

PHILOSOPHY OF MANAGEMENT

- Outcome in ICU is predominantly determined by initial management of patient at risk of life threatening illness.

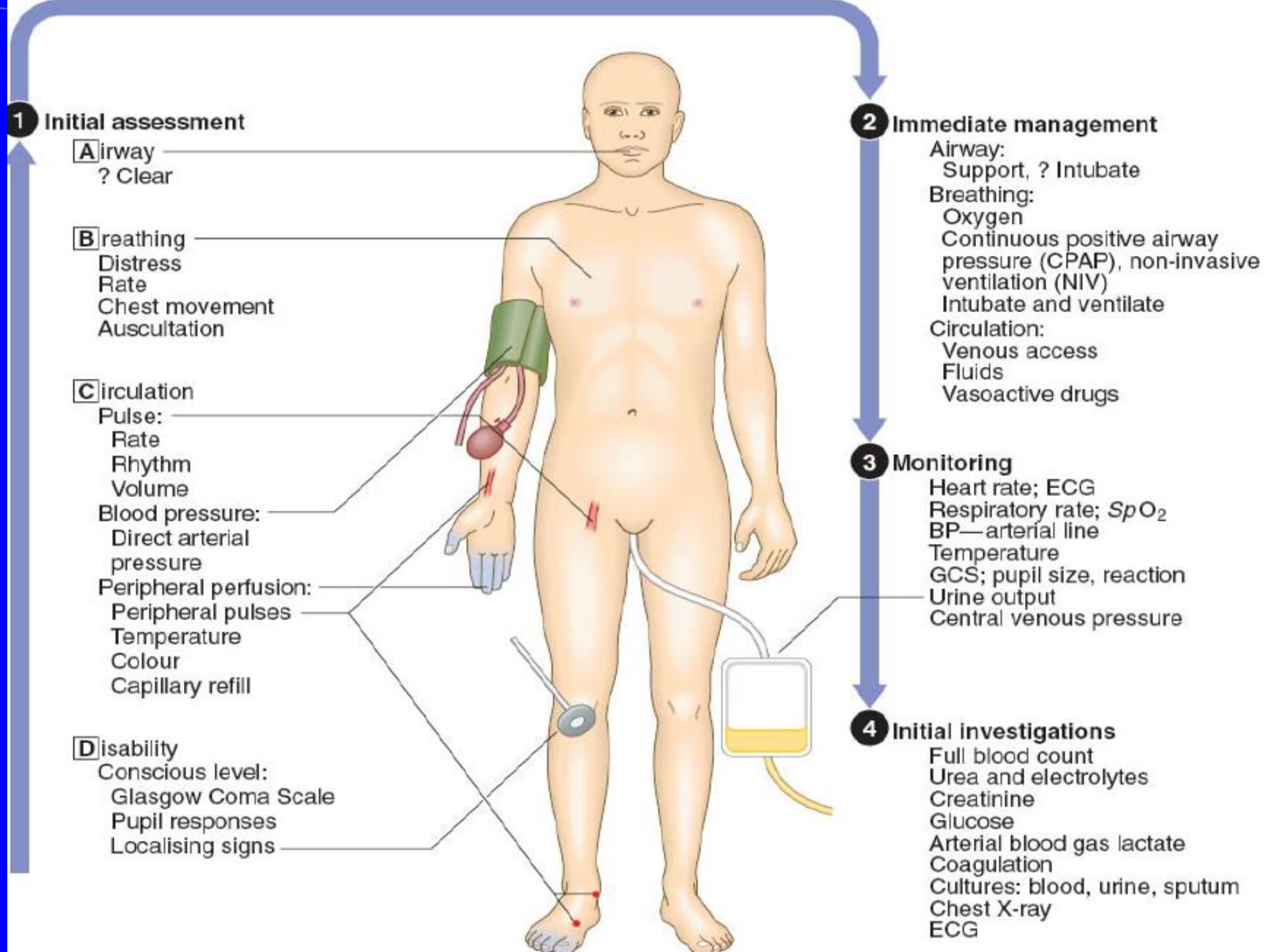
"TIME IS TISSUE"

So a prompt and protocolized resusucitation regimen helps in salvaging these patients.

ASSESSMENT AND MANAGEMENT SHOULD GO HAND IN HAND

PRIORITIES

1. Prompt *resuscitation* & adhering to *advanced life support* guidelines
2. Urgent *treatment of life threatening emergencies* (hypotension, hypoxaemia , hyperkalaemia, hypoglycaemia and dysrhythmias)
3. *Analysis* of the *deranged physiology*
4. Establish a *complete diagnosis* (as history & further diagnostic results are available)
5. Careful *monitoring* of the patient's condition and response to treatment


1 Initial assessment
A irway
? Clear
B reathing
Distress
Rate
Chest movement
Auscultation
C irculation
Pulse:
Rate
Rhythm
Volume
Blood pressure:
Direct arterial pressure
Peripheral perfusion:
Peripheral pulses
Temperature
Colour
Capillary refill
D isability
Conscious level:
Glasgow Coma Scale
Pupil responses
Localising signs
2 Immediate management
Airway:
Support, ? Intubate
Breathing:
Oxygen
Continuous positive airway pressure (CPAP), non-invasive ventilation (NIV)
Intubate and ventilate
Circulation:
Venous access
Fluids
Vasoactive drugs
3 Monitoring
Heart rate; ECG
Respiratory rate; SpO2
BP—arterial line
Temperature
GCS; pupil size, reaction
Urine output
Central venous pressure
4 Initial investigations
Full blood count
Urea and electrolytes
Creatinine
Glucose
Arterial blood gas lactate
Coagulation
Cultures: blood, urine, sputum
Chest X-ray
ECG

- Pacient constient, cooperant

  - Ce s-a intamplat?
  - Ce nu e bine in acest moment?
  - Exista o trauma Doare ceva?

Daca este posibil: scurt istoric (astm/BCV/DZ/Depresie)

Allergies

Medication

Past medical history

Last meal

Events preceding the current incident

Glasgow Coma Scale

TABLE 38-2

Glasgow Coma Scale

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	*Best response*	15
	Comatose client	8 or less
	Totally unresponsive	3

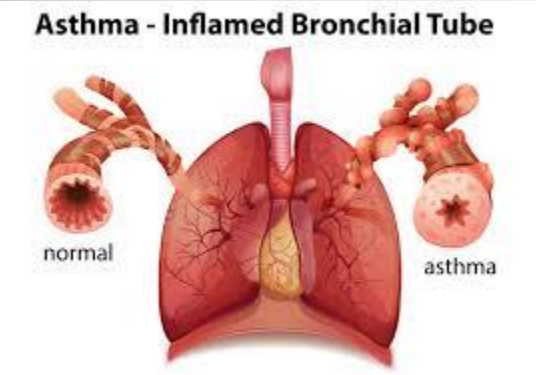
Nivelul de constienta

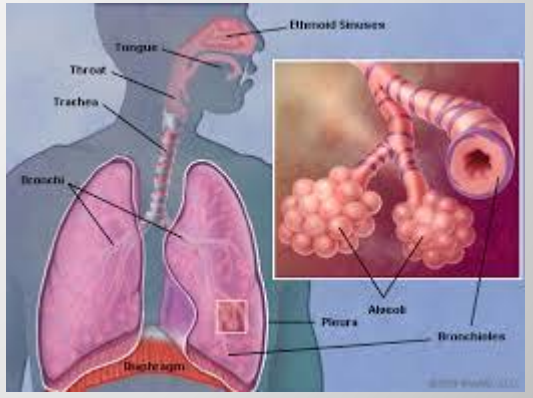
Evaluare:

- Tensiune Arteriala
- Alura Ventriculara
- Puls
- Temperatura
- Frecventa respiratorie
- Diureza +- sonda urinara
- Timpul de reumplere capilara

Examinarea pacientului critic

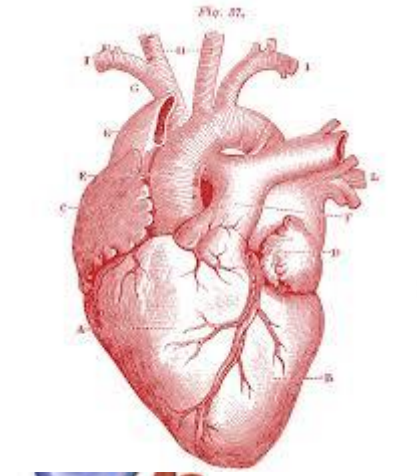
- Stridor / tiraj intercostal
- Obstructie
- Frecventa respiratorie (>35/min, <8/min)
- Respiratie de tip abdominal
- Detresa respiratorie (nu poate sa rosteasca o fraza/ utilizeaza mm accesori)
- SaO2<90% sub oxigenoterapie
- ↑Pco2 (gazometrie)

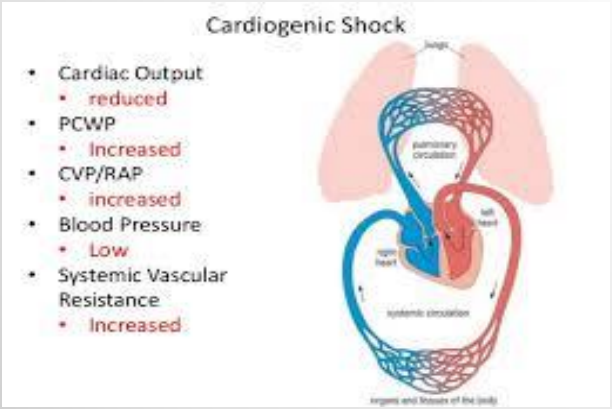




Semne respiratorii

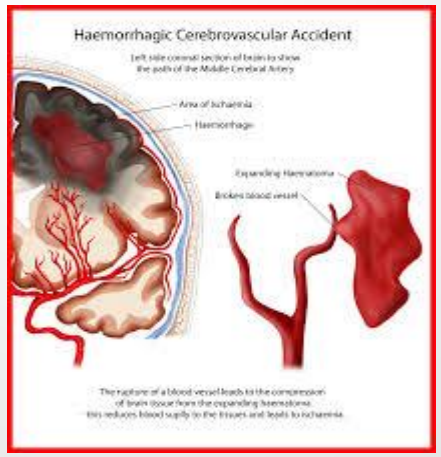
- Puls absent
- AV>180 /min sau av<40/min
- TA<100mmHg
- Timp de reumplere capilara ↑↑
- Oligurie/anurie
- ECG:TV/FV/BAV/Asistola

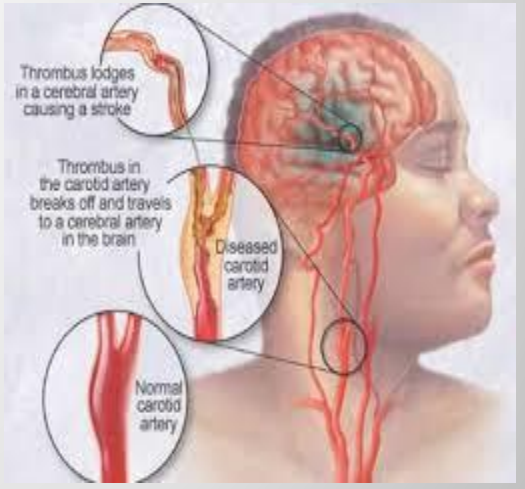




Semne cardiovasculare

- Nu raspunde la comenzi
- Nu raspunde la stimuli durerosi
- Raspunde la stimuli durerosi doar la nivelul de hemicorp
- Frecventa respiratorie joasa
- Alterarea brusca a starii de constienta
- Mioza/midriaza/reflex fotomotor
- Crize tonico-clonice
- Glasgow <10





Semne neurologice

nationalgeographic.com