ASSESSMENT OF VITAL SIGNS

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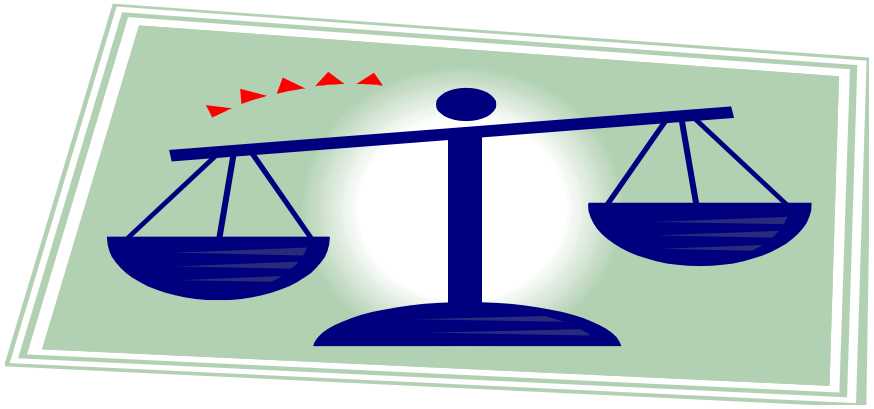


WHAT ARE VITAL SIGNS?

- ***Homeostasis***: *is the state of equilibrium within the body, maintained through the adaptation of body systems to changes in either the internal and external environment*

- When ***injury/illness*** occurs, the body's ability to maintain homeostasis may be impaired, which will show in a person's ***Vital Signs*** modifications

- Important for health care providers to know what are normal and abnormal vital signs

Vital signs

- Vital signs are important physical signs. They may indicate:

- that an individual is alive
- her/his physical conditions
- They are: ***heart beat, breathing rate, temperature, blood pressures, consciousness, and more recently oxygen saturation***

Vital signs

- These signs may be observed, measured, and monitored to assess ***an individual's level of physical functioning***

Vital signs

Normally vital signs may change with:

- ***Age***
- ***Sex***
- ***Weight***
- ***Exercise tolerance***
- ***Condition***

Vital signs

- All measurements should be made while the patient is seated (for at least 5 minutes) or lying in the bed

VITAL PARAMETERS

1. *Consciousness*
2. *Body temperature*
3. *Respiration rate*
4. *Blood pressure*
5. *Pulse*
6. *(Oxigen saturation)*

1. CONSCIOUSNESS

Human ability to be aware of own thoughts, emotions, surroundings → adequate responses

GLASGOW COMA SCALE (GCS)

Patient's response to:

- verbal stimulation
- painful stimulation
- movement

Scale 3 –15

CONSCIOUSNESS

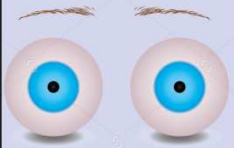
- Two components of conscious behavior are:
  - **Vigilance (arousal):** appearance of wakefulness
  - **Awareness (content):** the sum of cognitive and affective function

- Awareness depends on arousal, but normal arousal does not guarantee normal awareness!

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

Behaviour	Response
 Eye Opening Response	4. Spontaneously 3. To speech 2. To pain 1. No response
 Verbal Response	5. Oriented to time, person and place 4. Confused 3. Inappropriate words 2. Incomprehensible sounds 1. No response
 Motor Response	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No response

CONSCIOUSNESS

Changes in consciousness	
QUALITATIVE	**QUANTITATIVE**
• anxiety • depression • delirium	• somnolent • sopor • coma (shallow/deep)

2. BODY TEMPERATURE

Balance between heat produced and heat lost by the body

Heat regulating centre: hypothalamus

Heat production: caused by cell metabolism

Heat losses (cool off process):

- perspiration
- respiration
- radiation

Types of thermometers:

- mercury-in-glass
- electronic
- chemical

BODY TEMPERATURE

BODY TEMPERATURE	SYMPTOMS
Hypothermia ↓ 36 °C	Skin paleness Tiredness
Normal 36 – 36,9 °C	Lowest 5-6 am Highest 4-6 pm
Pyrexia / slight fever 37,0 – 37,9 °C	Perspiration Skin redness Headache
Fever > = 38 °C Presence of infection → body defence	General weakness Tachycardia Skin paleness/redness Shivers Perspiration

BODY TEMPERATURE

- The normal body temperature of a person varies depending on:

- recent physical activity
- food and fluid consumption
- time of day
- in women, the stage of the menstrual cycle

BODY TEMPERATURE

ROUTES FOR MEASURING THE BODY TEMPERATURE

- ORAL
best site for measuring in the clinical settings
triangle shaped thermometer
axillo – oral difference 0,3 °C

- **AXILLARY**
more likely to be affected by the environmental temperature,
used in children/adults

- RECTAL
fast thermometer, used in infants/confused patients /receiving - O2 *axillo – rectal difference 0,5 °C*

- VAGINAL
used in gynecology

3. RESPIRATION RATE

NORMAL RESPIRATIONS

- Effortless
- Regular
- Smooth

AVERAGE RESPIRATIONS

- Infant to 2 years 24–34/min
- To puberty 20-26/min
- **Adults** **12-20/min**

RESPIRATORY RATE

- **Normal 12-20/min**
- Bradypnea ↓ 10/min
- Tachypnea 25/min
- Apnea: stop

RESPIRATORY RHYTHM

- Normal
- Dyspnea (exertion/rest)
- Cheynes-Stokes respiration (irregular deep/slow/shallow)
- Kussmaul's breathing (deep)

under 12 breaths

over 20 breaths

SOME RESPIRATION PATTERNS

- ***Apnea:*** stopped breathing : temporary or permanent
- ***Bradypnea:*** abnormally slow breathing
- ***Dyspnea:*** difficult or breathing, shortness of breath
- ***Hyperpnea or tachypnea***: breathing that is faster or deeper; hyperventilation
- ***Cheyne-Stokes respiration***: irregular breathing pattern of periods of apnea lasting 10-60 seconds followed by periods of fast and slow breathing
- ***Kussmaul's breathing***: deep, gasping respirations

4. BLOOD PRESSURE (BP)

The pressure of blood in the arterial wall

Factors affecting BP:

- blood volume
- strength of contraction of left ventricle
- elasticity of artery walls

Assessment:

- **Normal:** 120-140/60-80 mmHg
- **Hypertension:** 150/90 mmHg
- **Hypotension** : ↓100 mmHg

Measurements stated in terms of ***millimeters of mercury (mmHg)***

BLOOD PRESSURE

BP reading:

- systolic pressure (ventricle contraction)
- diastolic pressure (ventricle at rest)

BP readings record: BP 120/80

Equipment:

- sphygmomanometer
- stethoscope

BLOOD PRESSURE

Places for measuring:

- upper arm (brachial artery)
- calf / thigh (popliteal artery)

Measuring techniques:

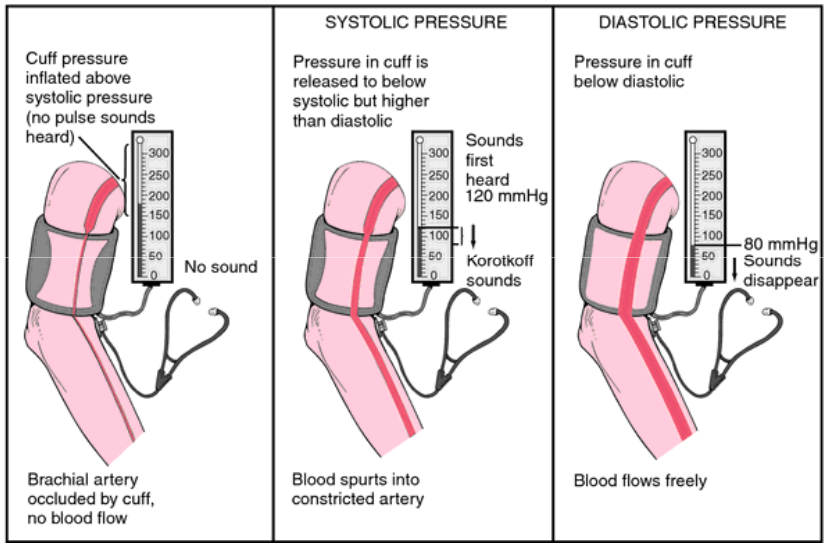
- auscultation
  (sphygmomanometer+stethoscope)
- palpation
  (sphygmomanometer)
- invasive methods (CVP)

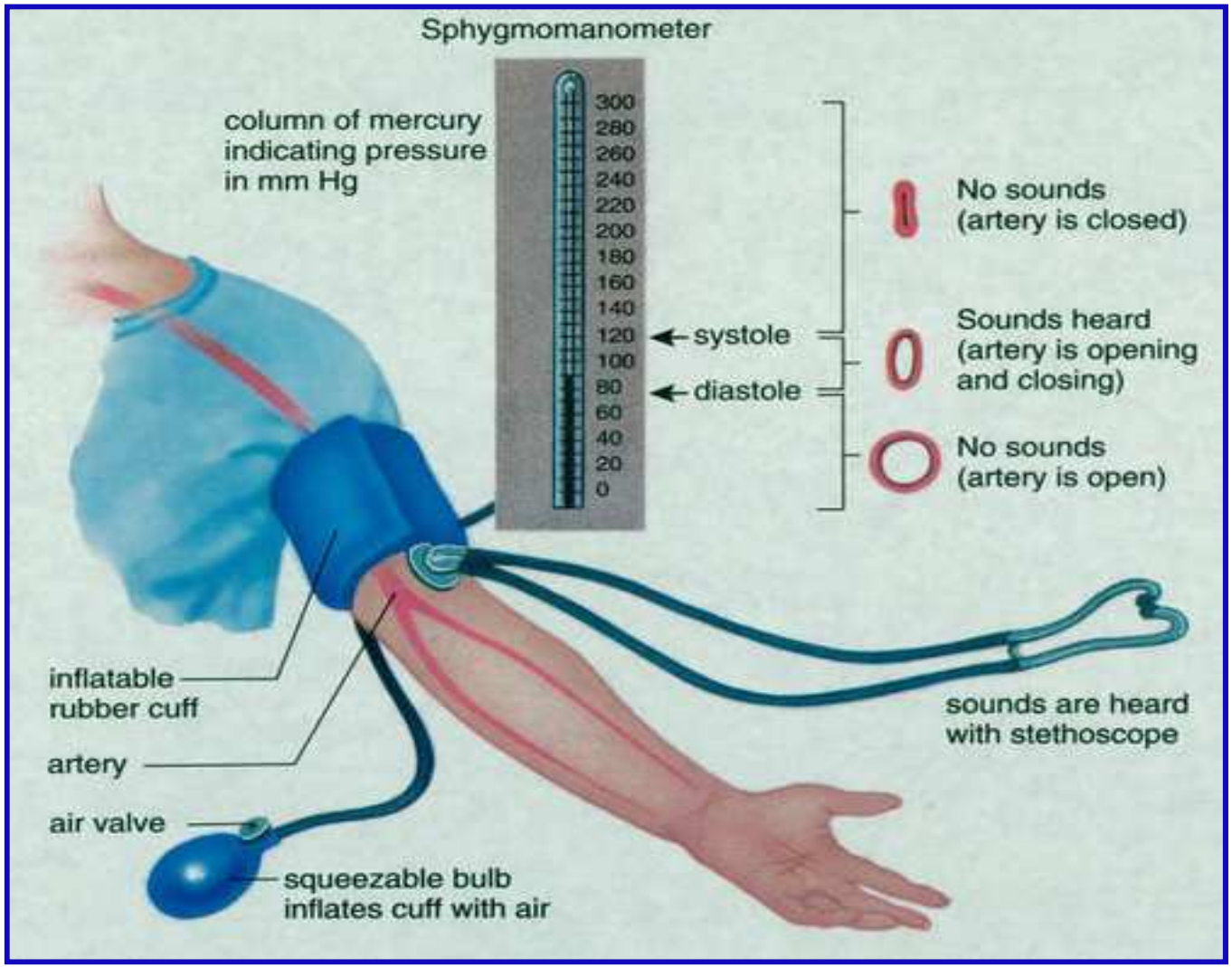
BLOOD PRESSURE

- Patient should abstain from eating, drinking, smoking and taking drugs that affect the blood pressure one hour before measurement

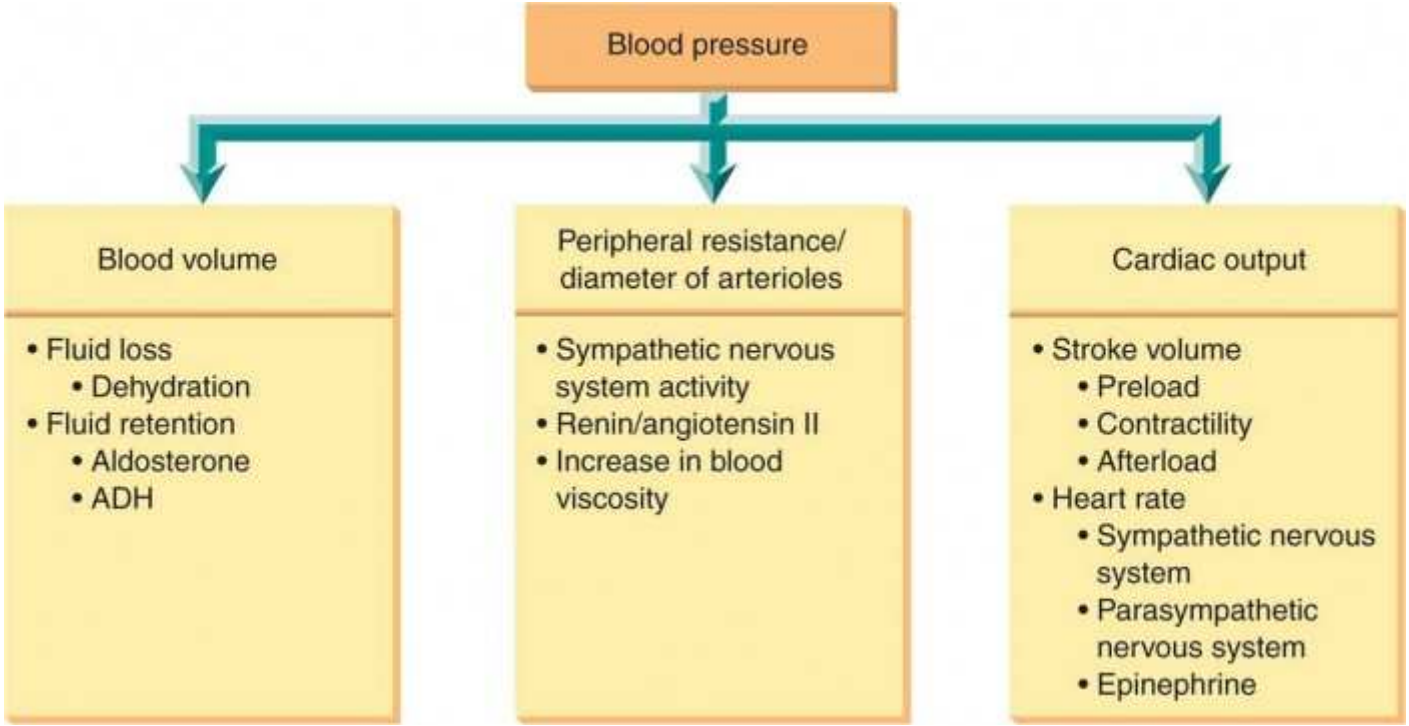
BLOOD PRESSURE

- ***Patient position:***
  - Seated or supine
- ***Procedure:***
  - Cuff secured over upper arm
  - Stethoscope placed over brachial artery
  - Inflate cuff to 180-200 mm Hg
  - Air slowly released
  - Note point at which 1st pulse sound is heard
  - Note point at which last pulse sound is heard




Sphygmomanometer
column of mercury indicating pressure in mm Hg
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
systole
diastole
No sounds (artery is closed)
Sounds heard (artery is opening and closing)
No sounds (artery is open)
inflatable rubber cuff
artery
air valve
squeezable bulb inflates cuff with air
sounds are heard with stethoscope

Blood pressure may be affected by many different conditions



Orthostatic Hypotention

- Orthostatic (postural) hypotension if frequent in elderly, diabetics, and hypertensive treated patients

- First measure BP when the patient is supine and then repeating after having stood for 2 minutes, which allows for equilibration

- Systolic blood pressure should not vary by more then 20 points when a patient moves from lying to standing

BLOOD PRESSURE

Affected by:

- Decrease in blood volume (severe bleeding or dehydration) – Hypovolemic shock
- Increased capacity of vessels volume (shock)
  - Rapid/weak pulse; ↓ BP
- Decreased ability of heart to pump blood
  - ↓ nutrients/oxygen to organs of body (anoxia)

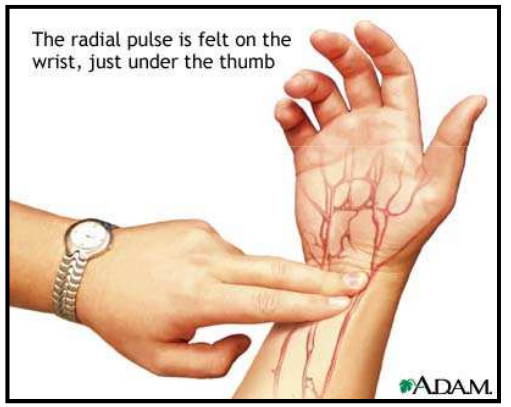
5. PULSE

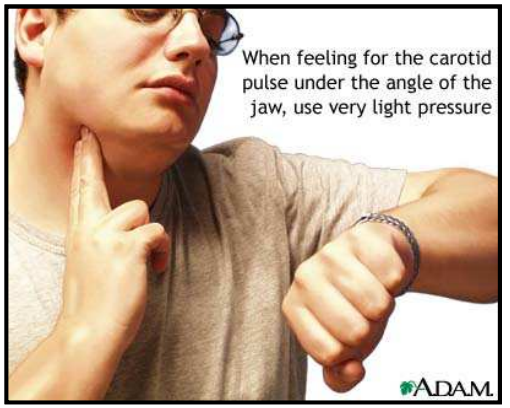
Expansion of an artery with each hart beat

Measuring techniques / places of assessing:

- PALPATION
  a. **carotis**
  a. **brachialis, <u>radialis</u>**
  a. femoralis, poplitea, etc.

- AUSCULTATION
  stethoscope





PULSE

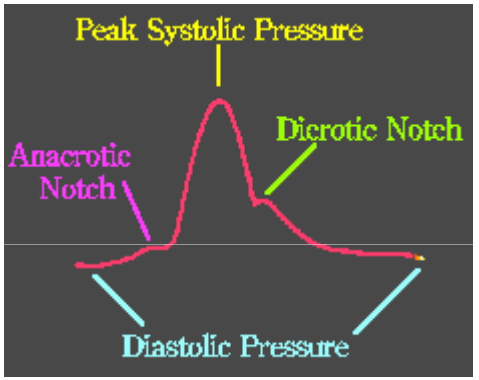
- The pulse rate may fluctuate and increase with:

- ***Exercise***
- ***Training***
- ***Illness, fever***
- ***Injuries***
- ***Emotions***

Girls and and women, in general, tend to have faster heart rates than do boys and men (body size)

Pulse: Quantity

- Measure the rate of the pulse (recorded in beats per minute). Count for 30 seconds and multiply by 2 (or 15 seconds x 4)
- If the rate is particularly slow or fast, it is probably best to measure for a full 60 seconds in order to minimize the error



Pulse: Volume and Regularity

- Does the pulse volume feel normal?
- This reflects changes in stroke volume. In hypovolemia, the pulse volume is relatively low

- Is the time between beats constant?
- Irregular rhythms are quite common (e.g. premature beats, atrial fibrillation)

6. OXIGEN BLOOD SATURATION

The fraction of oxygen-saturated hemoglobin relative to total hemoglobin (unsaturated + saturated) in the blood

$$S_pO_2 = \frac{HbO_2}{HbO_2 + Hb}$$

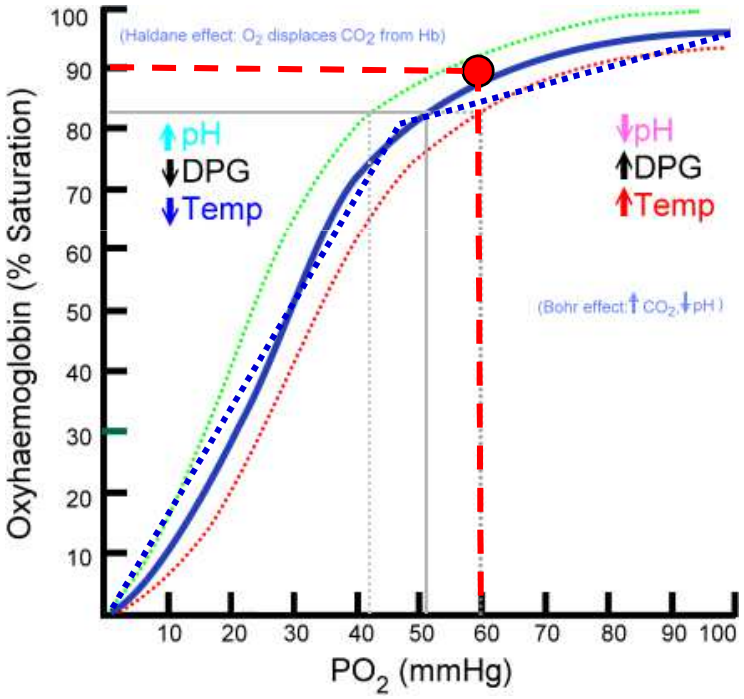
Oxygen Saturation Levels	
Severity	% Saturation
None/Minimal	> 96%
Mild	90% - 95%
Moderate	80% - 89%
Severe	< 80%

PULSE OX

- Rapid, widely available, non-invasive means of assessment in most clinical situations
- Normal **blood saturation** in humans is considered > 96%. Levels below 90% are considered low, resulting in hypoxemia. Blood oxygen levels below 80% may compromise organ function such as brain and heart, and should be promptly addressed

PULSE OX

- The % of oxygen saturation does not always correspond to the same PaO_2
- The haemoglobin desaturation curve can be shifted depending on the *pH, temperature* or arterial carbon monoxide or carbon dioxide levels
- **True tissue oxigenation depends not only on O2 saturation but also on <u>Hb Levels and Perfusion</u> (blood pressure)**



Arterial Blood Gas (ABG -EGA)

INDICATIONS:

- To obtain information about patient ventilation (PCO2), oxygenation (PO2) and acid-base balance
- Monitor gas exchange and acid base abnormalities for patient on mechanical ventilator or not
- To evaluate response to clinical intervention and diagnostic evaluation (oxygen therapy)
- An ABG test may be most useful when a person's breathing rate is increased or decreased or when the person has very high blood sugar levels, a severe infection, or heart failure

ABG (EGA)

- **PH:**

  measures hydrogen ion concentration in the blood, it shows blood' acidity or alkalinity

- **PCO2 :**

  It is the partial pressure of CO2 that is carried by the blood for excretion by the lungs, known as respiratory parameter

- **PO2:**

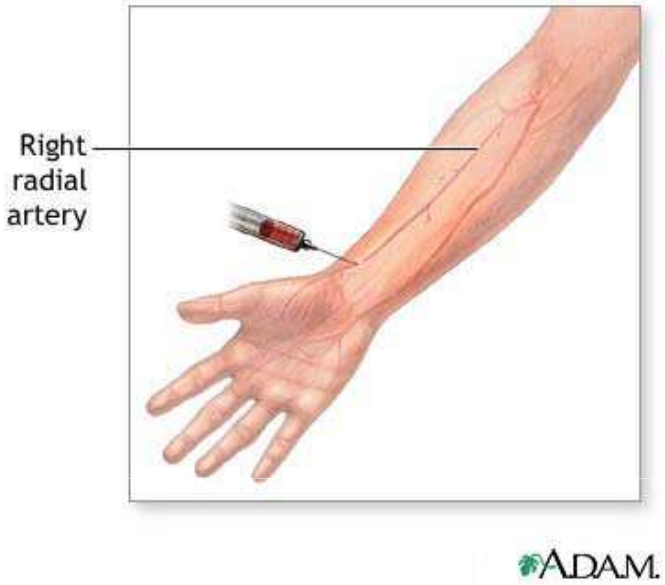
  It is the partial pressure of O2 that is dissolved in the blood , it reflects the body ability to pick up oxygen from the lungs

- **HCO3:**

  metabolic parameter, it reflects the kidney's ability to retain and excrete bicarbonate

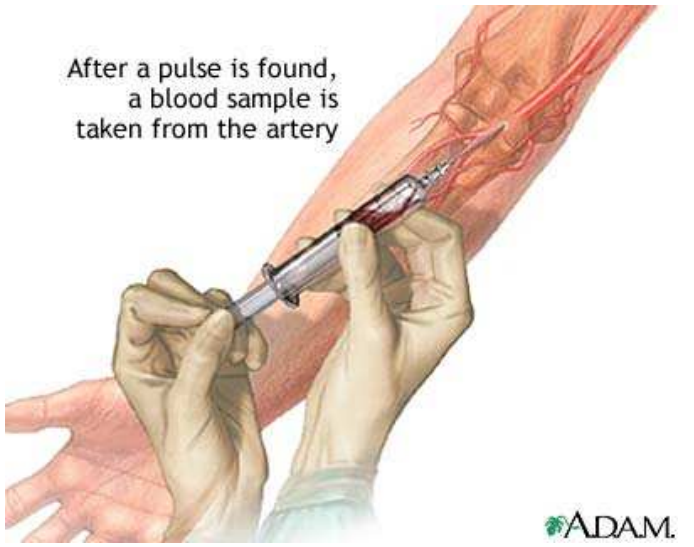
ABG (EGA)

- Radial artery (most common)
- Brachial artery
- Femoral artery



Radial is the <u>most preferable</u> site used because:

- It is easy to access
- It is not a deep artery which facilitate palpation, stabilization and puncturing



MODIFIED EARLY WARNING SCORE - MEWS

Score	3	2	1	0	1	2	3
Respiratory rate (breaths/min)	>35	31-35	21-30	9-20			<7
SpO2 (%)	<85	85-89	90-92	>92			
Temperature (C)		>38.9	38-38.9	36-37.9	35-35.9	34-34.9	<34
Systolic BP (mmHg)		>199		100-199	80-99	70-79	<70
Heart rate (bpm)	>129	110-129	100-109	50-99	40-49	30-39	<30
A V P U				Alert	Voice	Pain	Unconscious

A score > 4 is linked to increased likelihood of death or admission to an intensive care unit