MONITORING CRITICAL PATIENT IN EMERGENCY DEPARTMENT

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CRITICAL PATIENT

- Critical patients are those; who are at risk for actual (or) potential life threatening health problems.

- Decompensation of the status of the patient leads to the multi organic failure and death without therapeutic intervention .

ETIOLOGY

- Traumatological: polytrauma, crush syn, craniocerebral , contusion of the chest, burns
- Shock of various clinical causes, cardiac impairment
- Sepsis; 25% mortality
- Acute hemorrhagia, pulmonar embolism

AIMS ?

- To save the basic vital function
- Stabilization of patient
- To detect organ dysfunction and guide the restoration of tissue oxygen delivery.
- Right diagnosis
- Adequate therapy

MANAGEMENT OF CRITICALLY ILL PATIENT

- **Complete monitoring**
- Respiratory care
- Cardio vascular care
- Gastrointestinal/nutritional care
- Neuro muscular
- Comfort and reassurance
- Communication with the patient
- Venous thrombosis prophylaxis

COMPLETE MONITORING

- The verb monitor originates from the Latin word ‘‘monere’’, which means ‘‘to remind, advise, or warn’’.

- Monitoring is only an adjunct to the careful observation of clinical signs in the critically ill patient.

COMPLETE MONITORING

- Idioms such as the golden hour , early-goal-directed-therapy (EGDT), time is muscle and time is brain have been promulgated to emphasize the importance of timely management of critically ill patients presenting to the ED.

WHY COMPLETE MONITORING ?

- Monitoring ensures rapid detection of changes in the clinical status
- Allows accurate assessment of progress and response to therapy
- Trends are generally more important than a single reading
- Alarms are crucial for patient safety

FOR WHO ?

WHO MUST WE MONITORING COMPLETELY ?

Cardiogenic	Hypovolemic
Dysrhythmias – extreme bradycardia or tachycardia	Haemorrhagic, trauma – external hemorrhage, intrathoracic, intraabdominal, pelvis and retroperitoneal, long bones
Acute coronary syndrome	
Acute myocarditis	Haemorrhagic, non-trauma – gastrointestinal (UGIB, LGIB), ruptured ectopic pregnancy, ruptured AAA
Cardiomyopathies	
Post traumatic myocardial injury	
Valvular heart disease	Non-haemorrhagic – diarrhoea, vomiting, heat stroke, excessive sweating
Distributive	**Obstructive**
Neurogenic shock (high spinal cord transection)	Tension pneumothorax
Anaphylactic shock[b]	Pericardial tamponade
Septic shock[a]	Pulmonary embolism

HOW CAN WE MONITORIZE CRITICALLY ILL PATIENTS ?

- Non invasive methods
- Invasive methods

NON INVASIVE METHODS

- Clinical Assessment and Serial Biomarker Measurements
  - Goal directed history
  - Clinical examination
  - Basic bedside monitoring

NON INVASIVE METHODS

- Mean arterial pressure must be above;
  - 60 mmHg to achieve adequate abdominal perfusion pressure
  - 70 mmHg for cerebral perfusion and
  - 85 mmHg for renal perfusion

NON INVASIVE METHODS

- Ultrasonography
  - Non-invasive, safe, free of ionizing radiation and can be performed at the bedside
  - The findings of regional wall motion abnormalities (RWMA), a poorly contractile myocardium, low ejection fraction, dilated cardiac chambers, valvular stenosis, regurgitations and the presence of comet tail artifacts or "B-lines" suggest a cardiogenic aetiology,
  - Absence of lung sliding and comet tail artifacts with the presence of a lung-point sign on lung ultrasonography may suggest a missed tension pneumothorax

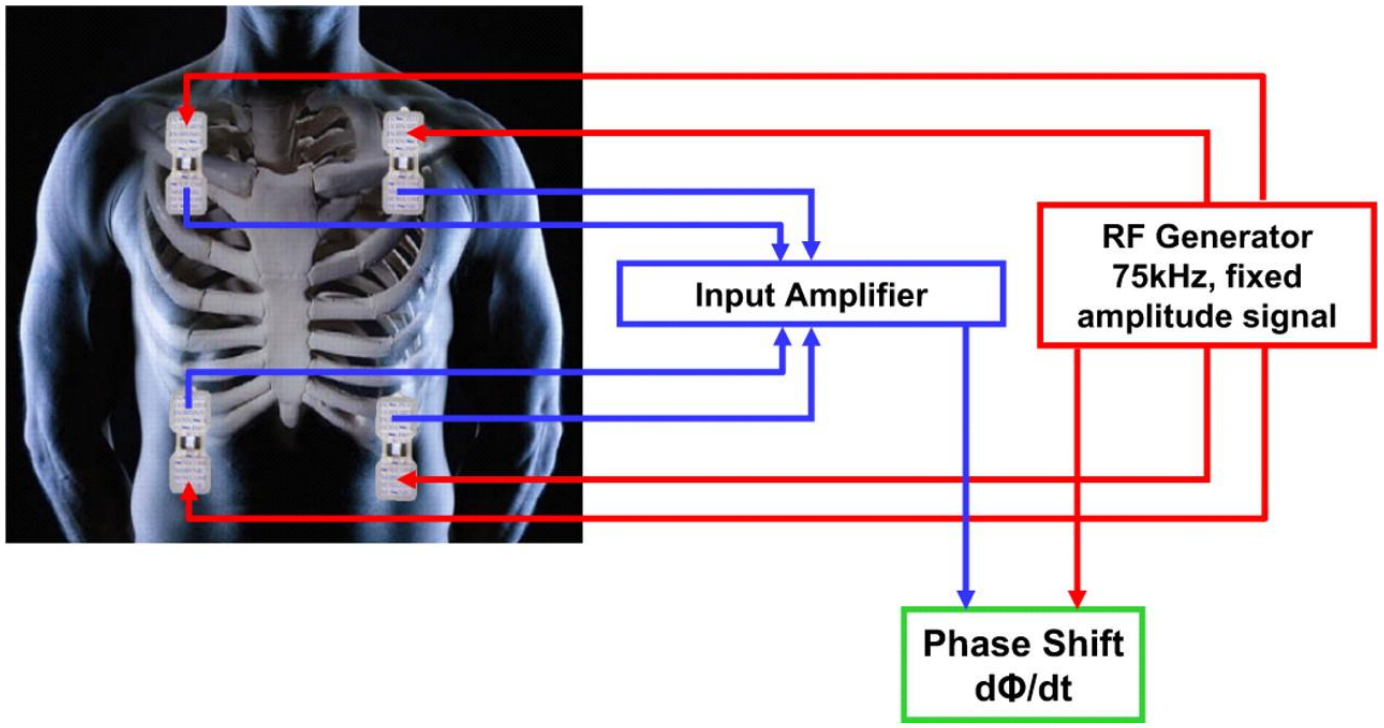
NON INVASIVE METHODS

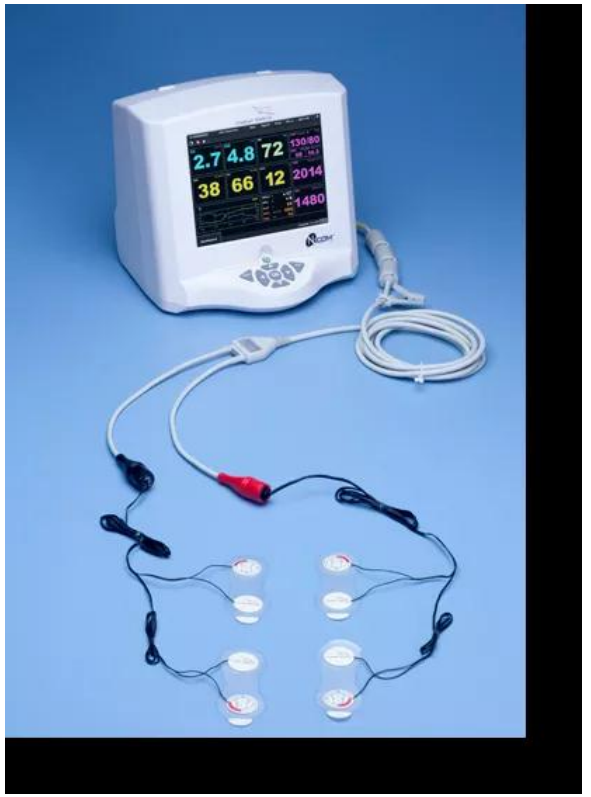
- Ultrasonography
  - A dilated inferior vena cava (IVC), systolic collapse of the right atrium for more than a third of the cardiac cycle and diastolic collapse of the right ventricle = Pericardial tamponade ?
  - Dilatation of right sided cardiac chambers, elevation of pulmonary artery pressures and mural thrombi on transthoracic views = Pulmonary embolism?
  - 2-dimensional, motion (M) or Doppler modes of imaging have been described that predominantly assess the variation in blood flow and blood flow velocity with the respiratory cycle for fluid responsiveness

NON INVASIVE METHODS

- Bioreactance
  - Continuously measures the time delay (phase shift) between the electrical current that is applied to the thorax and voltage that is returned.
  - These phase shifts correlate with aortic blood volume and are used to determine stroke volume.
  - Monitor reliable in determining CO and fluid responsiveness when coupled with a PLR maneuver.

NON INVASIVE METHODS

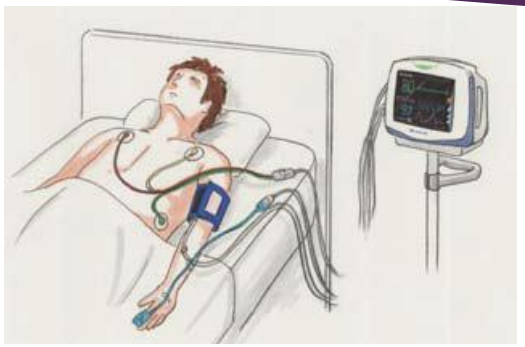




NON INVASIVE METHODS

- Finger based monitoring devices
  - Pulse oximeter
  - Estimated continuous cardiac output (esCCO™) monitoring device continuously estimates cardiac output by determining the pulse wave transit time (PWTT) (time taken for blood from the heart to reach the finger-tip)
  - The ClearSight™ device continuously measures BP, CO, SVV and PPV via an inflatable finger cuff.

NON INVASIVE METHODS



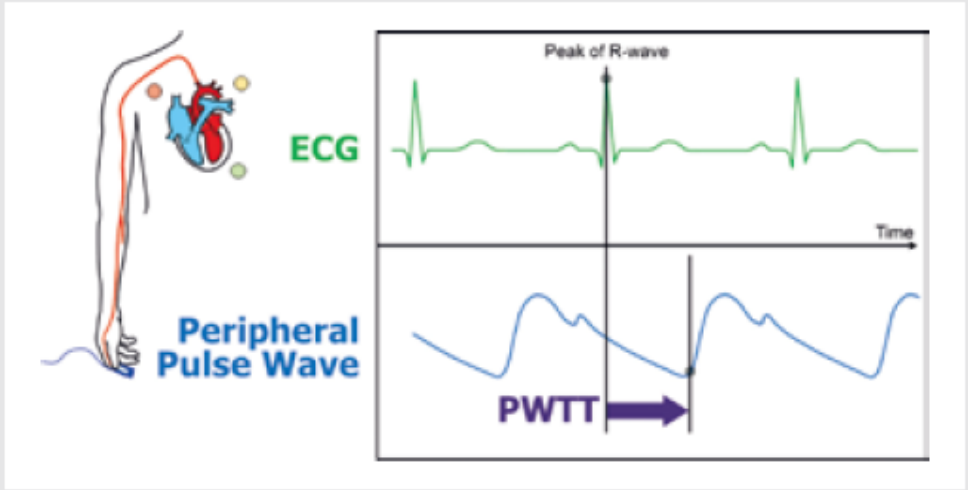
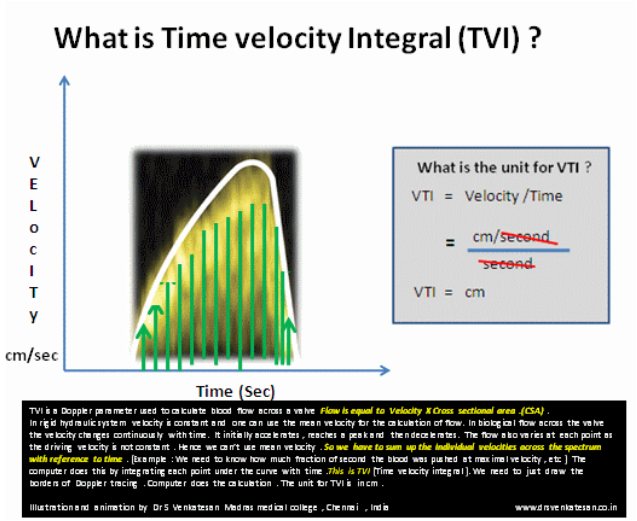


Figure 1 : Pulse Wave Transit Time derived from ECG and pulse oximetry signal

NON INVASIVE METHODS

- Mini fluid challenge
  - An increase in the ultrasonographic VTI after administering a small volume of fluid (100 ml) can predict fluid responsiveness without the detrimental effects associated with large fluid boluses



NON INVASIVE METHODS

- The end-expiratory occlusion test
  - Interruption of the respiratory cycle at the end of expiration will avert the expected cyclical changes in venous return and cardiac output.
  - 5% increase in CO after a 15 s end-expiratory hold maneuver was predictive of fluid responsiveness.

INVASIVE METHODS

- Central venous pressure monitoring
  - A useful marker of right ventricular function
  - Has no value in predicting fluid responsiveness in the critically ill patient
  - Because CVP is influenced by frequent and unpredictable changes in vascular tone, intra-thoracic pressure, ventricular compliance and myocardial geometry in the critically ill patient

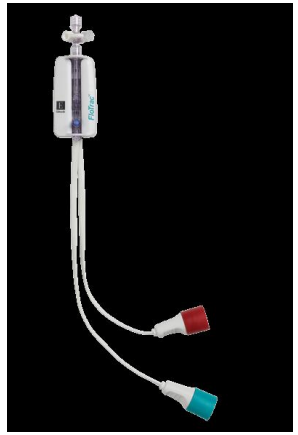
INVASIVE METHODS

- Pulmonary artery catheter
  - Widely used as a diagnostic tool in critically ill patients
  - Based on the principle of thermodilution
  - Can be rather challenging with complications that include pulmonary infarction and hemorrhage, rupture of the balloon tip and cardiac arrhythmias

INVASIVE METHODS

- Modern invasive HDM devices
  - Require a CVP catheter as well as an intra-arterial line to allow for continuous hemodynamic monitoring
  - FloTrac/Vigileo™, Costatus' LiDCO™, PiCCO™and Volume View/EV 1000™

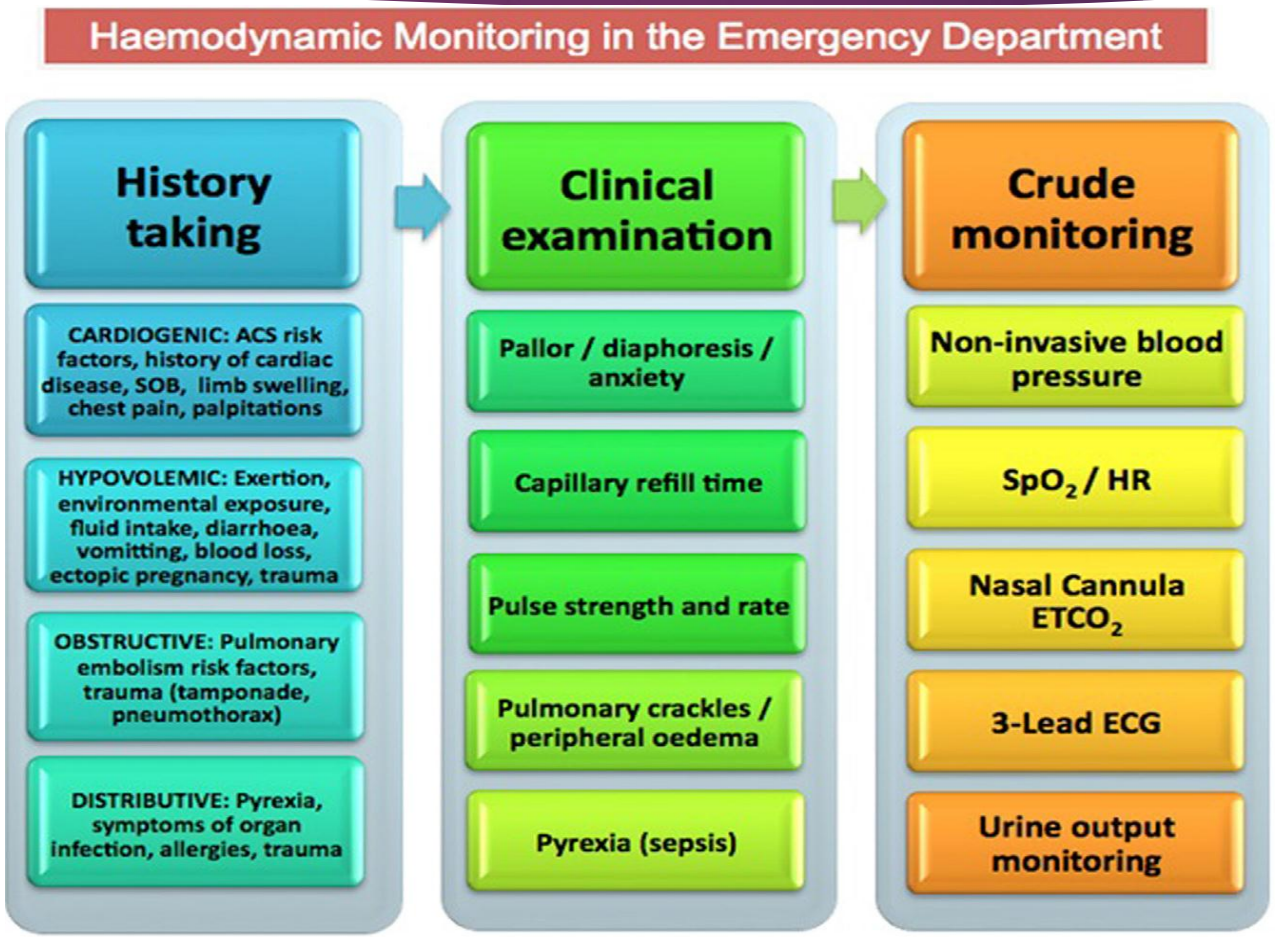
INVASIVE METHODS



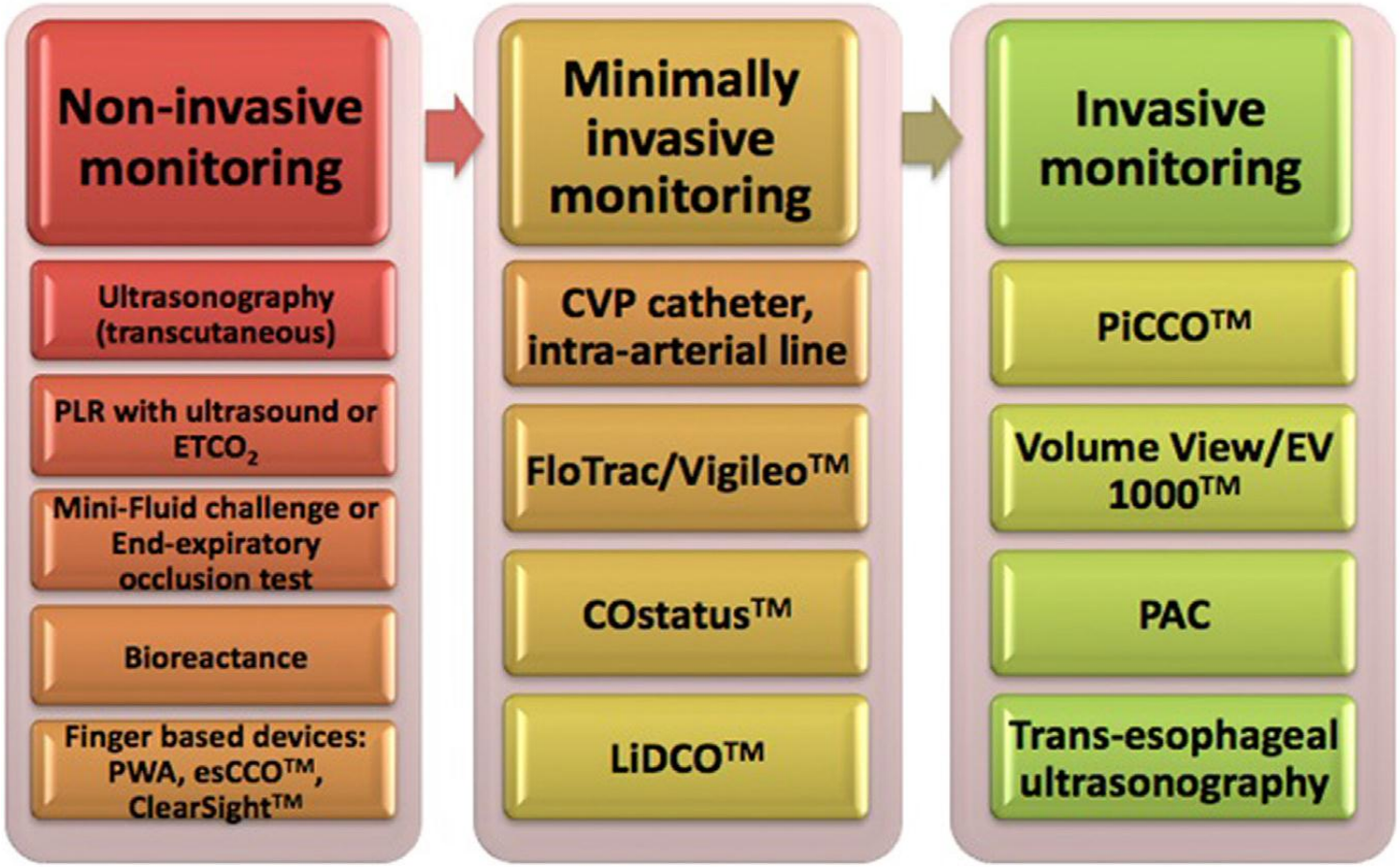
SUMMARY

- For the critically ill hemodynamically unstable patient presenting to the ED, management based on clinical assessment and simple bedside monitoring is sufficient in the majority of cases

SUMMARY


Haemodynamic Monitoring in the Emergency Department
History taking
CARDIOGENIC: ACS risk factors, history of cardiac disease, SOB, limb swelling, chest pain, palpitations
HYPOVOLEMIC: Exertion, environmental exposure, fluid intake, diarrhoea, vomitting, blood loss, ectopic pregnancy, trauma
OBSTRUCTIVE: Pulmonary embolism risk factors, trauma (tamponade, pneumothorax)
DISTRIBUTIVE: Pyrexia, symptoms of organ infection, allergies, trauma
Clinical examination
Pallor / diaphoresis / anxiety
Capillary refill time
Pulse strength and rate
Pulmonary crackles / peripheral oedema
Pyrexia (sepsis)
Crude monitoring
Non-invasive blood pressure
SpO_2 / HR
Nasal Cannula $ETCO_2$
3-Lead ECG
Urine output monitoring

SUMMARY


Non-invasive monitoring
Ultrasonography (transcutaneous)
PLR with ultrasound or $ETCO_2$
Mini-Fluid challenge or End-expiratory occlusion test
Bioreactance
Finger based devices: PWA, esCCO™, ClearSight™
Minimally invasive monitoring
CVP catheter, intra-arterial line
FloTrac/Vigileo™
COstatus™
LiDCO™
Invasive monitoring
PiCCO™
Volume View/EV 1000™
PAC
Trans-esophageal ultrasonography

THANK YOU


THE PATIENTS KNOW MORE ABOUT THEIR DISEASES THAN ME. I MUST GET FASTER MODEM, HIGHER SPEED INTERNET ACCESS THAN THEM
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