

RESPIRATORY

NURSING STUDY NOTES

Respiratory nursing bundle



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RESPIRATORY OVERVIEW

UPPER RESPIRATORY TRACT FUNCTIONS

Located **outside** the chest cavity

NOSE

Warms, humidifies & filters air

SINUSES

Air-filled spaces that produce mucous to keep nose moist

PHARYNX

Passage of food & air to lungs & digestive system

LARYNX

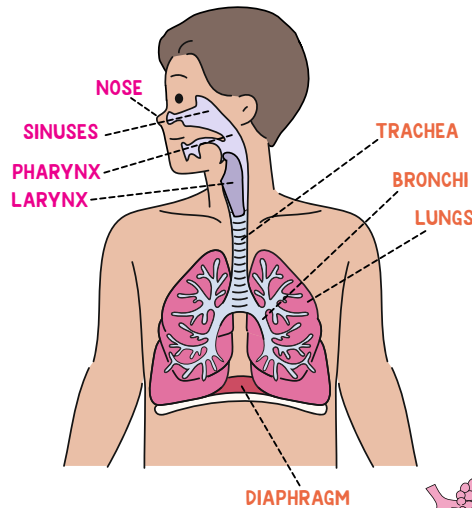
Contains **VOCAL CORDS & EPIGLOTTIS**:

VOCAL CORDS:

Produces sound for speech

EPIGLOTTIS:

Covers vocal cords during swallowing



LOWER RESPIRATORY TRACT FUNCTIONS

Located **inside** the chest cavity

TRACHEA

Airway that carries O₂ to lungs

BRONCHI

Distributes air throughout lungs to bronchioles & alveoli

Right bronchus is **wider, shorter & more vertical**
MORE PRONE TO ASPIRATION

LUNGS

Supplies O₂ to body & exhales CO₂

DIAPHRAGM

Muscle used for inhaling & exhaling

ALVEOLI

Air sacs where gas exchange occurs

STEPS of GAS EXCHANGE

VENTILATION

Act of breathing air in & out of the lungs

Inhale **O₂** & exhale **CO₂**

CELL EXCHANGE

Diffusion of **O₂** & **CO₂** takes place on the cellular level

O₂ goes into cell & **CO₂** leaves the cell

CIRCULATION

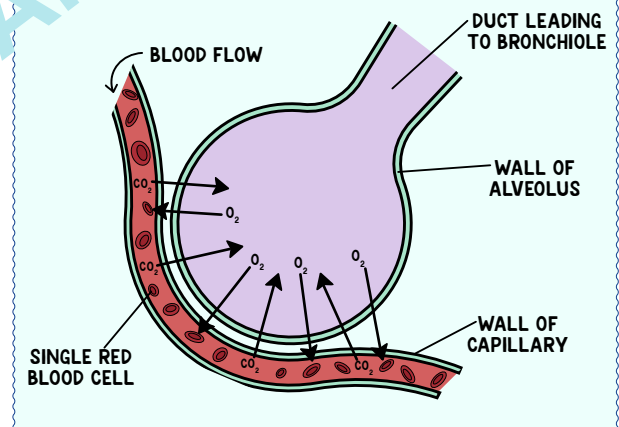
Transport of **oxygenated blood** to the peripheries & the rest of the body

DIFFUSION

O₂ diffuses from alveoli to move to capillaries (rest of body)

CO₂ diffuses from capillaries to alveoli to be exhaled

ALVEOLUS GAS EXCHANGE



BREATHING MECHANICS

INSPIRATION

- ▶ When you **inhale** (breathe in)
- ▶ Diaphragm **contracts** (moves down)
- ▶ Allows **oxygen** to flow into the lungs
- ▶ Intrapulmonary pressure < atmospheric pressure

EXPIRATION

- ▶ When you **exhale** (breathe out)
- ▶ Diaphragm **relaxes** (moves up)
- ▶ Allows **carbon dioxide** to leave the lungs
- ▶ Intrapulmonary pressure > atmospheric pressure

Air moves from **HIGH PRESSURE** to **LOW PRESSURE**

FI_{O2}

FRACTION OF INSPIRED OXYGEN

Air you **breathe in**

ROOM AIR= 21%

Each liter of oxygen adds about 4%

EXAMPLES:

1L= 24%
2L=28%
3L=32%

PA_{O2}

PARTIAL PRESSURE OF OXYGEN

O₂ pressure in arterial blood

NORMAL RANGE:
80-100 mmHg

HYPOXEMIA

Means low O₂ in the **blood**

SA_{O2}

ARTERIAL OXYGEN SATURATION

O₂ saturation in arterial blood

NORMAL RANGE:
94-100%

HYPOXIA

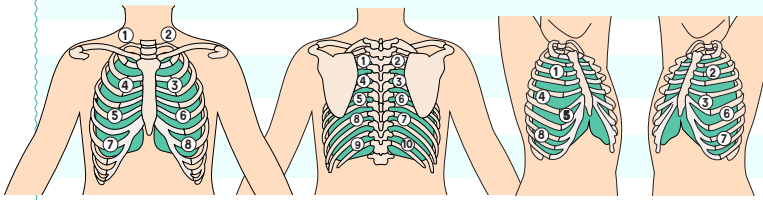
Means low O₂ in the **tissues**

SP_{O2}

is arterial oxygen saturation measured by pulse oximeter

RESPIRATORY ASSESSMENT

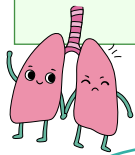
AUSCULTATING LUNG SOUNDS



- ★ Ask patient to sit upright and rest arms on lap
- ★ Try to listen in a quiet environment (turn off TV if on)
- ★ Instruct to take deep breaths
- ★ Listen on bare skin (not on clothing)
- ★ Listen on inhale and exhale
- ★ Auscultate the front, back and both sides of the chest
- ★ Listen from top to bottom

NORMAL LUNG SOUNDS

BRONCHIAL/TRACHEAL	BRONCHOVESICULAR	VESICULAR
SOUNDS: ► High ► Loud ► Shallow LOCATION: Trachea & larynx	SOUNDS: ► Medium pitched ► Hollow LOCATION: Anterior: 1st & 2nd intercostal space Posterior: Between scapulae	SOUNDS: ► Soft ► Low LOCATION: Anterior & posterior over most of lungs



HYPOXIA

Decreased O₂ supply to tissue & cells

EARLY SIGNS:

- Restlessness
- Anxiety
- Tachycardia
- Tachypnea

IMMEDIATE NURSING INTERVENTIONS

- Raise head of bed
- Administer oxygen
- Provide oral suctioning
- Pain meds or reposition if from pain
- Assess need for resp. treatments
- Ensure pulse oximeter is **accurate!**

ADVENTITIOUS LUNG SOUNDS

TYPE	SOUNDS LIKE:	CAUSED BY:	CONDITIONS:
WHEEZING	High pitched "f. whistling flute"	Narrowed airway or bronchoconstriction	→ Asthma → COPD
FINE CRACKLES	High pitched crackling (rubbing hair between fingers)	Inflammation of lungs	→ Pneumonia → Bronchitis
COARSE CRACKLES	Low pitched crackling (pulling apart velcro)		→ Asthma → Emphysema
RHONCHI	Low rattling/ rumbling (snoring)	Fluid & secretions in airway	→ URI → Pneumonia
STRIDOR	High pitched inspiratory whistle (seal barking)	Upper airway narrowed or obstructed	→ Foreign body → Croup → Epiglottitis
PLEURAL FRICTION RUB	Low pitched dry rubbing (Walking on creaky floor)	Pleural layers rubbing against each other from inflammation	→ Lung cancer → Pneumonia → Emphysema

FACTORS AFFECTING PULSE OX ACCURACY

- Nail polish
- Poor circulation
- Cold fingers
- Patient movement
- Poor placement

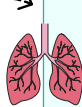
LATE SIGNS:

- Bradycardia
- Extreme restlessness
- Dyspnea
- Hypotension
- Cyanosis

EMERGENCY!

- **Notify MD immediately**
- **Complete interventions above**
- **Call rapid response**
- **Do NOT leave patient!**

ARTERIAL BLOOD GAS BASICS

VALUE	WHAT IS IT?	REGULATED BY:	NORMAL RANGE
 PH	Measures acid-base balance in body	LUNGS & KIDNEYS	7.35–7.45
 CO2	Amount of carbon dioxide in the blood	LUNGS	35–45 MMHG
 HCO3	Amount of bicarbonate in the blood	KIDNEYS	22–26 MEQ / L
PAO2	Amount of oxygen in the blood	LUNGS	80–100 MMHG

THINK **CO2** FOR **ACID**

THINK **BASE** FOR **BICARBONATE**

MEMORY TRICK

Once you remember 7.35–7.45, just drop the 7 to get 35–45 for CO2

LUNGS are above **KIDNEYS** so think **CO2** above **HCO3**

NOT USED TO DETERMINE ABG; JUST MEASURES OXYGENATION STATUS

INTERPRETING AN ABG

1 IS THE PH **ACIDOTIC (ACID)** OR **ALKALOTIC (BASIC)**?

Pair this with the above memory trick to remember which values are acidic & which are basic

Write out the numbers & match the values to the corresponding side

To remember which is which:
USE ABA & BAB

A	PH	<7.35	>7.45	B
B	CO2	<35	>45	A
A	HCO3	<22	>26	B

A=ACID

B=BASE

2 IS THE CO2 **HIGH** OR **LOW**? USE THE ABA & BAB TABLE

<35 (low CO2) = **BASIC**

>45 (high CO2) = **ACIDIC**

3 IS THE BICARB **HIGH** OR **LOW**? USE THE ABA & BAB TABLE

<22 (low HCO3) = **ACIDIC**

>26 (high HCO3) = **BASIC**

4 IS IT **RESPIRATORY** OR **METABOLIC** IN NATURE?

USE THE TIC-TAC-TOE METHOD

If pH & CO2 in same column, it is **respiratory** in nature

If pH & HCO3 in same column, it is **metabolic** in nature

IF THE PH IS **NORMAL**, DETERMINE IF IT'S CLOSER TO **ACIDOSIS** OR **ALKALOSIS**

TIC-TAC-TOE METHOD EXAMPLE

ACIDIC	NORMAL	BASIC
7.31 (PH)		28 (HCO3)
67 (CO2)		

This example is **respiratory** in nature

5 IS IT COMPENSATED?

If pH is out of range and CO2 or HCO3 is in range
UNCOMPENSATED

If all three values are out of range
PARTIALLY COMPENSATED

If pH is normal
FULLY COMPENSATED