SCENARIOS

- A 55 yrs old male is found down in a hospital waiting area. Medical doctor is called and upon arrival the patient is found to have an oxygen saturation of 88% and pin point pupils. He is brought to your ER where a room air arterial blood gas is performed.
- Result; ph -7.25; po2 -65; pco2 -60; Hco3 -26
- Acid base status----------

ARTERIAL BLOOD GASES

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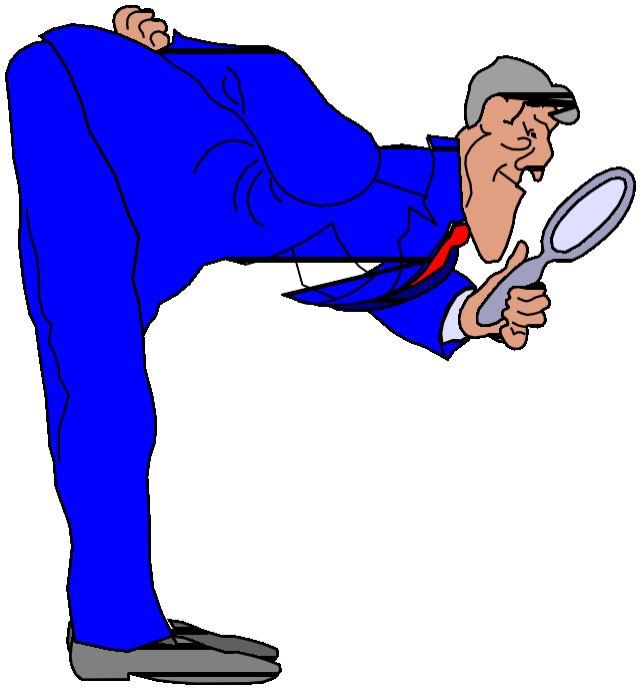
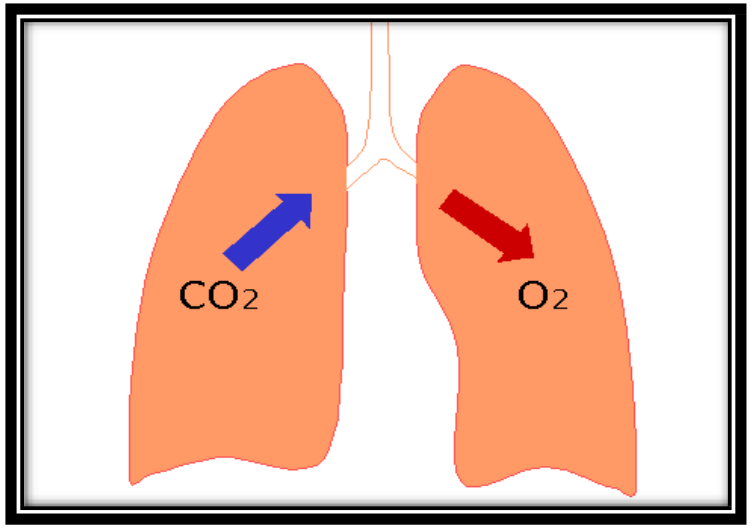
ABG: Definition:



- Arterial Blood Gas (ABG) analysis, is an invasive test which measures the amount of oxygen (O_2) and carbon dioxide (CO_2) in the blood, as well as the acidity (pH) of the blood.

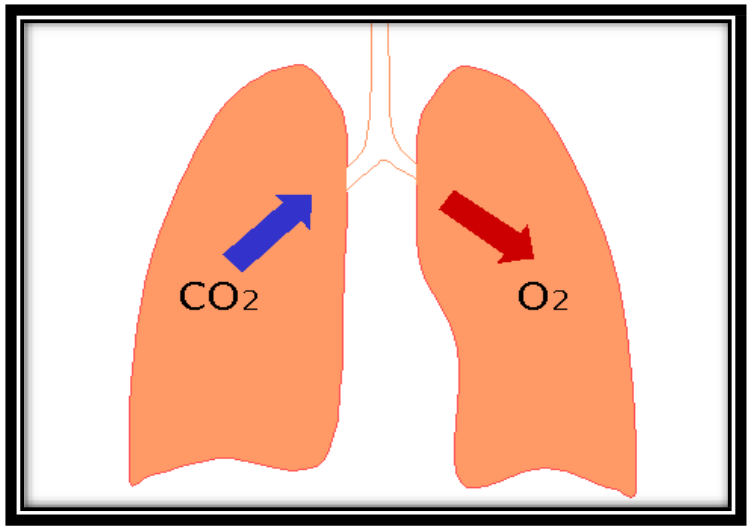
Purpose of ABG Analysis

- oxygenation of blood through gas exchange in the lungs.
- carbon dioxide (CO2) elimination through respiration.
- acid base balance or imbalance in extra cellular fluid (ECF).



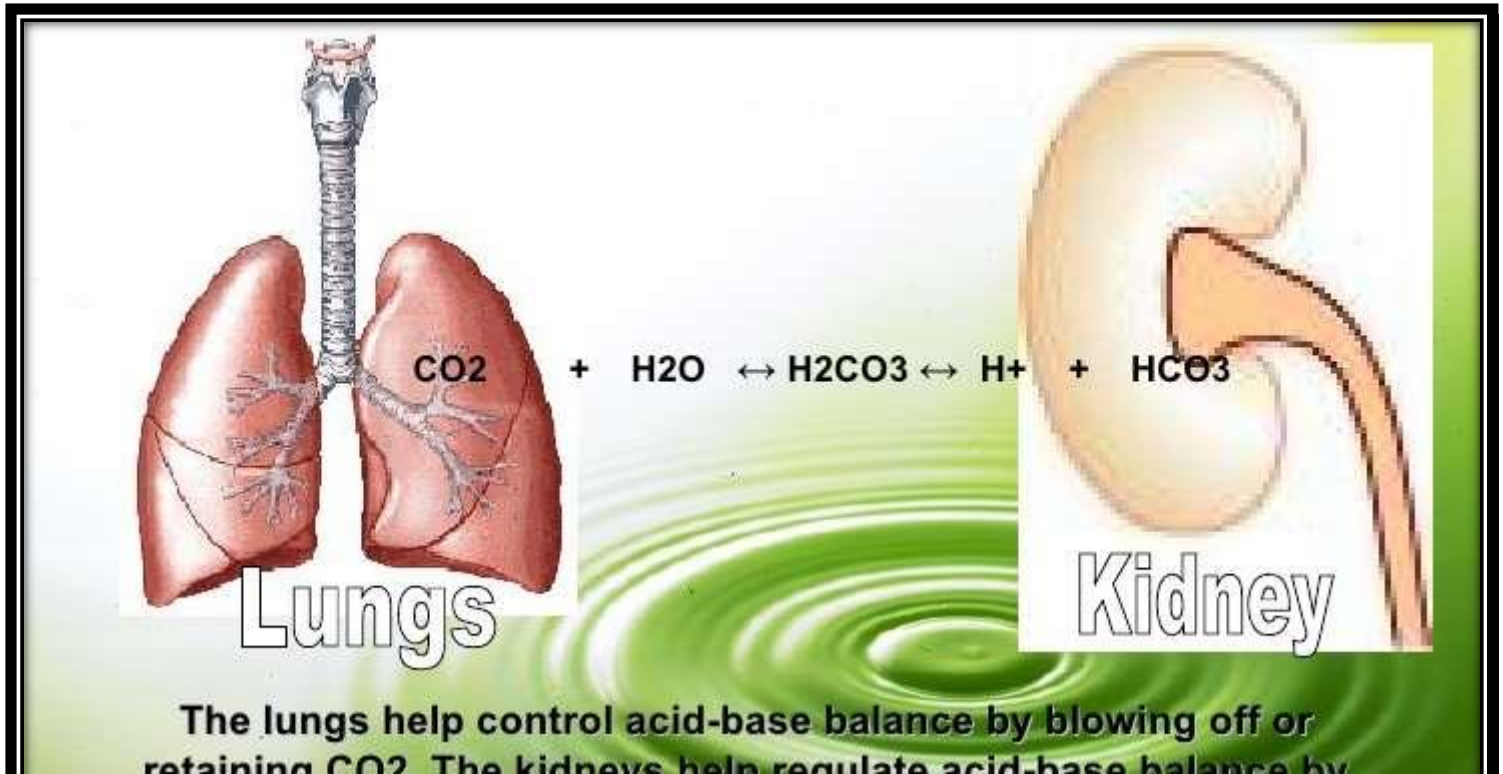
Purpose of ABG Analysis

- Evaluates how effectively the lungs are delivering O_2 to the blood and how efficiently they are eliminating CO_2 from it.



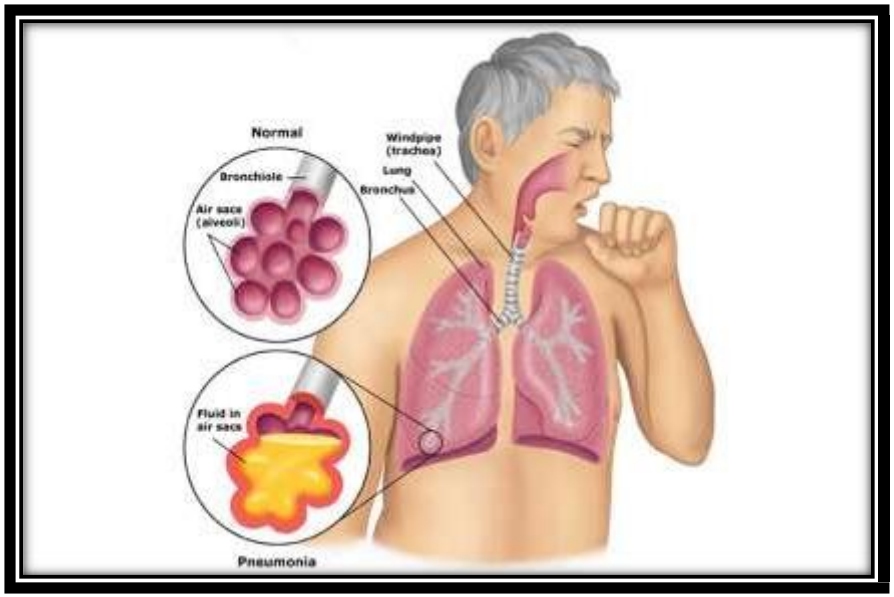
Purpose of ABG Analysis

- Indicates how well the lungs and kidneys are interacting to maintain normal blood pH (acid-base balance).



Purpose of ABG Analysis

- Assess respiratory disease and other conditions that may affect the lungs, and to manage patients receiving oxygen therapy (respiratory therapy).



ABG COMPONENTS

MAIN COMPONENTS	ABBREVATION
PH	HYDROGEN IONS IN BLOOD
PO2	PARTIAL PRESSURE OF OXYGEN
PCO2	PARTIAL PRESSURE OF CARBON DIOXIDE
SaO2	OXYGEN SATURATION
HCO3	BI CORBONATE

NORMAL ABG VALUES

COMPONENTS	VALUES
PH	7.35-7.45
HCO3	22-26 mm Hg
PCO2	35-45 mm Hg
PO2	80-100 mm Hg
SAO2	95-100%

Why ABG is ordered?

Characteristics of *1°* acid-base disorders

DISORDER	PRIMARY RESPONSE			COMPENSATORY RESPONSE
Metabolic acidosis	↑ $[H^+]$	↓ PH	↓ HCO_3^-	↓ pCO_2
Metabolic alkalosis	↓ $[H^+]$	↑ PH	↑ HCO_3^-	↑ pCO_2
Respiratory acidosis	↑ $[H^+]$	↓ PH	↑ pCO2	↑ HCO_3^-
Respiratory alkalosis	↓ $[H^+]$	↑ PH	↓ pCO2	↓ HCO_3^-

INDICATIONS

- CARDIAC /RESPIRATORY /RENAL FAILUER
- RESPIRATORY THERAPY(VENTILLATED PATIENT ETC)
- HEAD OR NECK TRAUMA, injuries that may affect breathing.
- PROLONGED ANESTHESIA – particularly for cardiac bypass surgery or brain surgery – during and for a period after the procedure.
- HYPERGLYCEMIA
- SEPSIS
- BURNS
- POISON /TOXINS
- OTHERS (SEVER ILL PATRIENTS ……)

ABG PROCEDURE

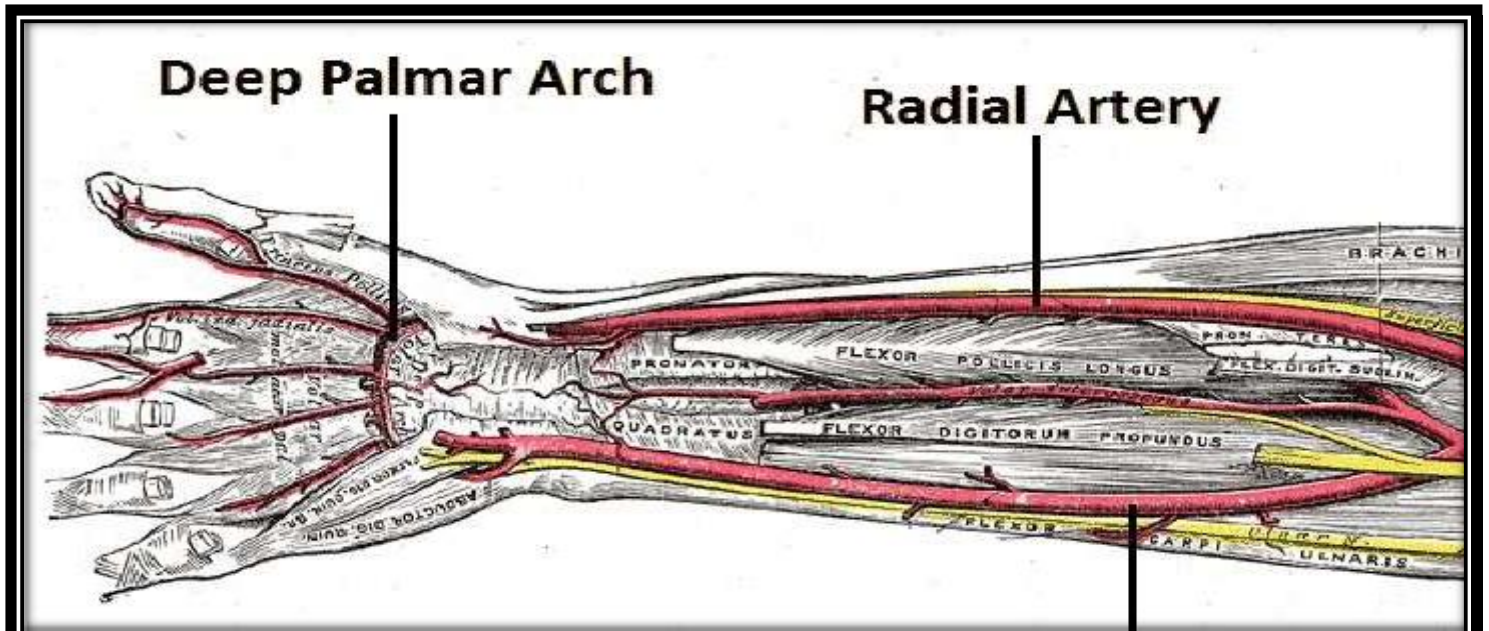
EXTRACTION SITE

EXTRACTION SITE

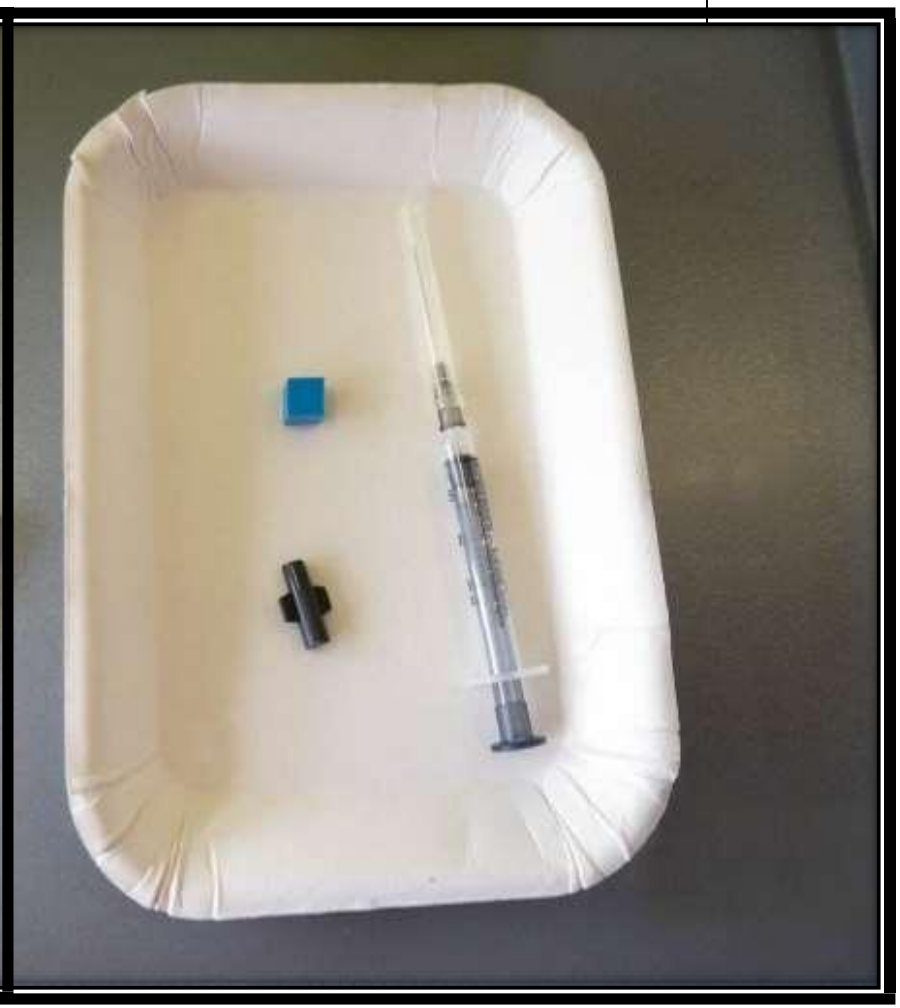
- Radial artery
- The femoral artery (or less often, the brachial artery) used, during emergency situations or with children.
- Blood can also be taken from an arterial catheter already placed in one of these arteries.

EXTRACTION SITE

- Commonly from the radial artery because:
- it is easily accessible,
- can be compressed to control bleeding,
- has less risk for occlusion.



ARTICLES



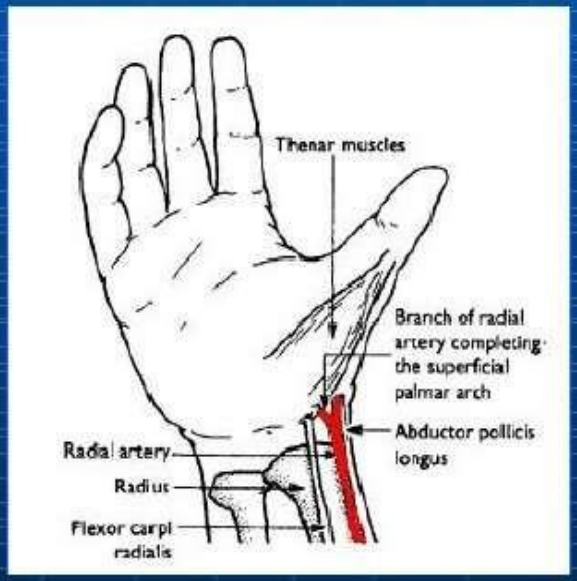
ALLEN'S TEST

- Elevated the hand and make a fist for the approximately 30 seconds.
- Apply the pressure over the ulnar and the radial arteries and look for the hand (this under take for 8 seconds).
- If there is any delay then it may not be safe to perform radial artery.

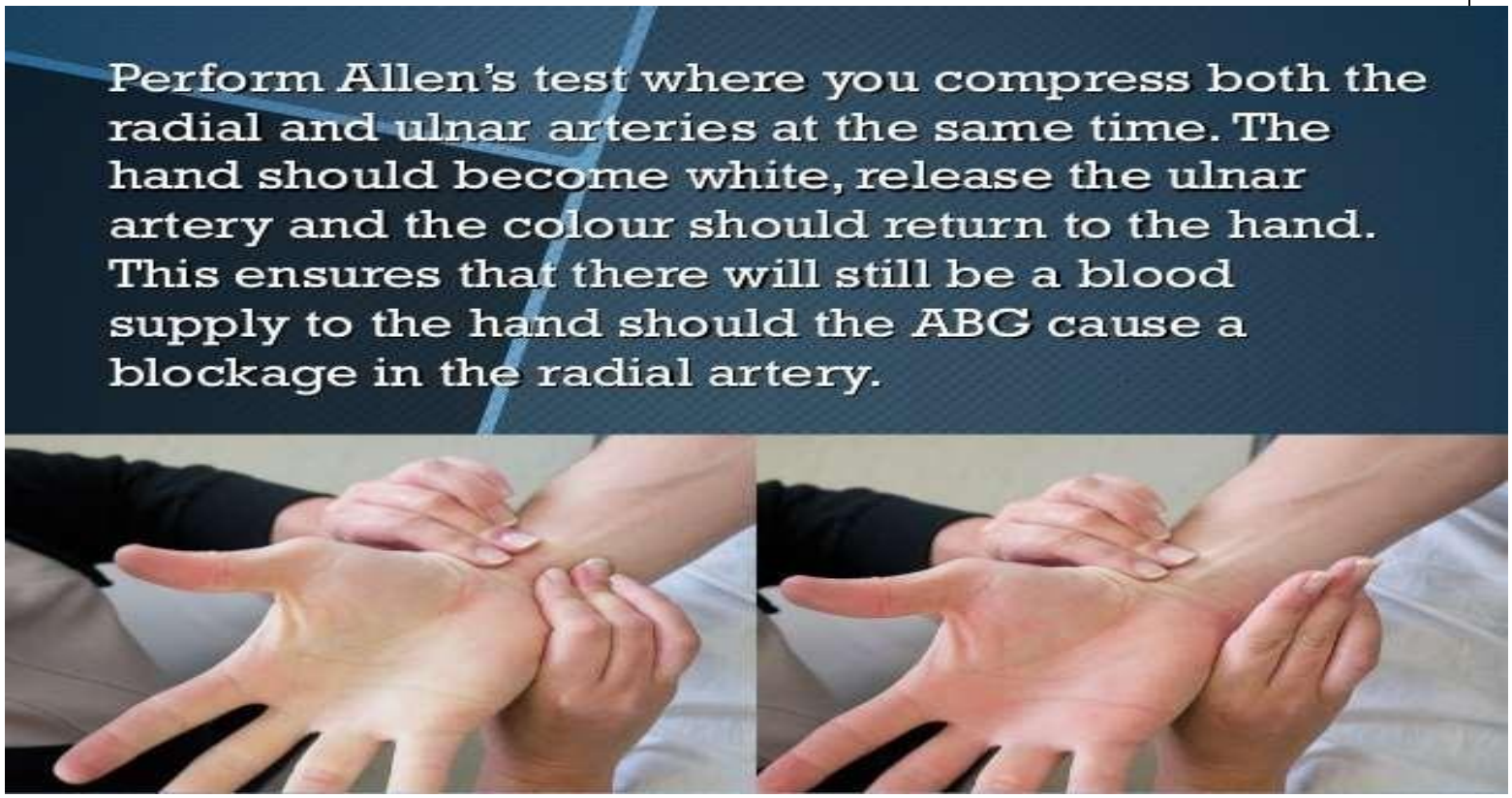
ALLEN'S TEST

The Allen Test

- have the patient clench his/her fist
- press on both radial and ulnar arteries
- have the patient unclench fist
- test for good collateral flow.



ALLEN'S TEST


Perform Allen's test where you compress both the radial and ulnar arteries at the same time. The hand should become white, release the ulnar artery and the colour should return to the hand. This ensures that there will still be a blood supply to the hand should the ABG cause a blockage in the radial artery.

ABG PROCEDURE

- Explain the procedure to the patients, It is pain full.
- ABG syringe usually come prepared and are heparinsed. Some contain a vacuum and thus the plunger does not always need to be pulled.
- The wrist is extended a pillow under the hand may improve comfort.
- Palpate the artery and hold fingers firmly over the pulsation.

"Wash your hands, introduce yourself to the patient and clarify their identity. Explain what you would like to do and obtain consent. This is a slightly uncomfortable procedure so you should let the patient know this.

- Position the patient's arm with the wrist extended.
- Locate the radial artery with your index and middle fingers.

CONTD…

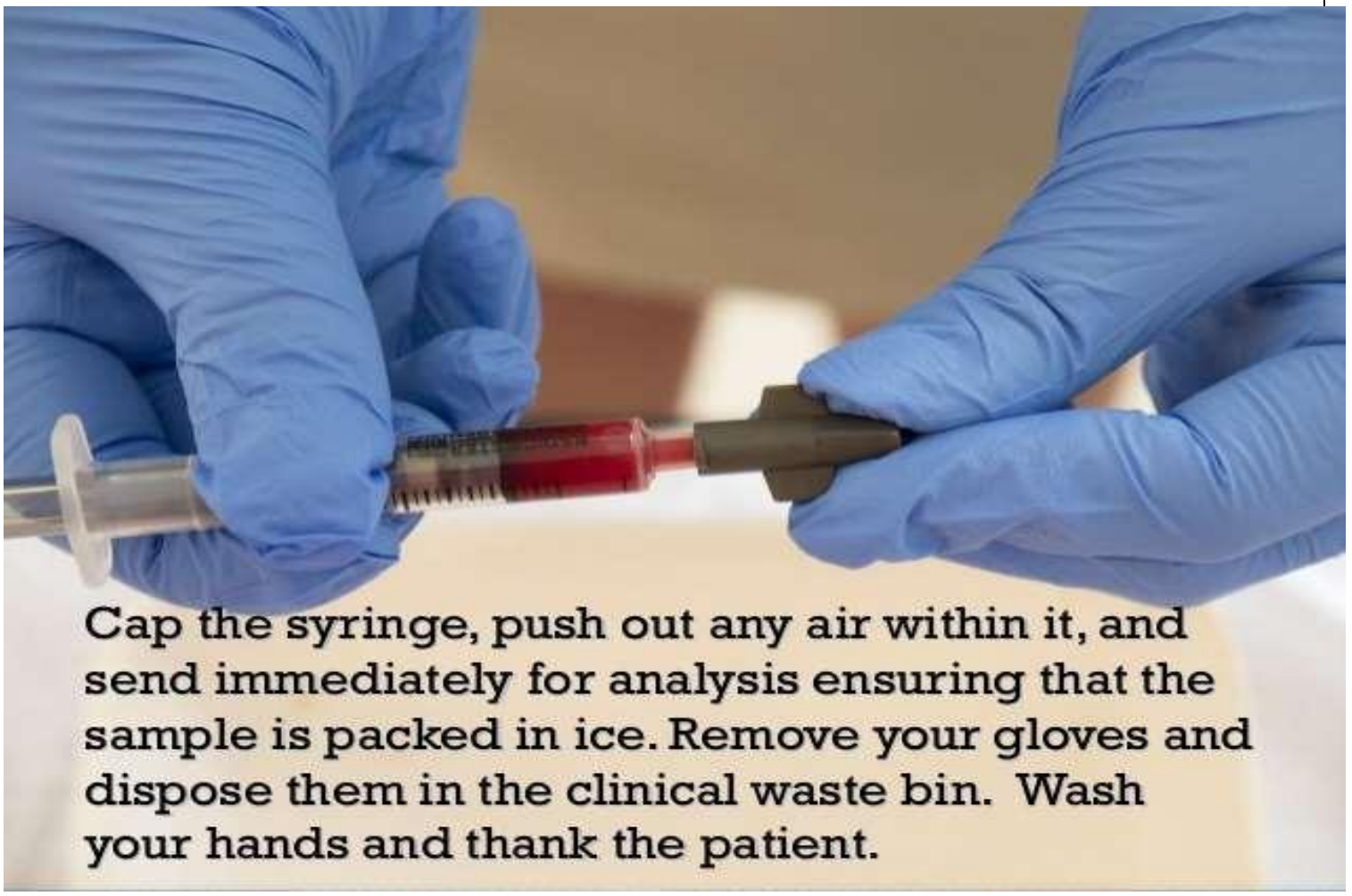
- Then introduce the needle at a 45 degree angle slowly with the bevel facing upward, aiming for the point of maximum pulsation.
- Once you have taken the sample and withdrawn the needle , apply firm pressure for a minimum of two minutes. (if longer the patient is on any antiplatelet medication)
- Once u hit the artery, try to obtain at least a 1 ml sample

PROCEDURE

Contd..

"Remove the needle/syringe placing the needle into the bung. Press firmly over the puncture site with the gauze to halt the bleeding. Remain pressed for 5 minutes.

SAFE TO HANDLE



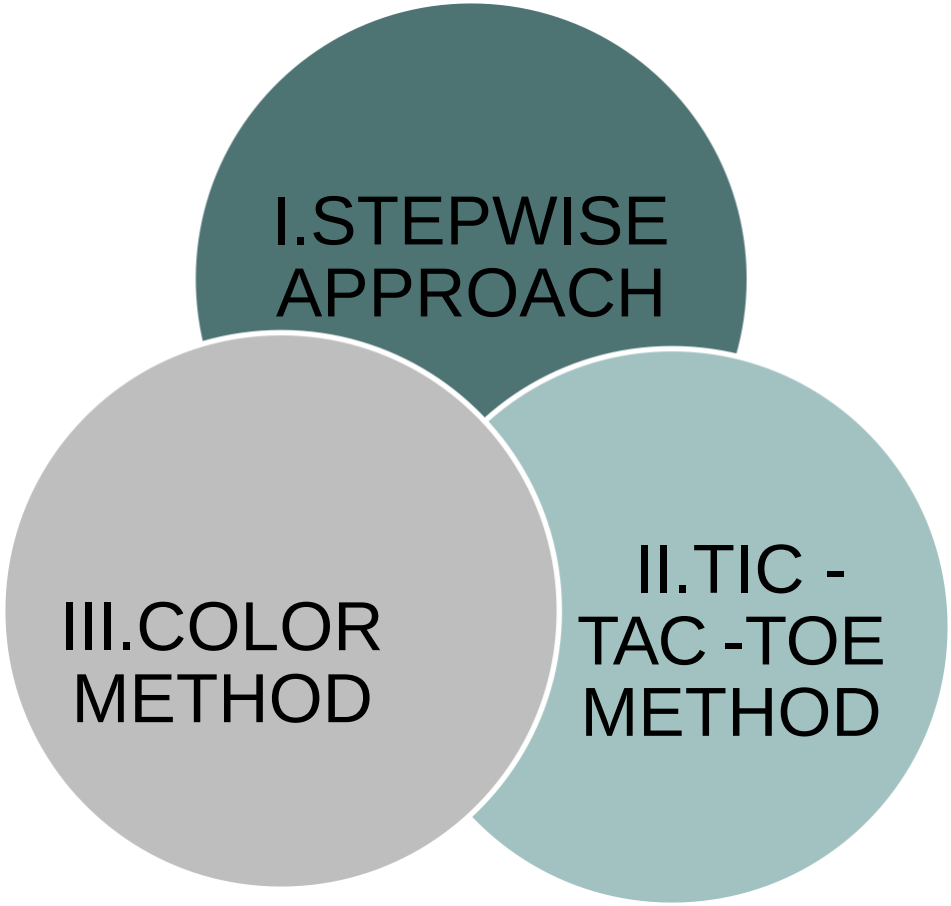
CONTRA INDICATION

- Allen’s Test Negative.
- Bleeding Diathesis,
- Distal To Surgical Shunt(av Fistula)
- On Anticoagulant Therapy.
- Severe Peripheral Vascular Diseases(absence Of An Arterial Pulse)
- Infection Over The Site,

POTENTIAL COMPLICATION

- Pain
- Hematoma , hemorrhage
- Trauma to vessel
- Arterio spasm
- Air or clotted blood
- Arterial occlusion
- Infection

ABG INTERPRETATION



STEPWISE APPROACH

STEP I

- DETERMINE THE PH
- ACIDOSIS / ALKALOSIS

STEP II

- EVALUATE THE PCO2
- ABOVE 45= ACIDOSIS OR BELOW 35= ALKALOSIS

STEP III

- EVALUATE HCO3
- ABOVE 26 =ALKALOSIS OR BELOW 22 = ACIDOSIS

CONTD….

STEP IV

- MATCHING
- MATCH THE PROBLEM VALUE WITH PH

STEP V

- DOES THE CO2 OR THE HCO3 GO THE OPPOSITE DIRECTION WITH THE PH ?

STEP VI

- ARE THE PO2 AND THE O2 SATURATION NORMAL ?

COLOR METHOD

- BLUE – BASE
- RED -- ACID
- **BLACK – NEUTRAL**

- (PRACTICE ABG ;
- PH -7.24,PCO2 -75, HCO3- 28
- now find the parameters color that match the ph ……
- **RESPIRATORY ACIDOSIS)**

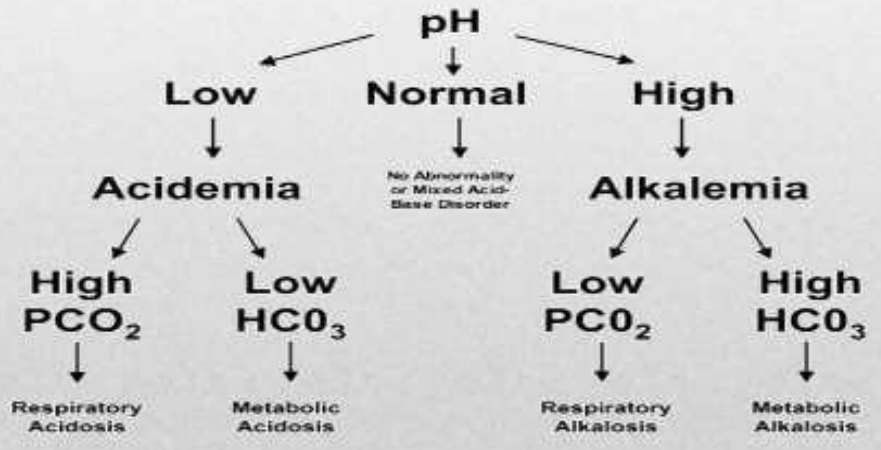
ABNORMAL VALUES

TEST	NORMAL	value ⇩	value ⇧
PH	7.35-7.45	ACIDOSIS	ALKALOSIS
PCO2	35-45	ALKALOSIS	ACIDOSIS
HCO3	22-26	ACIDOSIS	ALKALOSIS
PO2	80-100	HYPOXEMIA	O2 THERAPY
SAO2	95-100%	HYPOXEMIA	

INTERPRETATION

ABG Interpretation

Figure 1: Identifying the Primary Process



INTERPRETATION

pH	PCO_2	HCO3	Interpretation
Acid	Acidotic	Alk	Respiratory Acidosis
		Acid	Combined respiratory and metabolic Acidosis
	Alkalotic	Acid	Metabolic Acidosis
Alkali	Acidotic	Alk	Metabolic Alkalosis
	Alkalotic	Acid	Respiratory Alkalosis
		Alk	Combined Alkalosis


Thank You