BLOOD GAS EVALUATION
Worksheet for Review

COMPONENTS Review

pH	Hydrogen ion concentration in the blood
HCO_3	Plasma bicarbonate concentration
$PaCO_2$	Partial pressure of carbon dioxide in arterial blood
BE	Base excess is number of anions available in blood to help buffer changes
PaO_2	Partial pressure of O_2 in arterial blood
SaO_2	Percent of saturation of O_2 in the hemoglobin

What is the nurses role in drawing an ABG?

What is the Allen test?

NORMAL LAB VALUES:
Normal values at sea level

PaO_2	80-100 mm/Hg
$PaCO_2$	35-45 mm/Hg (Indicator of ventilation, lungs)
pH	7.35-7.45 (Blood acidity or alkalinity)
HCO_3	22-26 mEq/L, (Metabolic component, kidneys)
SaO_2	95-100%
BE	+2 - -2 mEq/L, + value = metabolic alkalosis; - value = metabolic acidosis Represents the amount of buffering ions in the blood. HCO^3 is the main ion. Takes all ions into account when determining acid/base balance in the metabolic component.)

ASSESSING OXYGENATION

Oxygenation of tissues measured with the PaO_2 and SaO_2.
3% of bloods oxygen is dissolved in plasma (measured by PaO_2). 97% is bound to hemoglobin (measured by SaO_2).

Key item : Adequate hemoglobin levels are essential for adequate oxygenation.
Ideally hemoglobin is 100% saturated

- SaO_2 of 95%-100% is normal
- PaO_2 80-100 considered normal for a healthy person under the age of 60 who is breathing at sea level.

Factors to consider with PaO_2 :

- Is there a history of chronic respiratory problems? Chronic respiratory disease increases hemoglobin levels and increases the O_2 carrying capacity.
- Is there an exogenous source of O_2 being administered?
- What is the altitude where you live? The higher the altitude, less O_2 is in the air. Normally the body compensates
- Cardiac output status? Body must have adequate cardiac output to pump oxygenated blood through the body.

ASSESSING RESPIRATORY ACIDOSIS

Acute problem

pH 7.25	_____
$PaC0_2$ 65	_____
$HC0_3$ 26	_____
BE +2	_____

What is it?_____

Why?

Chronic problem

pH 7.34	_____
$PaC0_2$ 64	_____
$HC0_3$ 32	_____
BE +8	_____

What is it? _____

Why?

KEY ITEM: Respiratory acidosis reflects hypoventilation. Amount of CO_2 retained by the lungs.

Causes:

Acute	Chronic
pulmonary edema	emphysema
atelectasis	cystic fibrosis
foreign body	asthma
pneumothorax	
hemothorax	
O.D. sedatives	
cardiac arrest	
severe pneumonia	

Assessment?

Know patients history
Note level of consciousness
Note respiratory rate and depth

S/S?

Confusion, dizziness, hypoventilation, palpitations, tachycardia, flushed skin, seizures, lethargy, stupor

Treatment?

Correct the underlying cause
Improve ventilation
Consider bronchodilators, Oxygen

ASSESSING RESPIRATORY ALKALOSIS

Acute problem

pH 7.6 _____
$PaC0_2$ 25 _____
$HC0_3$ 24 _____
BE 0 _____

What is it? _____
Why?

Chronic problem

pH 7.49 _____
$PaCO_2$ 25 _____
HCO_3 19 _____
BE -5 _____

What is it? _____
Why?

KEY ITEM: Respiratory alkalosis is triggered by hyperventilation (emotions, pain, ventilator hyperventilation. The most common cause is hypoxemia from pulmonary disorders

Causes:

anxiety
hypoxemia (low oxygen stimulates respiratory center in medulla to increase rate and depth of respiration)
high fever
pain
pulmonary emboli

Assessment?

C/O light headedness
Inability to concentrate
Hyperventilation syndrome - numbness, tingling

Treatment?

Correct the underlying cause
Breathe slowly - paper bag accumulate CO2

METABOLIC ACIDOSIS

Acute problem

pH 7.28	_____
$PaC0_2$ 40	_____
$HC0_3$ 15	_____
BE -9	_____

What is it? _____

Chronic problem

pH 7.34	_____
$PaC0_2$ 30	_____
$HC0_3$ 15	_____
BE -9	_____

What is it? _____

KEY ITEM: Metabolic Acidosis may stem from:

1) Pts kidneys inability to remove excess H+
2) Loss of HCO_3 by GI tract

* Respiratory compensation quick

Causes:

diarrhea
diabetic ketoacidosis
starvational ketoacidosis
alcohol ketoacidosis
renal failure
aspirin overdose

Assessment?

Know patients history
(Diabetic [↑ acid] , frequent diarrhea [↓ HCO_3])

S/S?

Confusion, drowsiness, respiratory rate and depth ↑.
arrhythmias
(Serum K+ ↑). Attempting to raise extracelluler pH, the body exchanges intracellular K+ for serum H+, increasing K+ in blood stream and amount of H+ in the cells)

Treatment?

Correct the underlying condition
Consider sodium bicarbonate

METABOLIC ALKALOSIS

Acute problem

pH 7.51	_____
$PaCO_2$ 40	_____
HCO_3 32	_____
BE +8	_____

What is it?_____

Chronic problem

pH 7.46	_____
$PaCO_2$ 46	_____
HCO_3 32	_____
BE +8	_____

What is it? _____

KEY ITEM: Caused by disturbances leading to an increase in HCO_3 or a decrease in body acids.
Lungs slow down, retain CO_2 to correct the pH

Causes:

vomiting or gastric suction
hypokalemia
Cushing's syndrome
alkali ingestion
Administration of sodium bicarbonate

Assessment?

C/O dizziness, tingling of fingers and toes
Circumoral paresthesia
Hypoventilation (compensatory)
Confusion, stupor

Treatment?

Correct the underlying condition
Consider IV fluids

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