Grade One Self Learning Guide to ICU/HDU

This guide needs to be completed PRIOR to beginning your ICU/HDU training to ensure you have the basic knowledge required to maximize your development in the ICU/HDU environment.

ANATOMY AND PHYSIOLOGY

Discuss:

♦ Respiratory muscles:
  - What muscles are used in breathing and their innervation?
  - What may precipitate weak respiratory muscles and how may this affect pulmonary rehabilitation/ventilation/weaning?

♦ The Pleura:
  - What is the purpose of the pleura?
  - What are the signs of a pneumothorax?

♦ Flow diagram of lung volumes and capacities:
  - Draw and explain lung volumes ie. FRC, Tv, Closing volume etc
  - Obstructive and Restrictive patterns
  - What is dead space
Gas Exchange
- Describe the transport of gases across the alveolar membrane.
- How does pulmonary oedema affect gas exchange?

Arterial Blood Gases:
- What are the normal values and what do they indicate?
- What are normal Venous blood gases and why do we use?
- What is a mixed venous saturation and why do we use it?
- What is PF ratio and what is it used for?

Ventilation/Respiration:
- Explain the difference between ventilation and respiration.

Ventilation/Perfusion (V/Q):
- What is meant by V/Q mismatch?
- How may positioning affect V/Q?
- Consider difference between positive and negative pressure breathing
- Why would the doctors order a VQ scan and a CT?
Intrinsic PEEP:
- Explain what you understand by physiological PEEP and the role it plays in treatment and weaning.
- How to identify it?
- Considerations for physiotherapy management

MECHANICAL VENTILATION
Identify the ventilator systems and their alarms:
- Drager Evita XL
- Carina (BiPAP)

Distinguish between:
- Volume Cycled Ventilation
- Pressure Cycled Ventilation
- Non Invasive Positive Pressure Ventilation
- High flow nasal cannula (HFNP)

Explain the following ventilator modes:
- IPPV/CMV
- BIPAP
- SIMV- PC
- SIMV- VC
- CPAP (PSV)
- BiPAP (NIV)

Explain the following Ventilation parameters/ support and discuss their uses and implications for physiotherapy.
- Autoflow
- Peak insp pressure (PIP)
- I:E ratio
- Tidal volume and minute ventilation
- PEEP
- CO2 Exp (neuro)
- Apnoea

**MONITORING**

**CARDIOVASCULAR SYSTEM:**

Identify the main components of a normal ECG trace

Define the following and their significance for physiotherapy:
- Bradycardia
- Tachycardia
- Atrial fibrillation
- Atrial flutter
- Ventricular tachycardia/fibrillation

Describe a normal arterial line trace and what factors alter the accuracy of the reading.
Recognise and explain the role of the following lines and any precautions with physiotherapy:

- CVP line
- Swan Ganz
- IABP
- CVVHD lines

**NEUROLOGICAL:**

Describe the effect that intra cranial pressure and mean arterial pressure has on cerebral perfusion pressure and how to calculate CPP.

Describe common medical management of high ICPs and sudden/ significant change neurological state.

What are the common complications post sub arachnoid hemorrhage and its management?

Recognise and explain the role of the following lines and any precautions with physiotherapy:

- EVD systems
- Sub Galeal drains (Jackson Pratt or Belovac drain)
- Lumbar drain
- ICP monitor (Codmans)

**RESPIRATORY**

**TRACHEOSTOMIES**

Discuss the indications for percutaneous Vs surgical tracheostomies.

Discuss the indications and contra – indications for a patient to undergo a tracheostomy.
Differentiate between fenestrated and non–fenestrated tracheostomies and inner tubes and their rationale.

Discuss the following issues involved with tracheostomies:
- Cleaning
- Oxygenation
- Humidification
- Coughing
- Swallowing
- Cuff deflation
- Weaning
- Changing tubes
- Passy Muir Speaking Valve
- HME

**INTERCOSTAL CHEST DRAINS (ICC):**

Discuss the indications for pleural chest drainage.

Explain the precautions and implications for physiotherapy. I.e. mobilisation, on/off suction

Assessment of ICC- swing, bubble, suction, drainage and implications

**OXYGEN:**

Recognise the following and describe the indications for their use and FiO2 delivery
- Face mask
- Nasal cannulae
- HFNP
- Fisher Paykel – humidification delivery
- Heat and moisture exchanger (HME)
- Mouthpiece nebs

Understand the difference between high and low flow oxygen.

Discuss the possible complications of oxygen therapy.

Discuss humidity vs nebulisation.

Identify ABGs with CO2 retention.

**ADJUNCTS:**
Discuss the rationale, precautions and demonstrate safe and effective use of:
- Mask CPAP – facial and nasal
- Nebulisers
- IPPB (BIRD)
- Flutter
- Bubble PEP

**CHEST X – RAYS:**
Discuss a basic chest x-ray assessment.
Recognise the following:
- Pneumothorax
- Pleural effusion
- Consolidation
- Collapse
- Atelectasis
- CVP and PA sheath, NG tube
- Pleural drain
- Surgical emphysema
- Bullae
- Fractured ribs

**AUSCULTATION**

Draw a normal examination of the lung fields using a stethoscope.

Identify the following breath sounds on auscultation and explain their clinical significance:
- Normal breath sounds
- Decreased breath sounds
- Bronchial breath sounds
- Wheeze
- Crackles
- Positive pressure V’s Spontaneous breathing
- Pleural rub

**SUCTION:**

Discuss the indications, precautions and possible complications when suctioning.

How do you select the correct suction catheter size?
Consider and Demonstrate safe and effective technique:

- Endotracheal
- Tracheostomy
- Nasopharyngeal airway (NPA)
- Gudels suction
- Blind suction
- Closed and open suction systems

VENTILATOR HYPERINFLATION:

Complete the mechanical ventilation self learning guide

DRUGS

Discuss the following classes of medications, and identify common medications used in the critical care setting and their implications on treatment:

- Sedatives
- Anaesthetic agents
- Analgesics
- Muscle relaxants
- Inotropes
- Bronchodilators

- Steroids

- Anti arrhythmic

NOTES:
ASSESSMENT AND TREATMENT

Throughout your ICU rotation assess and effectively treat self ventilating and mechanically ventilated patients with at least three different presenting conditions:

For example:

- Ventilated neurotrauma
- Vascular patient
- Oncology patient
- Ventilated surgical patient
- Type I respiratory failure patient
- Type II respiratory failure patient
- Recently extubated patient
- Cardiac failure patient
- Cardiac Surgery

Discuss the possible risk factors for respiratory complications for your chosen conditions.

Your assessment and treatment can be reviewed in the following ways:

- Peer review
- Paperwork review
- Treatment demonstration
- End of rotation presentation