



الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Workshop On Critical Care Outreach Services To Community Care Nurses and Medical Assistant:

**ICU survivor's facing with risk of cardiovascular and respiratory
problem: What should you do as healthcare provider?**



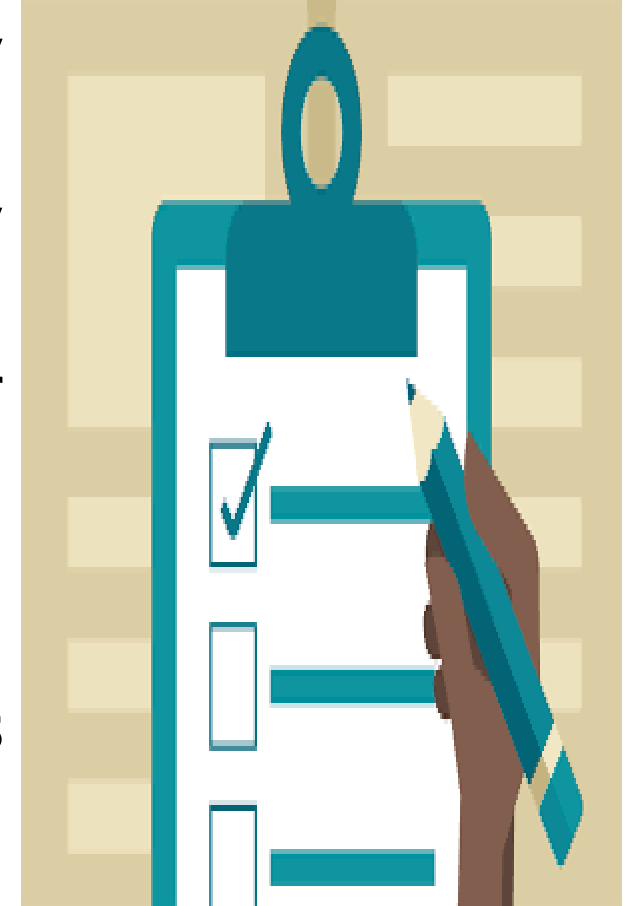
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Outlines

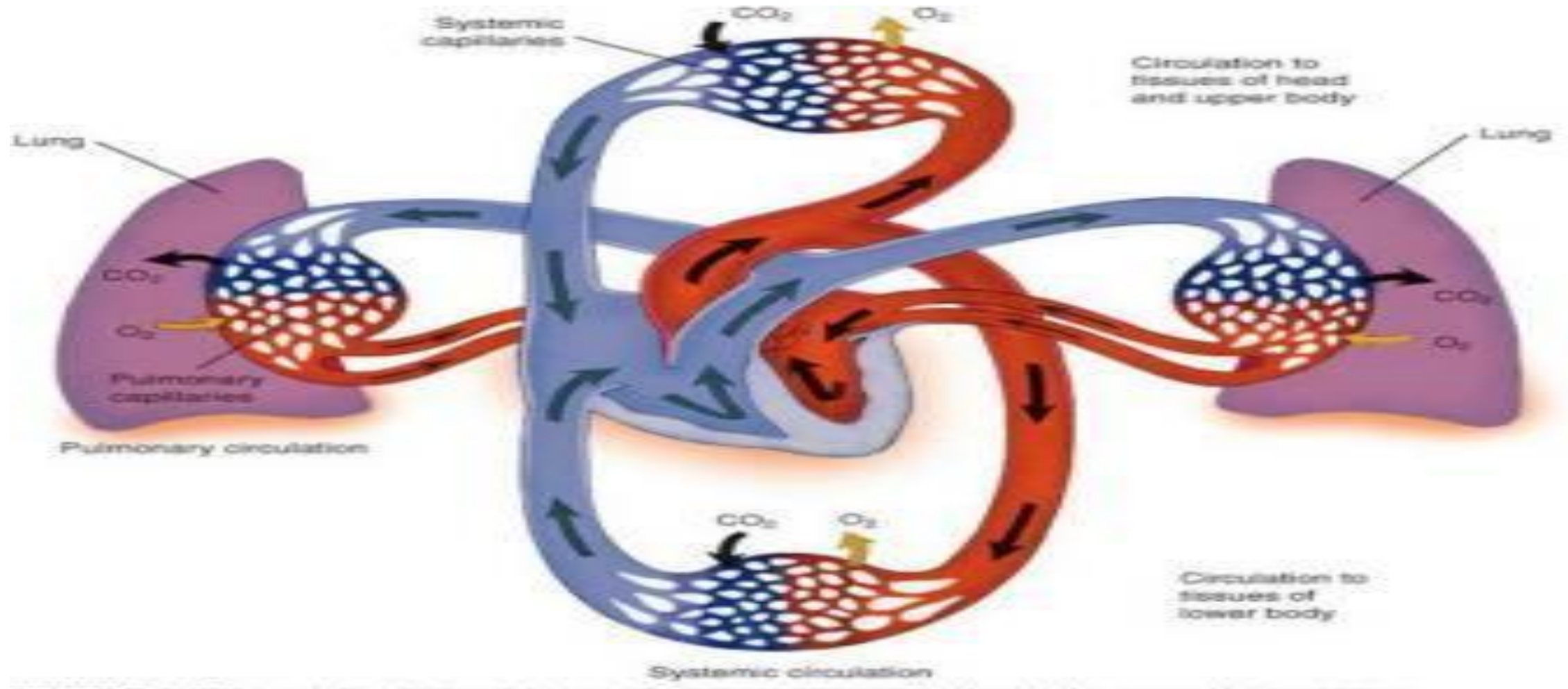
1. Cardiac disturbances - palpitation/irregular beat
2. Ventilation/ oxygenation - portable ventilator, O2
3. Tracheostomy care
4. Suctioning nasal, mouth
5. Physiotherapy – Chest

Learning Objectives

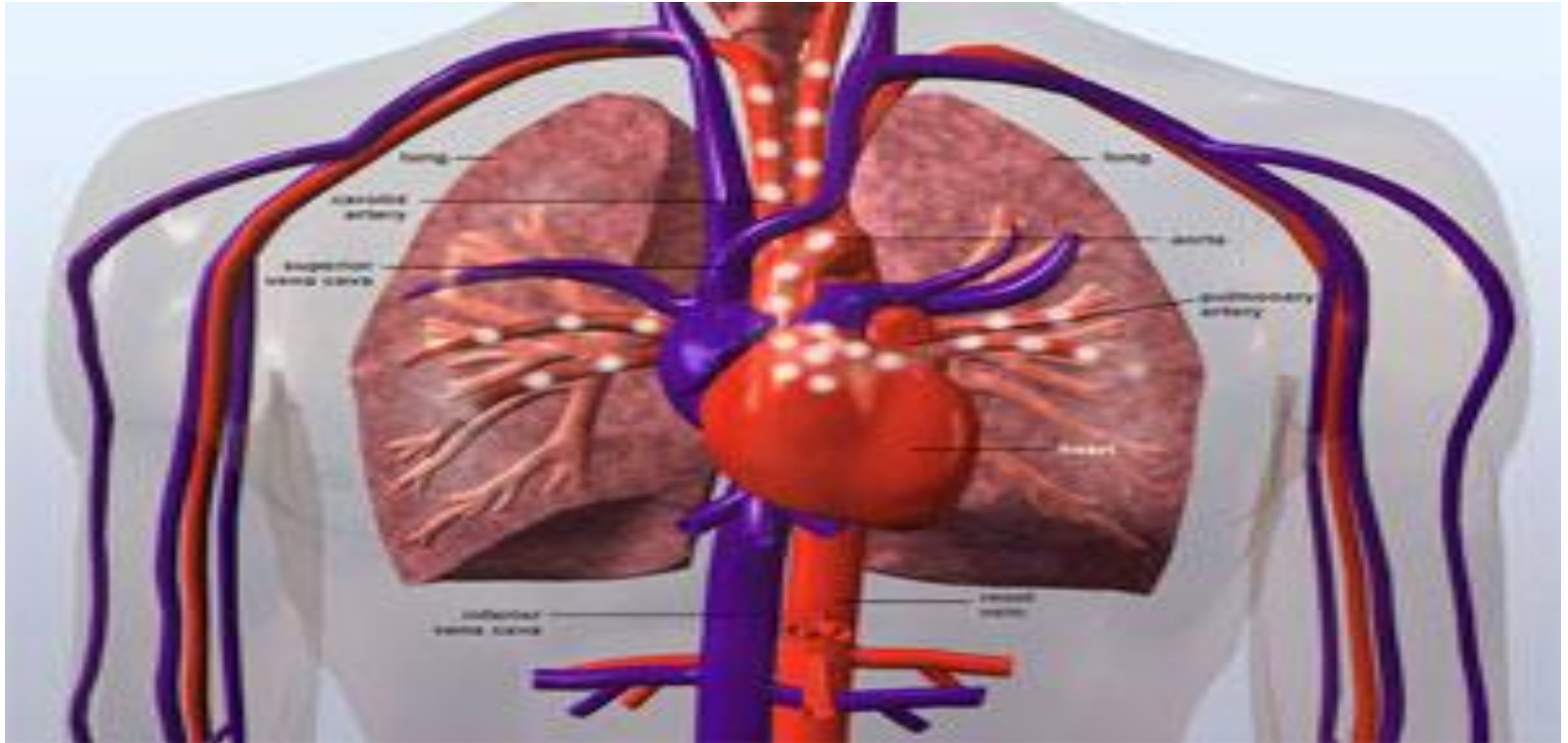
- Revisit the overview of systemic and pulmonary circulation.
- Revisit the anatomy of the cardiovascular and respiratory system.
- Discuss the common diseases related to cardiovascular and respiratory system.
- Identify the treatment related to cardiovascular and respiratory problems.
- Discuss the nursing management for critical care survivors with cardiovascular and respiratory problems.
- Discuss the nursing intervention for client in rehabilitation stages.



Overview of systemic & pulmonary circulation

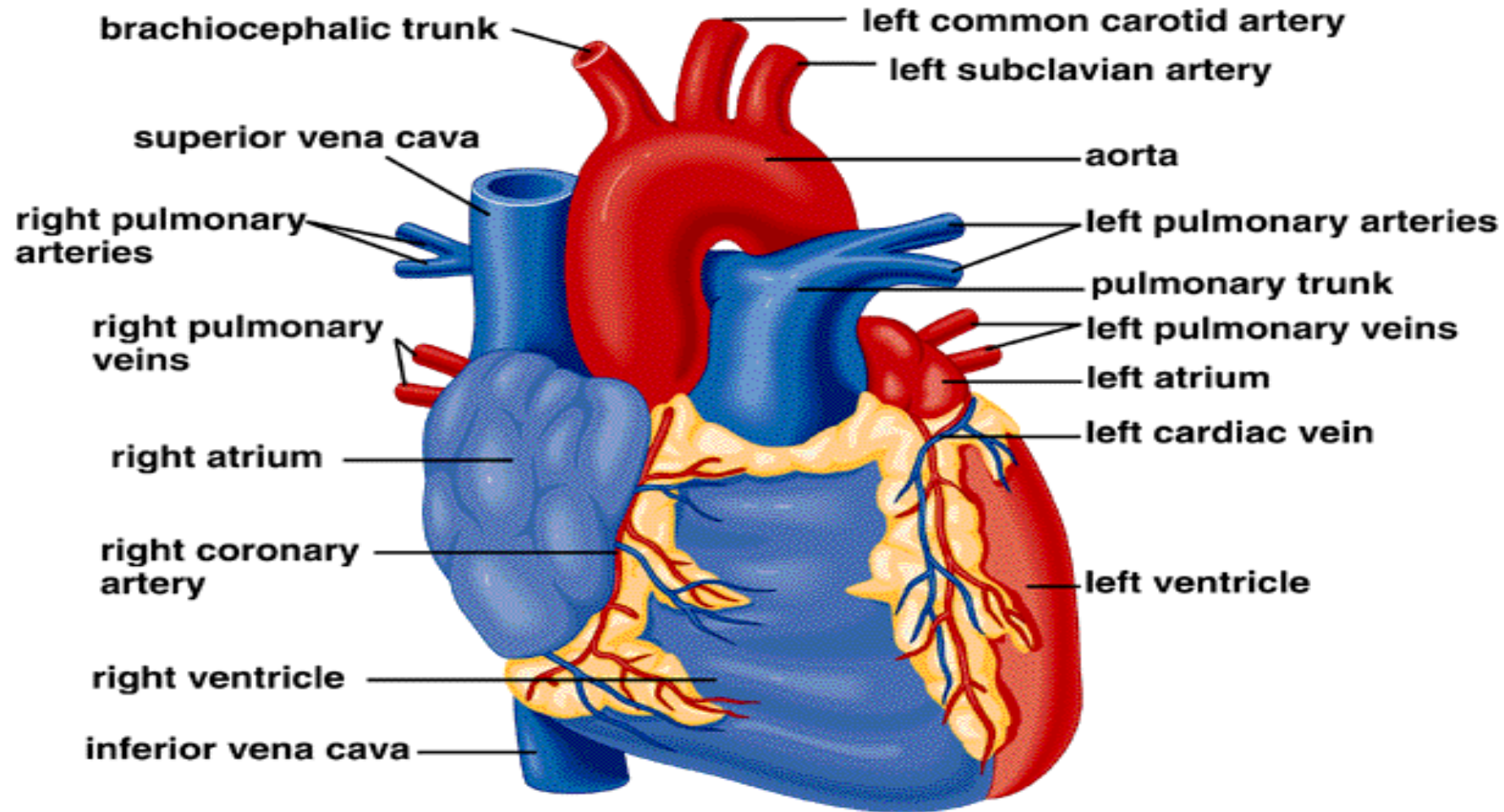


Anatomy of the cardiovascular and respiratory system



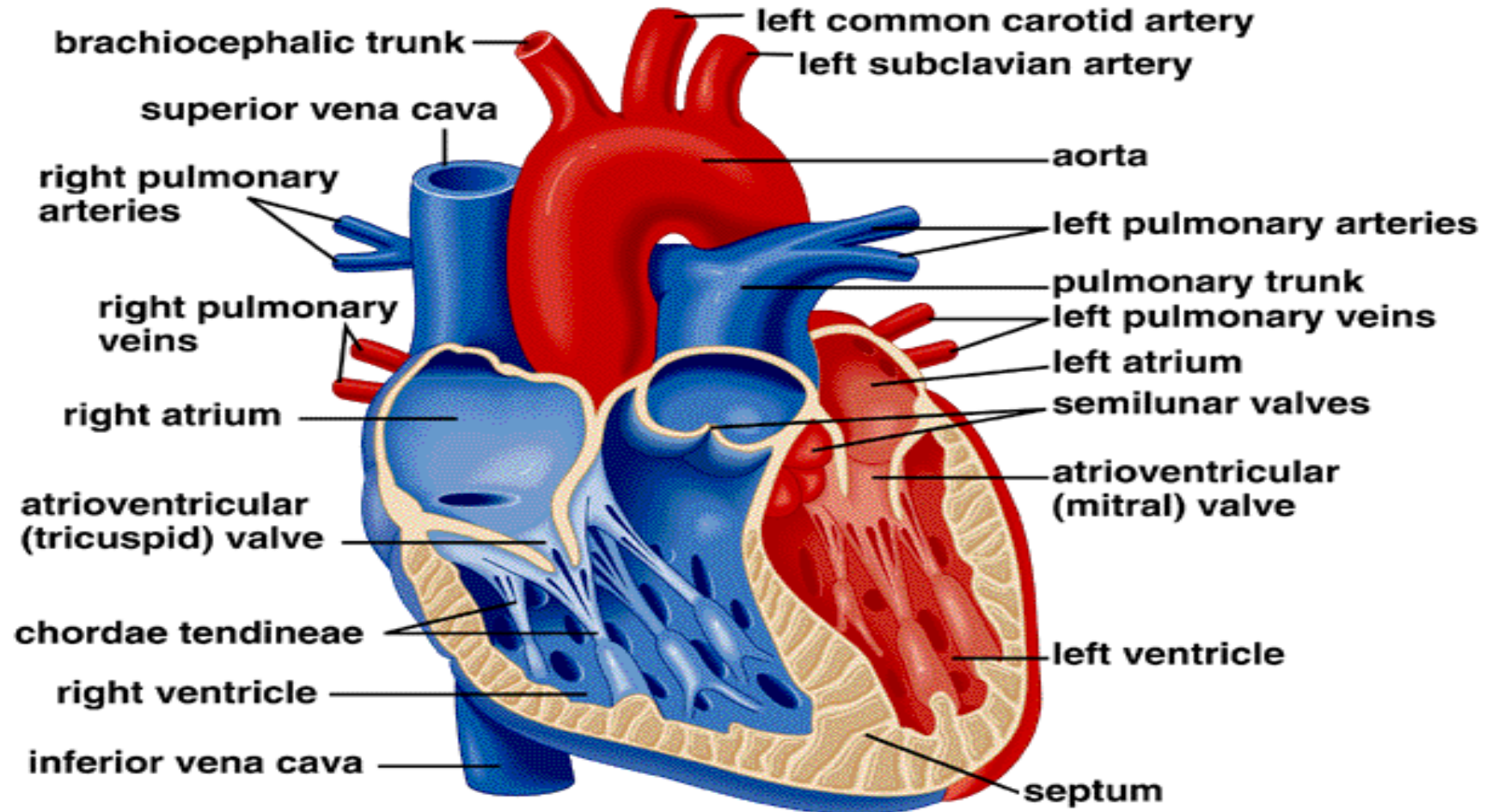
ANATOMY OF THE HEART

External Heart Anatomy



ANATOMY OF THE HEART

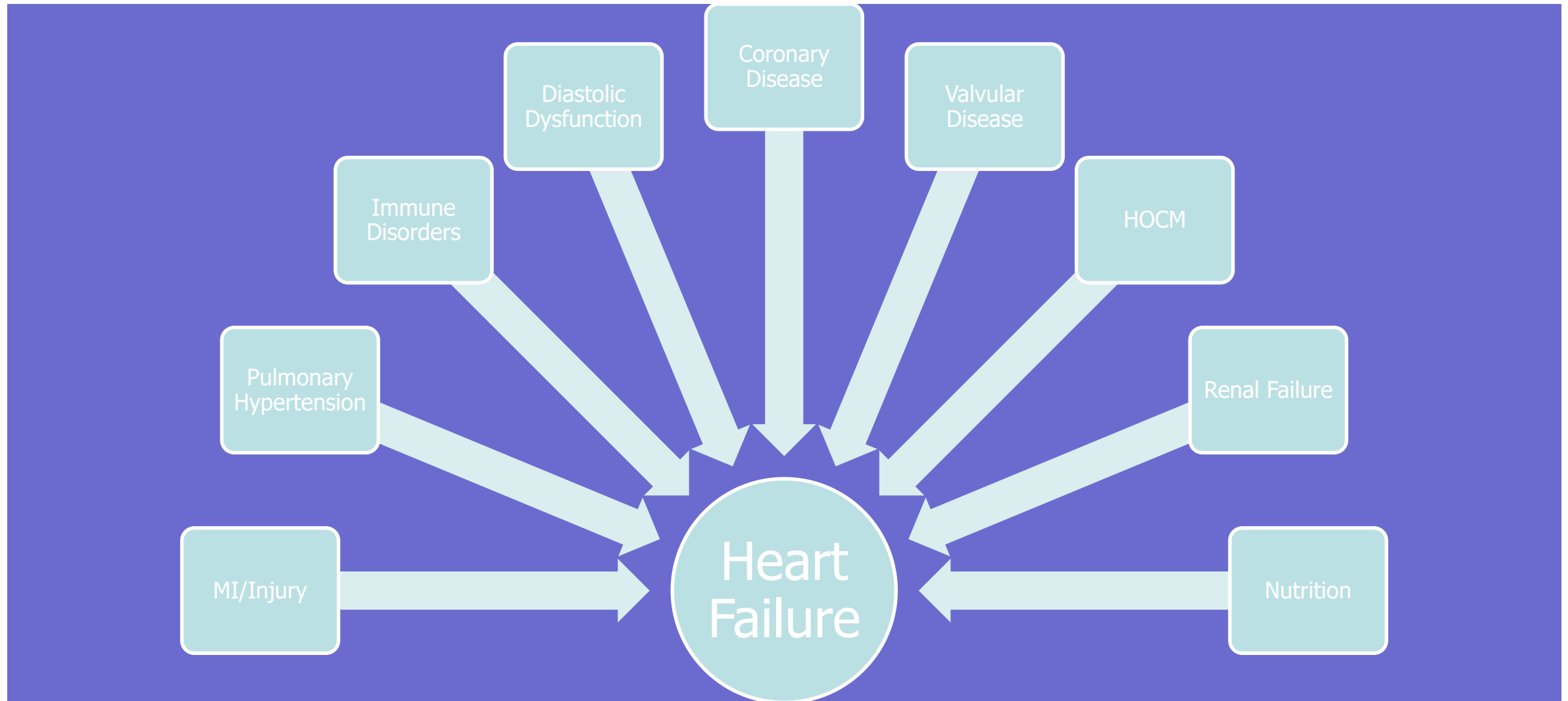
Internal View of Heart



Cardiovascular Disease

- Heart and blood vessel disease or cardiovascular disease
 - Ischaemic coronary artery disease e.g. MI, IHD
 - Vascular disorder e.g. DVT, PVD
 - Dysrhythmia **e.g. palpitation/irregular beat**
 - Congenital heart disease e.g. VSD, ASD
 - CVA, TIA
 - Cardiac failure

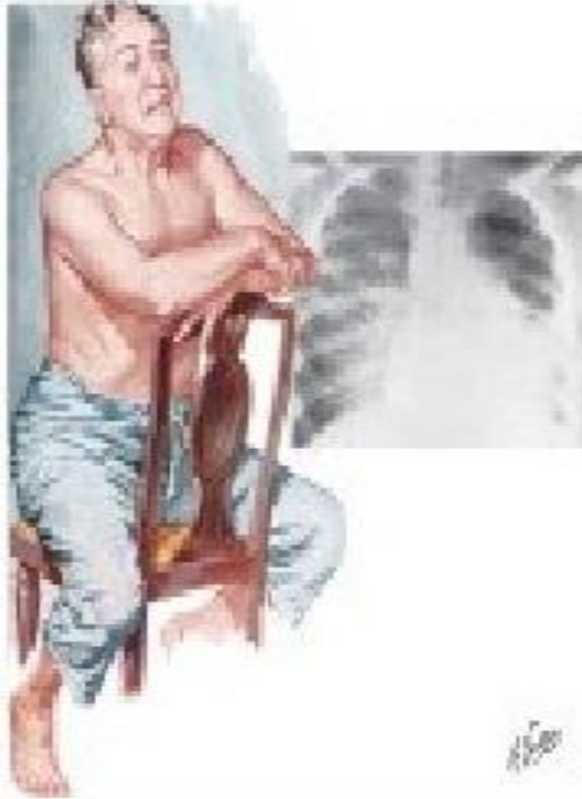
Challenges in Cardiac Patients



Patient experienced in Intensive Care Unit



Signs and symptoms of Rt-sided & Lt-sided ventricular failure



LEFT VENTRICULAR FAILURE

Pulmonary crackles

Tachypnea

S_3 gallop

Cardiac murmurs

Paradoxical splitting of S_2

RIGHT VENTRICULAR FAILURE

Jugular venous distention

Peripheral edema

Perioral and peripheral cyanosis

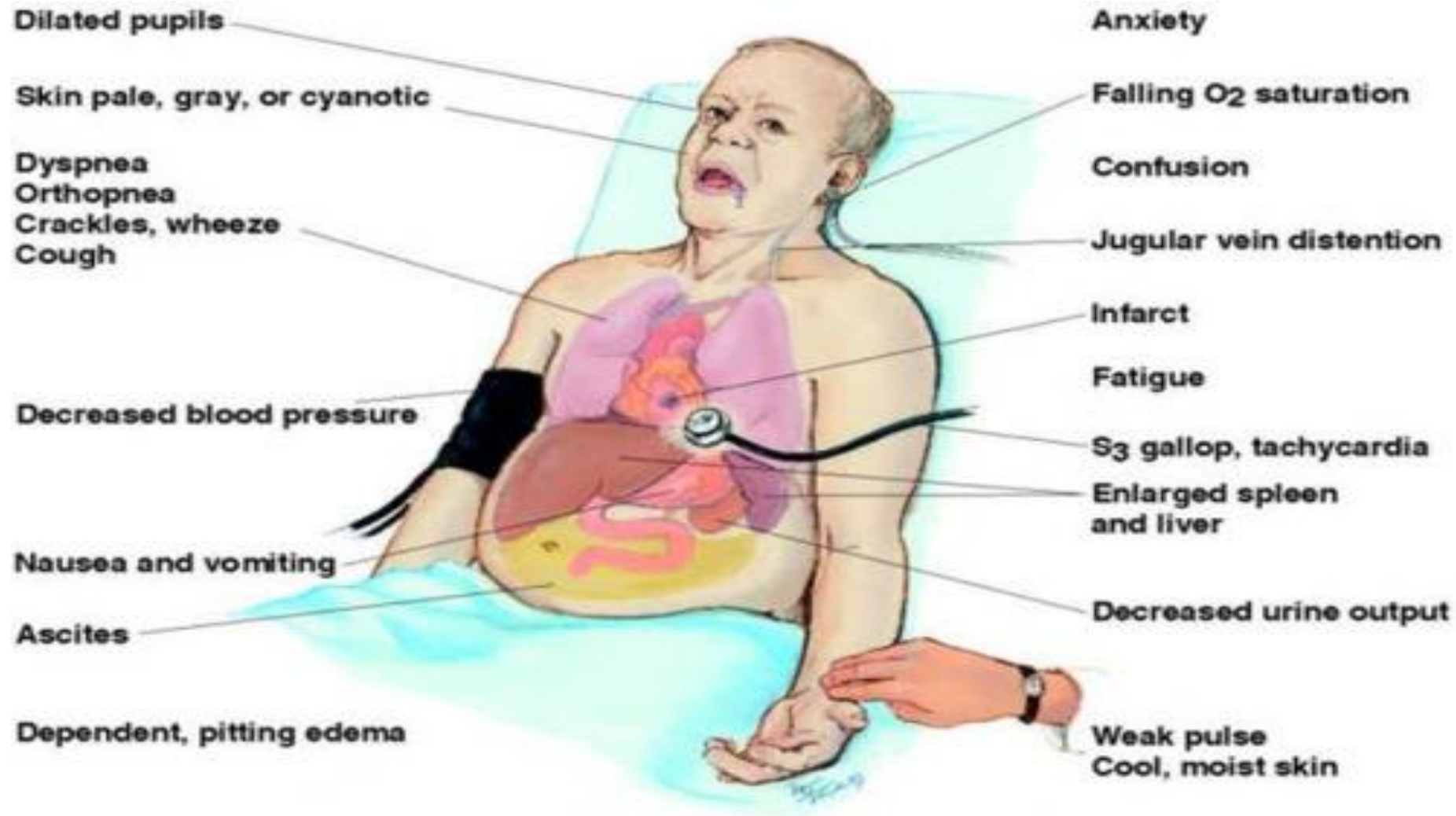
Congestive hepatomegaly

Ascites

Hepatojugular reflux



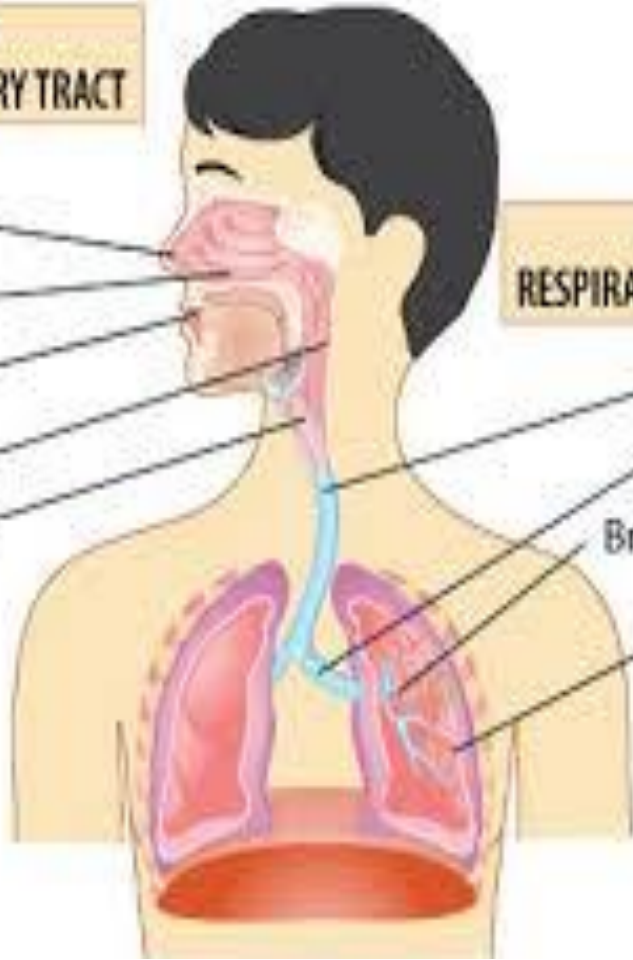
Signs and symptoms of CHF



Anatomical Overview of Respiratory System

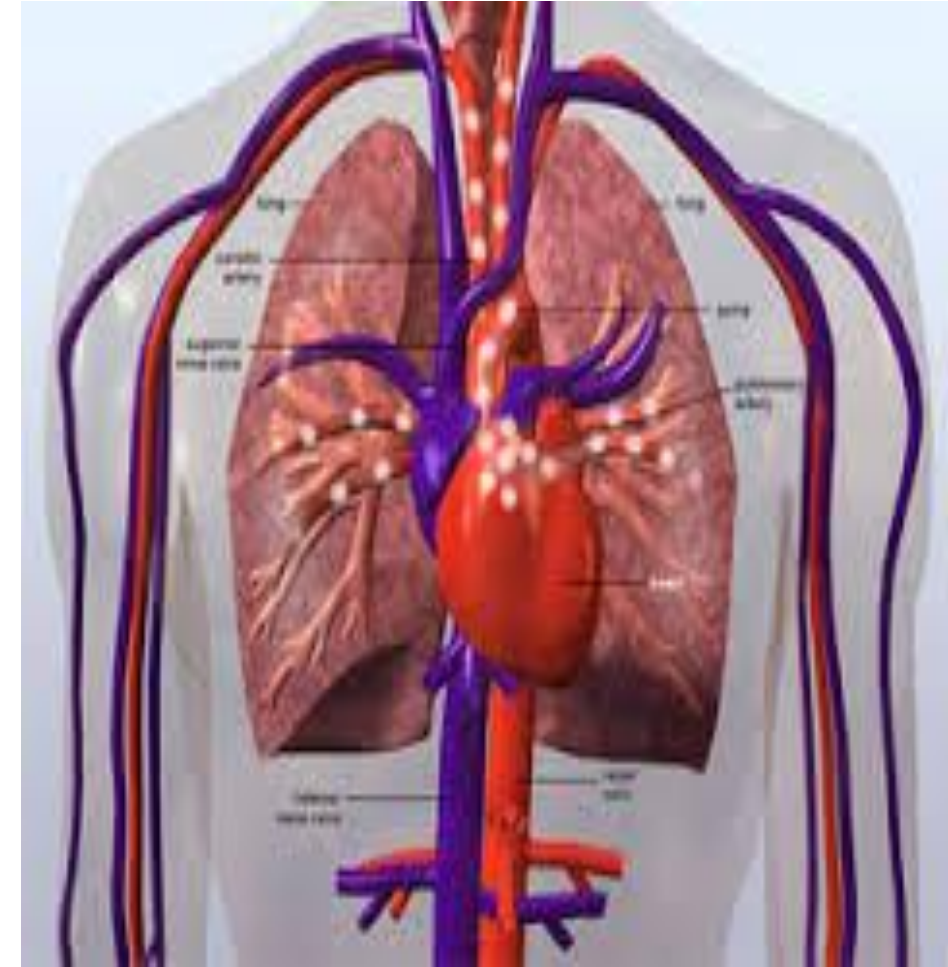
THE UPPER RESPIRATORY TRACT

Nose
Sinuses
Mouth
Pharynx
Larynx



THE LOWER RESPIRATORY TRACT

Trachea
Bronchi
Bronchioles
Lungs



Respiratory Disease

- Diseases that affect the air passages, including the nasal passages, the bronchi and the lungs.
- They range from **acute infections**
 - **pneumonia and bronchitis**
- **Chronic conditions**
 - **asthma and chronic obstructive pulmonary disease.**

Signs and symptoms of respiratory failure

- Most people with acute failure of the lungs and low oxygen levels will experience:
 - an inability to breathe.
 - bluish coloration in the skin, fingertips, or lips.
 - restlessness.
 - anxiety.
 - confusion.
 - altered consciousness.
 - rapid, shallow breathing.
 - tachycardia (racing heart).

Functional Decline Related to ICU Stay

Long Term Problem

–3.3 year median follow up after d/c from trauma ICU 100 patients

- 70% consider themselves less active than pre-injury
- 49% returned to work.

Livingston DH, Tripp T, Biggs C, Lavery RF (2009).

More than 6 years after a surgical ICU admission, **HRQOL is largely reduced**. Many patients still have a variety of health problems, including decreased cognitive functioning.

Timmers, T. K., M. H. Verhofstad, et al. (2011).

Consider the Patient Physiologic Reserve, their Personal Fitness Account



Did this patient walk into your hospital?

What has the patient done in the past 2 days, 2 weeks, 2 months, 2 years?

What are your assumptions?

In Summary

Critical illness is catabolic and depleting, rapidly and potentially lasting for years

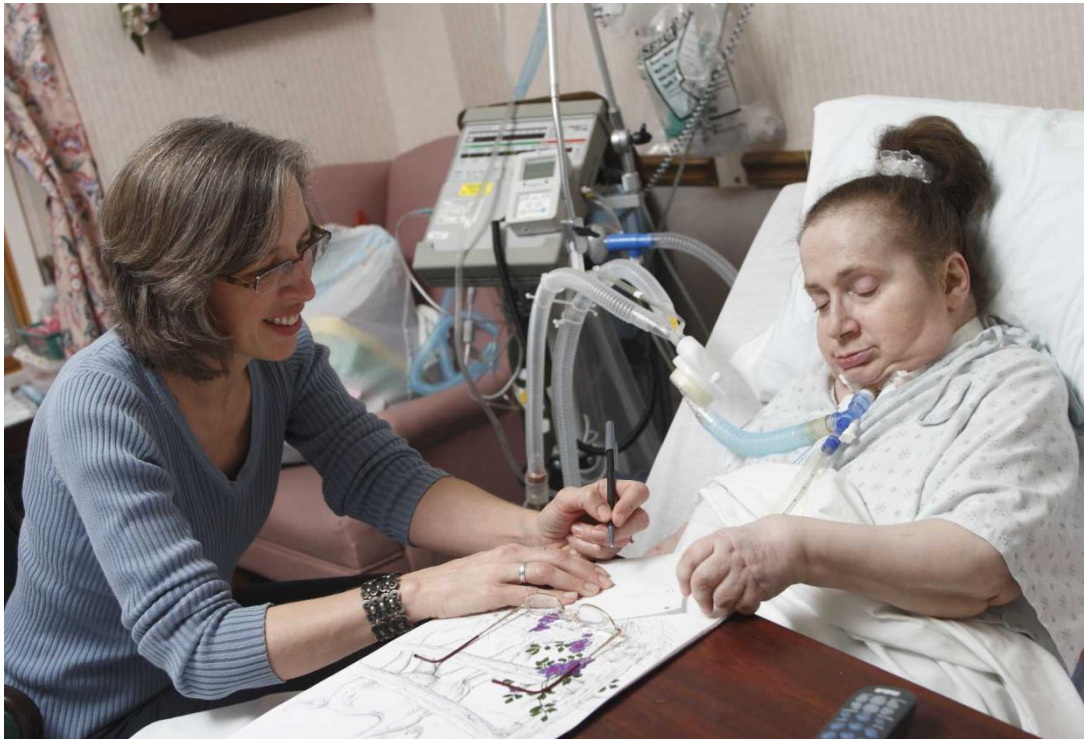
A prolonged ICU stay can cause delirium and cognitive changes for most patients

Mobility (mostly walking) combined with minimal or no sedation started at the beginning of an ICU stay is protective and preventative
Approach the task with structured QI project, collaboration, barrier identification



Oxygenation

Ventilator via tracheostomy



Ventilator via ETT



Oxygenation

Portable Oxygen



Hemodynamic Monitoring in Critical Illness Survivors with Cardiovascular & Respiratory Problem

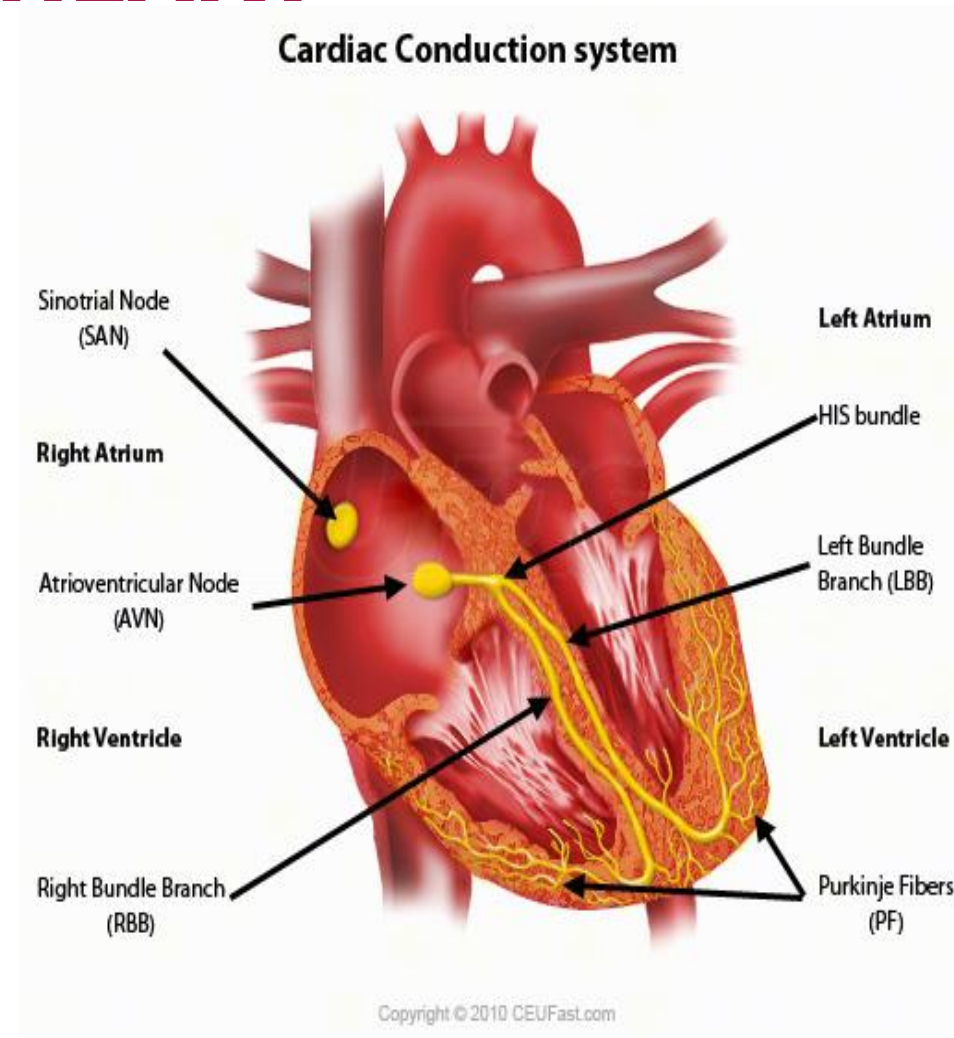
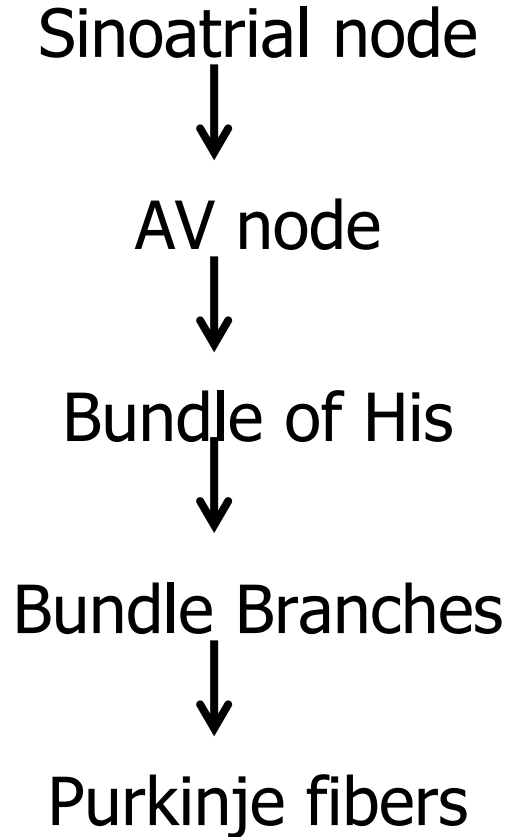
Vital signs

- BP
- RR
- HR/PR
- MAP
- SPO2
- Pain Score

Cardiac rate & rhythm with abnormal finding

- Auscultate heart rate
 - **>100 beats per minute (BPM) is tachycardia**
 - **< 60 BPM is bradycardia**
 - Dysrhythmias (abnormal heart rate or rhythm)
 - Rhythm: regular or irregular
 - Rate: slow or fast
- Palpate radial pulse & listen apical pulse simultaneously:
 - If radial pulse falls behind apical rate – **pulse deficit** (weak, ineffective contractions of left ventricle)

CONDUCTING SYSTEM OF THE HEART



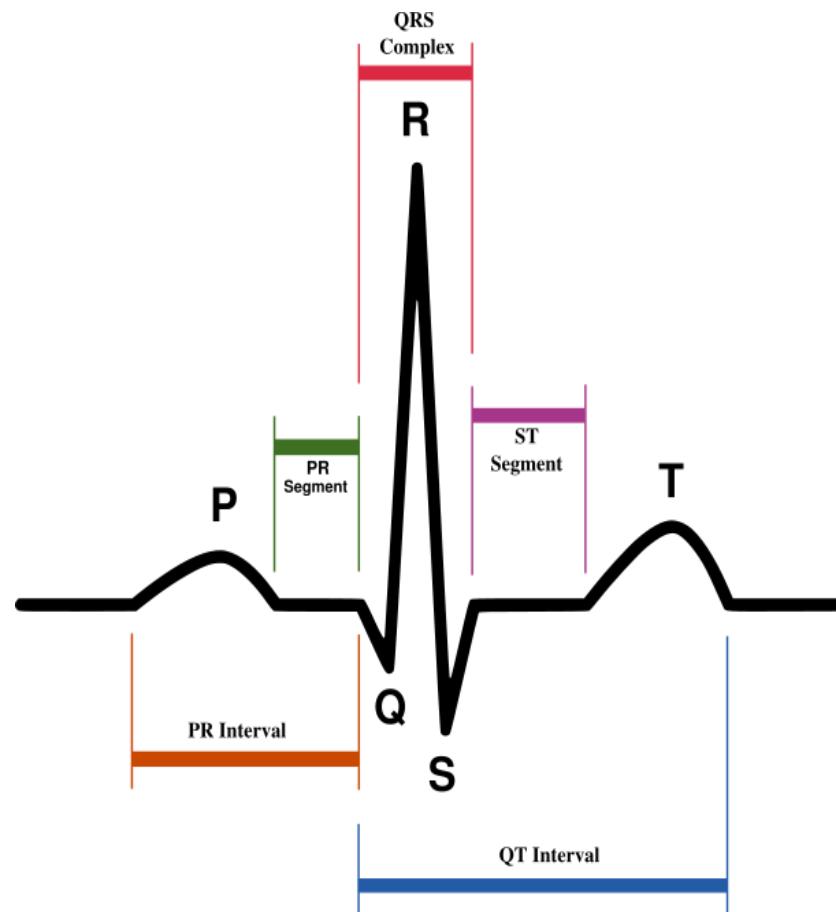
PACEMAKERS OF THE HEART

SA Node - **Dominant pacemaker** with an intrinsic rate of **60 - 100** beats/ minute.

AV Node - **Back-up pacemaker** with an intrinsic rate of **40 - 60** beats/minute.

Ventricular cells - **Back-up pacemaker** with an intrinsic rate of **20 - 45** beats/minute.

ELECTROPHYSIOLOGY



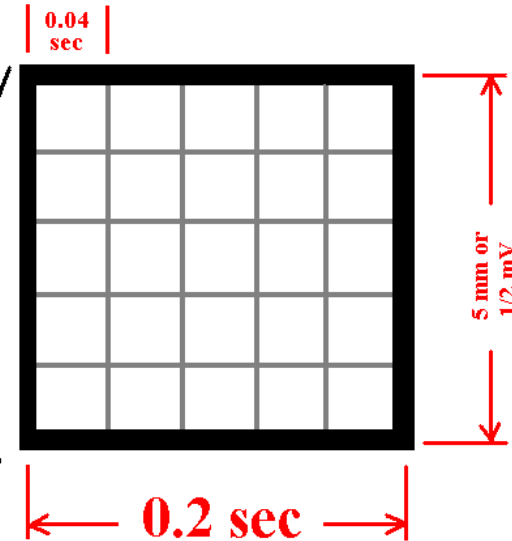
P wave = **Atrial depolarisation**
(*Contraction*)

QRS complex = **ventricular depolarisation**

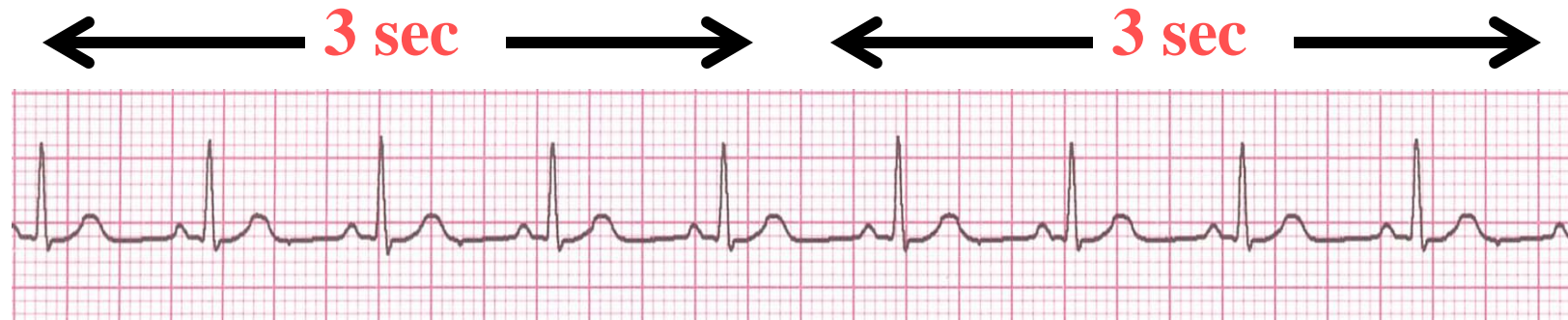
T wave = **repolarisation of the ventricles**

The ECG Paper

- Horizontally
 - One small box - 0.04 s
 - One large box - 0.20 s
- Vertically
 - One large box - 0.5 mV

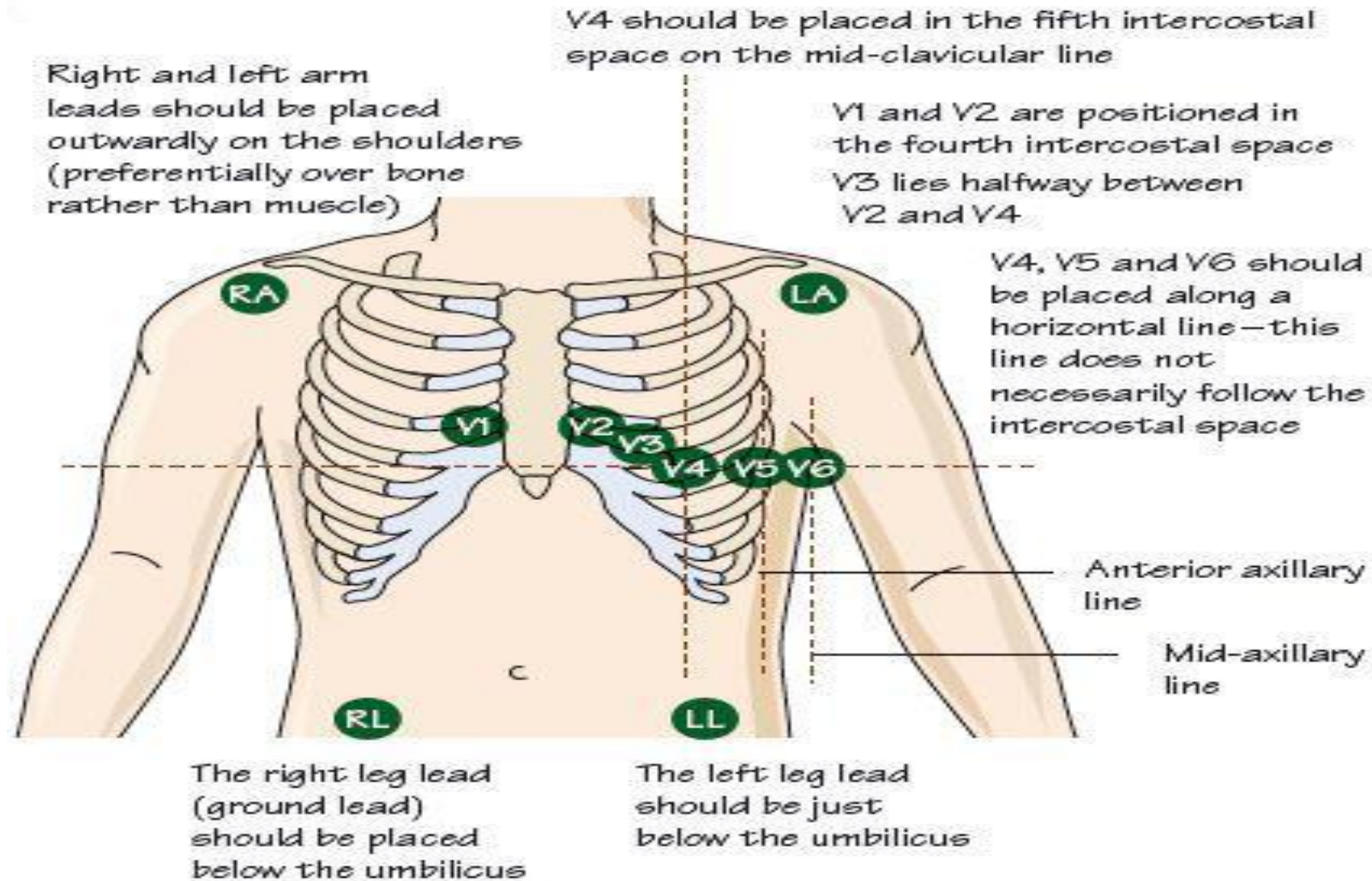


The ECG Paper (cont)



- Every 3 seconds (15 large boxes) is marked by a vertical line.
- This helps when calculating the heart rate.

Placement of Electrodes





ECG INTERPRETATION

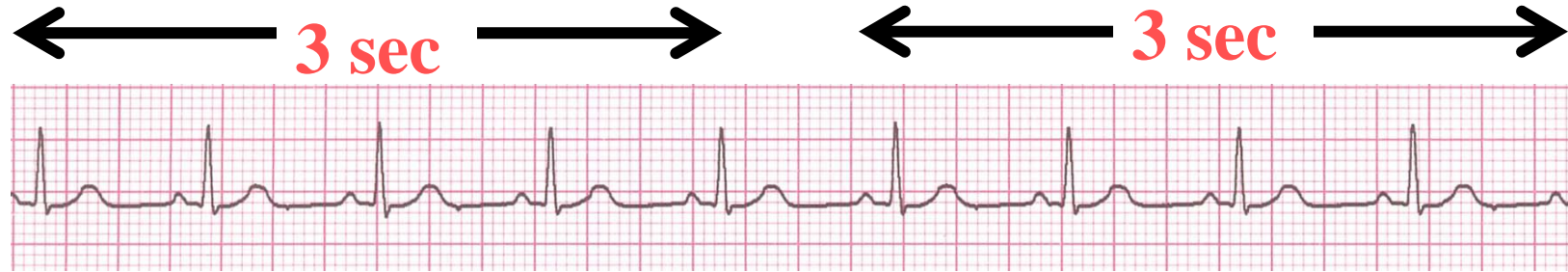
Really Very Easy
How to Analyze a Rhythm

Rhythm Analysis



- Step 1: Calculate rate.
- Step 2: Determine regularity.
- Step 3: Assess the P waves.
- Step 4: Determine PR interval.
- Step 5: Determine QRS duration.

Step 1: Calculate Rate

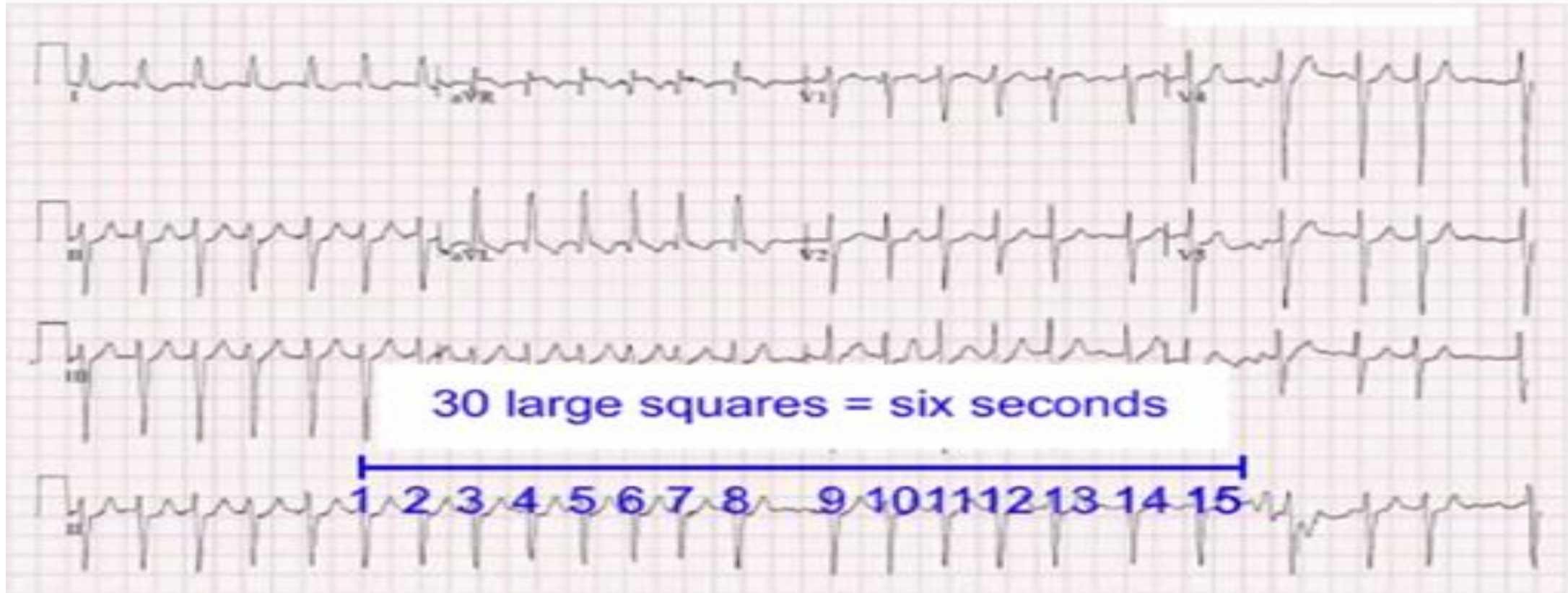


- Count the # of R waves in a 6 second rhythm strip, then multiply by 10.

* Interpretation?

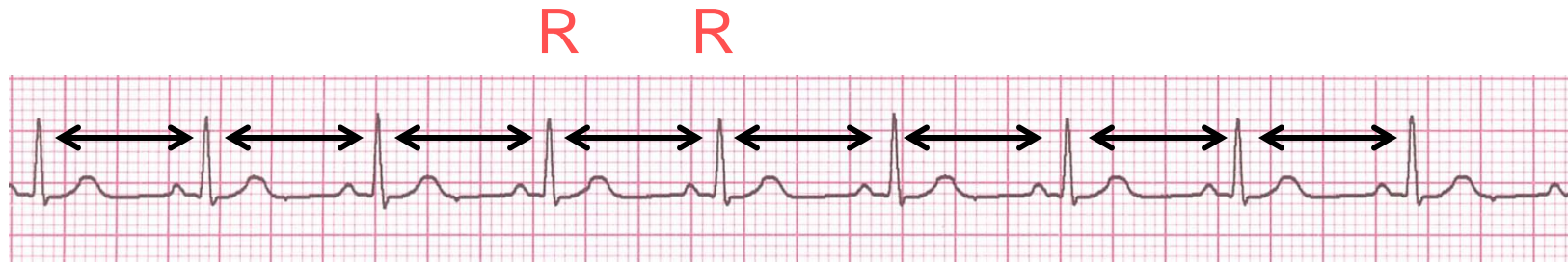
$$9 \times 10 = 90 \text{ bpm}$$

STEP 1: CALCULATE RATE



$$15 \times 10 = 150 \text{ bpm}$$

Step 2: Determine Regularity



- Look at the R-R distances (using a caliper or markings on a pen or paper).
- Regular (are they equidistant apart)?
Occasionally irregular? Regularly irregular?
Irregularly irregular?

Interpretation?

Regular

Step 3: Assess The P Waves



- Are there P waves?
- Do the P waves all look alike?
- Do the P waves occur at a regular rate?
- Is there one P wave before each QRS?

Interpretation?

Normal P waves with 1 P wave for every QRS

Step 4: Determine PR Interval



- Normal: 0.12 - 0.20 seconds.
(3 - 5 boxes)

Interpretation? *0.12 seconds*

Step 5: QRS Duration



- Normal: 0.04 - 0.12 seconds.
(1 - 3 boxes)

Interpretation? *0.08 seconds*

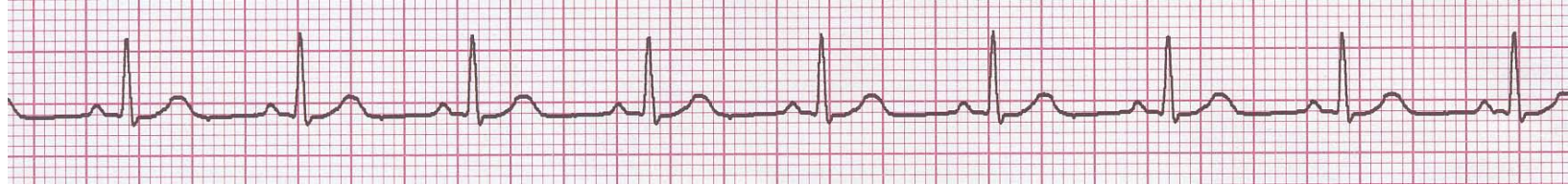
Rhythm Summary



- Rate 90 bpm
- Regularity regular
- P waves normal
- PR interval 0.12 s
- QRS duration 0.08 s

Interpretation? *Normal Sinus Rhythm*

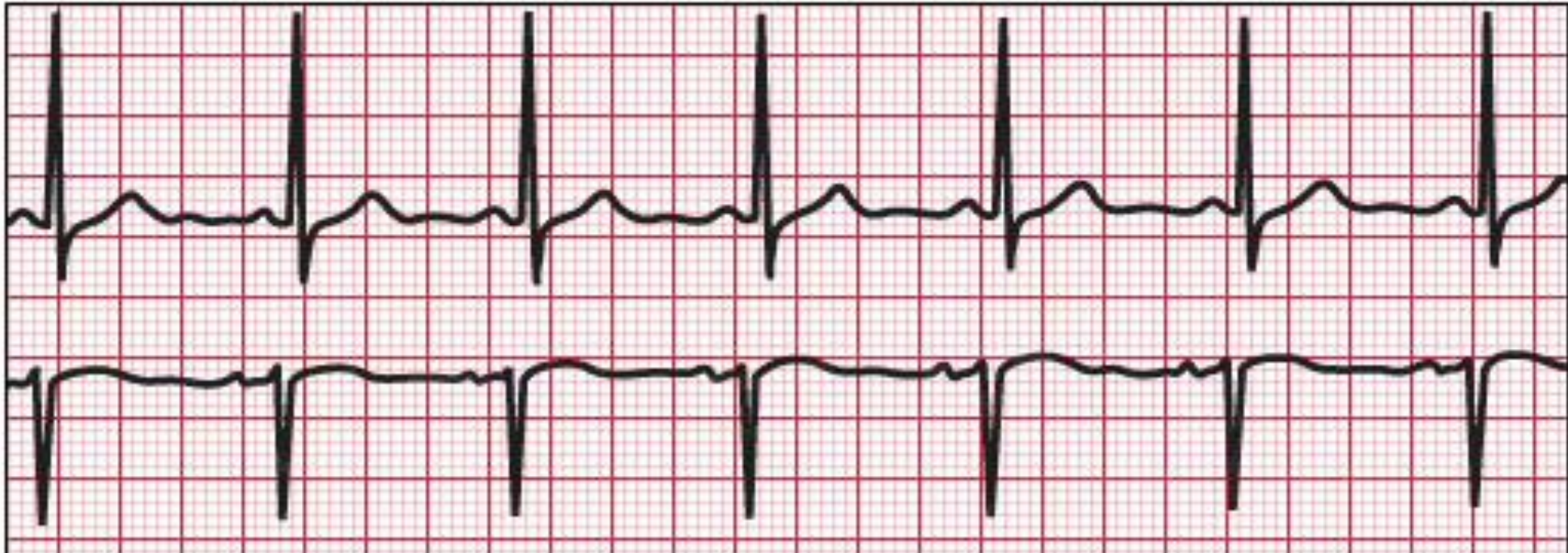
NSR Parameters



- Rate 60 - 100 bpm
- Regularity regular
- P waves normal
- PR interval 0.12 - 0.20 s
- QRS duration 0.04 - 0.12 s

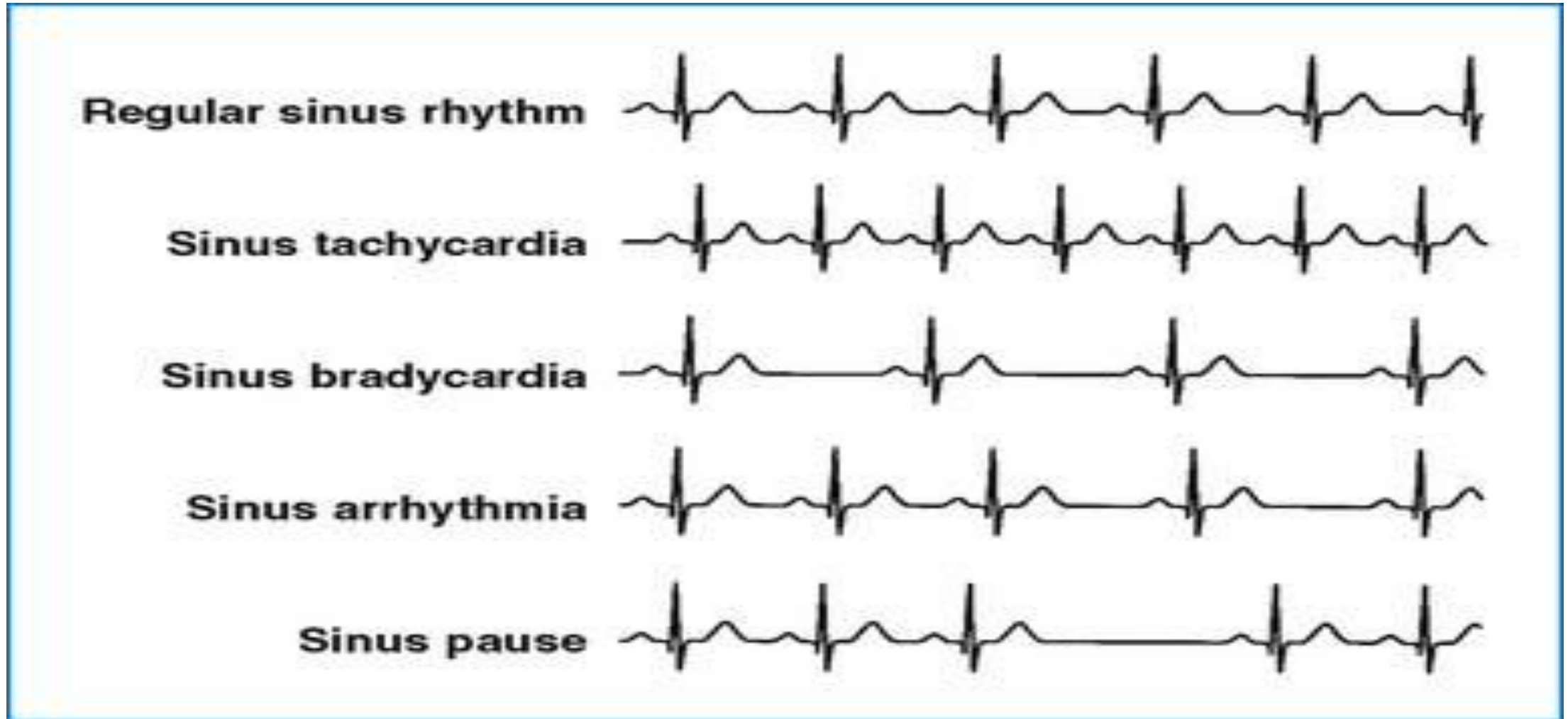
Any deviation from above is sinus tachycardia, sinus bradycardia or an arrhythmia

Normal Sinus Rhythm



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
60-100 bpm	Regular	Before each QRS, identical	.12 to .20	<.12

Nice to know



Cardiac Disturbance

Arrhythmia Formation

- Sinus node
- Atrial cells
- AV junction
- Ventricular cells
- Sinus Tachycardia (ST)
- Sinus Bradycardia (SB)
- Premature Atrial Contraction (PAC)
- Atrial Flutter (AF)
- Atrial Fibrillation (AFb)
- Paroxysmal Supraventricular Tachycardia
- AV Junctional Blocks
- Premature Ventricular Contractions (PVCs)
- Ventricular Tachycardia (VT)
- Ventricular Fibrillation (VF)

Pulse and Mean Arterial Pressures

- **Pulse pressure** is the strength of the pulse wave.
 - **Pulse pressure = Systolic–Diastolic (normal 40)**
- **Mean arterial pressure** is an estimate of ventricular pressure.
 - MAP is 2x the diastolic plus the systolic divided by 3.
 - **MAP = [(2 x diastolic)+systolic] / 3**
(eg. BP: 120/80mmHg ; MAP= 93mmHg)

Pulse pressure (PP)

- Used as a **prognostic marker** in clinical practice.
- **High PP** is a risk factor for the development of coronary heart disease, myocardial infarction, and heart failure in normotensive and hypertensive persons.
- **Low pp** in advanced heart failure and high pp in mild heart failure have been separately linked to **increased mortality rates**.

(Yildiran et.al, 2010)

Mean Arterial Pressure (MAP)

- MAP **represents** the average arterial pressure throughout **the cardiac cycle**.
- MAP has used to improve clinical outcome in a number of conditions; sepsis, trauma, stroke, intracranial bleed, and hypertensive emergencies.
- Normal at **least 60mmHg** and above.
- Clinical situation may different (120/80 , 160/60)
 - Either want to use MAP or PP

Ventilation/Oxygenation

- Shortness of breath (Cardiac/ Respiratory)
- Difficulty in breathing during activity (Cardiac/ Respiratory)
- Difficulty in breathing during lying down (Cardiac)
- Wheezing (Respiratory)

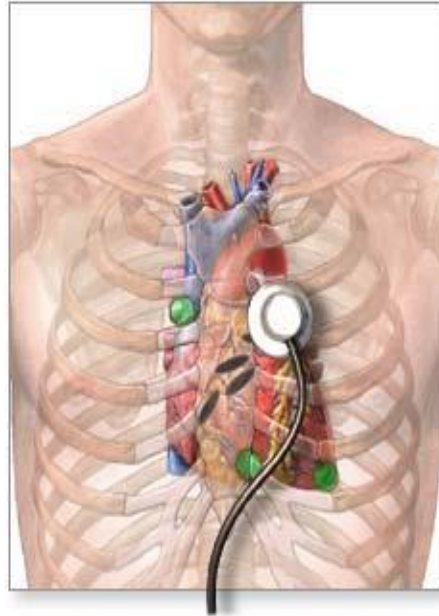
Rehabilitation/ Physiotherapy

- Cardiac Rehabilitation (By phases)
- Respiratory Rehabilitation

Basic Auscultation

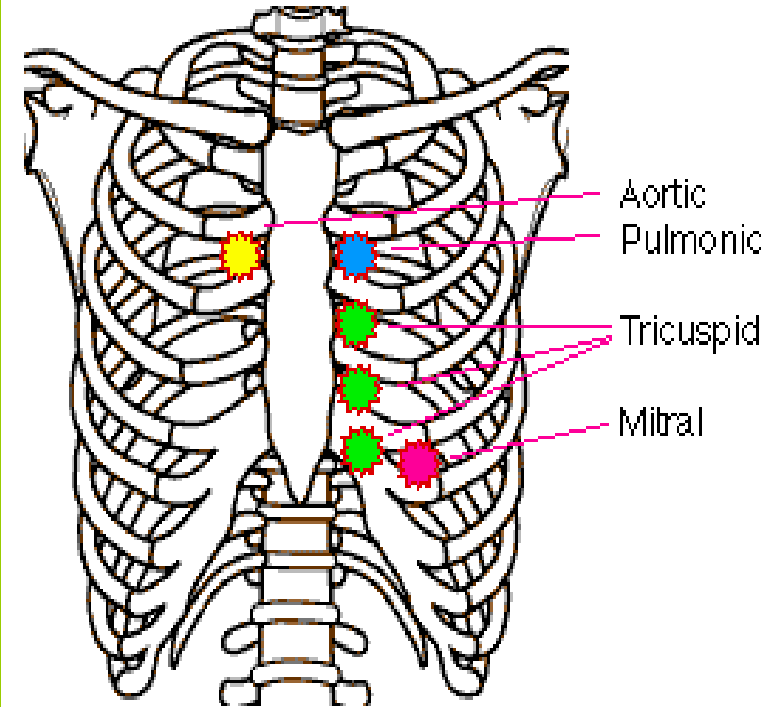
1. Listen with the diaphragm at the right 2nd interspace near the sternum (aortic area).
2. Listen with the diaphragm at the left 2nd interspace near the sternum (pulmonic area).
3. Listen with the diaphragm at the left 3rd, 4th, and 5th interspaces near the sternum (tricuspid area).
4. Listen with the diaphragm at the apex (PMI) (mitral area).
5. Listen with the **bell** at the apex.
6. Listen with the **bell** at the left 4th and 5th interspace near the sternum.

Auscultation & area

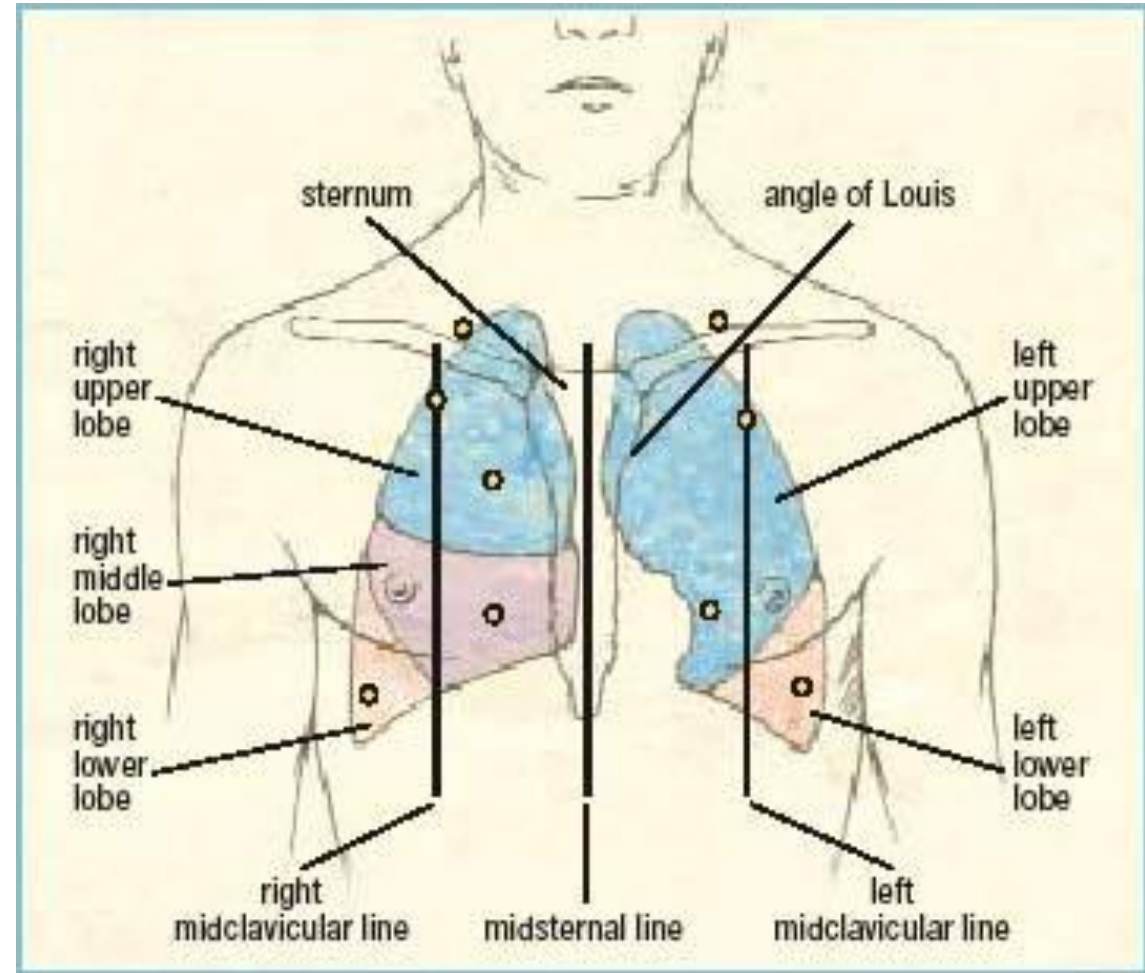
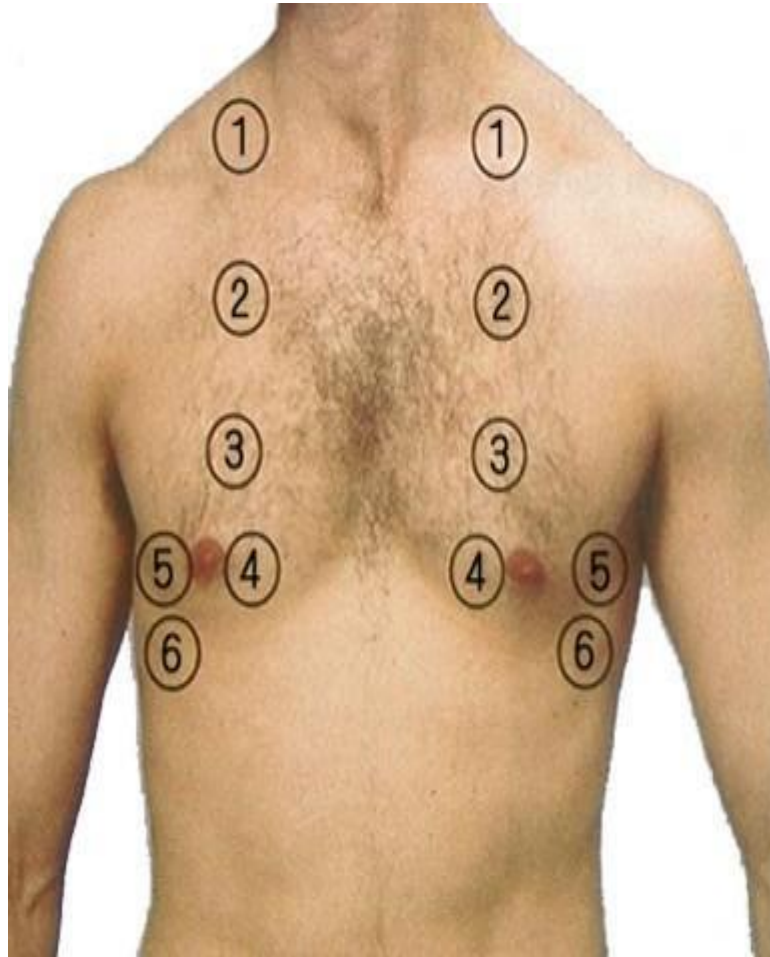


Auscultation is a method used to listen to sounds of the body during a physical examination

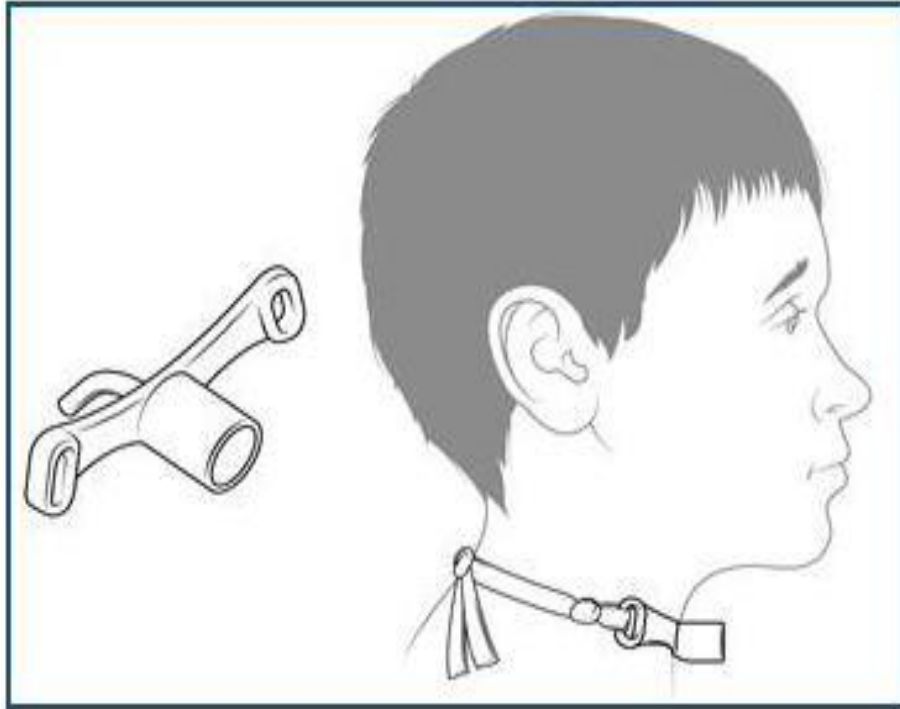
ADAM.



Auscultation for Respiratory



Tracheostomy Care



- Check for patency of the tube
- Positioning
- Suctioning
- Changing of the inner cannula

Emergency Tracheostomy Care

Check for danger
Check for response: Alert? Responds to Voice? Responds to Pain? Unresponsive?



ASSESS AIRWAY

- Look**: for breathing movements of the chest.
- Listen**: for breathing sounds from the tracheostomy tube.
- Feel**: for air coming from the tracheostomy tube or nose or mouth.

If airway **OBSTRUCTED**:

- Suction the tracheostomy tube.
- Change the patient's inner cannula tube if one is present.
- Extend the patient's neck slightly with a small towel rolled under the shoulders.
- If the tracheostomy tube is still blocked or dislodged: remove and re-insert a new tube.**
- If unable to re-cannulate, try again using a smaller size tube.
- If still unable to establish airway: **CALL 999 & Ambulance**



Patent tracheostomy in situ

ASSESS BREATHING

Is the child breathing? If NO:

- Connect resuscitation bag with oxygen flow to the tracheostomy tube and give 2 breaths.
- Reassess** – if not breathing, continue manual ventilation.
- If air leaks from the nose/mouth and this compromises ventilation – close these gently with one hand.

No patent tracheostomy in situ

ASSESS BREATHING

Is the child breathing? If NO:

- Use bag and mask over mouth and nose, cover the stoma with gauze and tape to prevent air leak.
- Give 2 breaths.
- Reassess** – if not breathing, continue manual ventilation.

Emergency care for client with Tracheostomy

- Reassess – if not breathing, continue manual ventilation.
- If air leaks from the nose/mouth and this compromises ventilation – close these gently with one hand.

- Give 2 breaths.
- Reassess – if not breathing, continue manual ventilation.



ASSESS CIRCULATION

Healthcare professionals: check for pulse for a maximum of 10sec.

Parents and carers in the community: check for absent signs of life (not moving, not breathing, unresponsiveness).

If absent, commence **chest compressions**, ratio of:

15 compressions : 2 breaths (healthcare workers).

30 compressions : 2 breaths (lay persons).

Definition

- Caring for a client with an artificial airway (tracheostomy tube).
- It is therefore paramount the principles and procedures specific to tracheostomy management.



A typical cuffed tracheostomy tube. The trach tube is held in place with tube ties that go around your neck.

Purpose

- To ensure **airway patency** by keeping the tube free from mucous build up
- To maintain mucous membrane and skin integrity
- To prevent infections
- To stimulate cough reflex



Principles of tracheostomy care

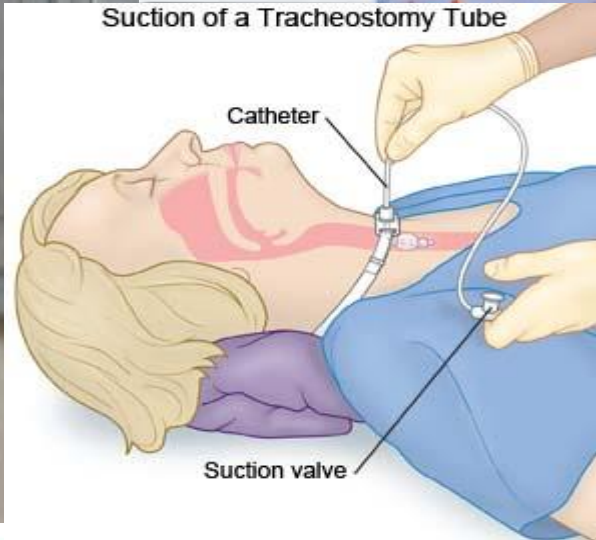
- Strictly aseptic technique
- Tracheobronchial airway must free from secretion and suction technique must be performed carefully
- Place client in a **semi-fowler's position** except contraindicated
- Make sure the tracheostomy ties not too tight
- Make sure the suction machine **pressure about 120-150mmHg**
- Each suction must less than 10 seconds and not more than 5 times
- Choose a catheter not exceeding half of the diameter of the tracheostomy tube. (Size: 6,8, 12, 14, 16")

Procedure:

Tracheostomy suction

- the removal of secretions from the trachea by means of a catheter inserted through tracheostomy tube when the client is unable to clear his own secretions.
- to maintain a patent airway to promote optimal exchange of oxygen and carbon dioxide and to prevent pneumoniae that results from pooling of secretions.

Suctioning: oral, nasal, ETT, trachy



Indications for suctioning

- Dyspnea
- Noisy breathing
- Cyanosis
- Restlessness
- Low oxygen saturation
- Copious secretion

Complication of suctioning

- Hypoxemia
- Dyspnea
- Mucosal trauma
- Risk for infection

Dressing

- Dressing to be changed for the first time 24hours post procedure
- Dressing to be changed thereafter once a shift or PRN when soiled

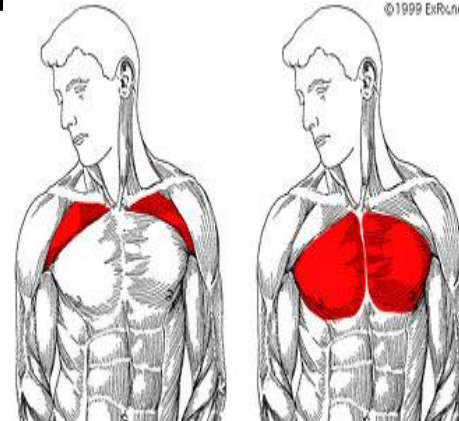
Health education about tracheostomy

- Teach client about sign/symptom of tracheostomy problems
- Inform about communication difficulty and impaired swallowing.
- Teach about tracheostomy care to client's family members
- Advise client don't make any move, touch or changes of tracheostomy tube.
- Advise client to cover tracheostomy tube during taking bath

Conclusion

Mobility is Medicine in Management of critical illness survivors with cardiovascular & respiratory problem

- Improves blood sugar homeostasis
- **Enhances cardiovascular function**
- **Enhances respiratory function**
- Enhances endothelial function
- Decreases chronic inflammation
- Regulates hormone levels
- Preserves musculoskeletal and neuromuscular integrity
- Decreases depression and improves cognition



References

- http://www.who.int/cardiovascular_diseases/en/.
- <http://www.who.int/respiratory/en/>.
- <http://www.heart.org/HEARTORG/>.
- <http://www.who.int/rehabilitation/en/>.
- <https://ecglibrary.com/ecghome.php>.

Thank you



Any Questions?