

Post Anaesthetic Care Unit

Wellington Regional Hospital Nga Puna Waiora 2020



Orientation guide For Year 3 Student nurses (9 weeks)

This book belongs to:

PACU Orientation Guide for Year 3 Student Nurses
2020

Page 1

Nau mai

Welcome.

We would like to take this opportunity to welcome you to the Perioperative Unit where you have been allocated a 9 week PACU placement. This orientation manual has been designed to build on your learning and development. The responsibility and accountability of completing your orientation manual is shared between yourself, your clinical liaison nurse and the nurse educator. There will be many opportunities for you to experience throughout your placement so please let us know how we can further support and facilitate your educational and development requirements. I hope you enjoy your 9 week placement with PACU and do not hesitate to come and talk to any member of staff if you need to discuss something.

Nga manaakitanga

PACU Clinical Liaison Nurses

CC-GD-PerioperativeDEU@ccdhb.org.nz

Shift Coordinator

048060726

Orientation Roster

Week	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
1							
2							
3							
4							
5							
6							
7							
8							
9							

We are a DEU

Our Philosophy

The Dedicated Education Unit (DEU) model of clinical teaching and learning in Wellington and is a partnership between organisations, the education provider Massey University (Massey) and Whitireia New Zealand (Whitireia) and the Capital and Coast District Health Board. Collaboration allows practice areas to provide a more supportive clinical learning and teaching environment for students. DEU's are dedicated to supporting nursing students on clinical placement encouraging incidental and intentional learning modes, and peer teaching. The DEU is based on an Australian model and offers an alternative to the Preceptorship model to focus on student learning and curriculum integration. The following principles underpin the partnership between Massey and Whitireia School of Nursing and a DEU practice area.

Our underpinning principles encourage us to create a strong learning partnership between education and our nursing practice. We aim to provide care in a cooperative manner, enabling collaboration between our nursing colleagues, student nurses and our patients. We will build goals together to ensure we have a common vision towards our collective accomplishments.

In our DEU you will be supported by our Clinical Liaison Nurses, **Izzy** and **Shaun**.

Izzy – I am currently in my third year of nursing and am working towards my post-graduate diploma in nursing studies! I am a recent add to the PACU team but prior to this I worked just across the way in the operating theatre, specifically in urology theatre.

Shaun – I am currently in my thirteenth year of nursing and have worked in a variety of areas within CCDHB. My passion is nursing education and I enjoy working with nursing students and new staff.

You will additionally have the support of your day-to-day preceptors, our wonderful nursing team here in PACU and the perioperative multidisciplinary teams.

Perioperative Services

Post Anaesthesia Care Unit

The Post Anaesthesia Care Unit provides a safe environment for patients to receive and recover from anaesthesia and surgery. Certain PACU staff also support other hospital teams, including the Acute Pain management Service (APMS), the national simulation suite and the Peripheral Inserted Central Catheter service (PICC). PACU is a fast paced and high acuity unit in which in a typical week, over 200 patients pass through its base. These will include patients needing cardiology, cardiothoracic, dental, ENT, neurosurgical, ophthalmic, orthopaedic paediatric, renal, and vascular interventions.

Pre Anaesthesia Assessment Clinic

The Pre Anaesthesia Assessment Clinic coordinates pre-admission activities for all elective patients. This department ensures optimal preparation and management of the inherent risks of surgery and anaesthesia. Patient assessments are carried out by specialist nursing staff, which provides the patients with information and resources to assist them in gaining the best possible outcome from their planned procedures.

Surgical Admissions

Surgical Admissions provides comprehensive services for ambulatory patients undergoing elective procedures.

Second Stage Recovery

Second Stage Recovery (SSR) accommodates all surgical patients post PACU who are expected to stay less than 24 hours post operation. On average, 90 patients a week will utilise the 23 ambulatory bays and beds, and many are discharged home from SSR within 4 – 6 hours of their operation. They can also accommodate those who require an overnight stay.

Day 1 – PACU CLN

Goal Setting

Always think and look for opportunities that you wish to participate in or achieve. We will discuss these further with your preceptor and, where possible, accommodate into the workload.

Initiative and eagerness

Get involved in as many learning opportunities as possible, but remember to stay focused on your key learning objectives.

Punctuality

We expect you to be on time for your shift and to call in if you will be late or absent. Informing only your institution's support person is not enough. The student roster is based on MECA requirements, associated with the institutions' guidelines. Leaving early is not acceptable except due to emergency or sickness. Students who frequently ask to leave early will have their placement performance discussed with their Clinical Liaison Nurse (CLN) and their Academic Liaison Nurse (ALN). Students are expected to follow the roster strictly; any requests for change of roster with must be arranged with the CLN or preceptor at least 24 hours in advance. *If you are sick, please ring or text the PACU Shift Coordinator phone.*

Communication

Communication is a key part of getting a positive experience from your placement in PACU. We realise at times you may feel overwhelmed, scared and uncomfortable. Please voice any concerns you may have. We also expect students to communicate honestly and openly. Any performance mistakes should be reported immediately. Any communication issues will be addressed during the weekly placement review with your clinical tutor.

Student nurse etiquette

Learn the basics first

Adhere to all CCDHB and PACU policies

Know emergency procedures and phone numbers

Be respectful to staff, patients and families

Evaluate your placement. We welcome constructive feedback and as an unit are always looking at ways to improve ourselves

Try not to turn down learning opportunities

Do not come in if you are sick

Do not complete a task without supervision

Listen to your preceptor

Day 1 and 2

Introductions	Completed
Charge Nurse Manager and office
Associate Charge Nurse Manager and office
Clinical Nurse Educator and office
Preceptors
Clinical Liaison nurses
Team members
Obtain	
Departmental tour
Name badge
Orientation manual
Swipe card
Discuss	
Admission and discharge process
Bedspace check
Competencies
Contact details for PACU
Daily checks and routine
Dos and don'ts
Emergency and evacuation procedure
ISBAR
Objectives for University
Objectives for PACU
Orientation expectations and opportunities
Patient assessment
Roster
Safer Sleep
Sick leave
Complete	
Bedspace check
Skills station
Resuscitation trolley check

PACU Tour Day 1 & 2

Find the locations for the following	Completed
ABG analysis machine
Airvo devices
APMS forms
Bair Hugger
Bladder scanner
Blood fridge
Blood and bodily fluid management kit
Brachytherapy unit
CPAP machines
Cytotoxic equipment and guidelines
Defibrillator
Delivery suite
• PPH trolley
• Pyxis
Duress button
ECG machine
Emergency call bells
Emergency exits
Emergency procedure guidelines
Fire alarm
Fire hydrant
Fire extinguisher
Glucometer
Haemocue
Holding bays
HoverMat
Interventional Radiology
Intensive care unit
Keys button
Malignant Hyperthermia trolley
Orderly bay
Pre-assessment clinic
Resuscitation trolley
Second stage recovery
Sluice room
Surgical admissions reception
Tea Room
Theatres

Learning opportunities

During your PACU placement, you will spend time with the following:

- Simulation mannekins to learn airway management and participate in scenarios
- Acute Pain Management Service (APMS) to develop additional pain management techniques
- Brachytherapy to learn about high dose radiation therapy
- Surgical Admissions Unit (SAU) / Second Stage Recovery (SSR) area
- Theatre experience to observe the anaesthetic induction and operation

PACU is an environment full of learning opportunities. Students often find this area overwhelming with its unpredictability. Therefore, while you are here exploring your learning opportunities, it is important to listen to your preceptor and to stay focused on fundamental skills development.

What do you wish to learn and experience?

Complete the abbreviations

The following are commonly used abbreviations that we see. Complete the table.

Abbreviation	Full definition
ABG	
ABs	
Angio	
A.S.A	
A V P U	
Bronch	
CAD	
CBI	
CHF	
COPD	
CWMS	
D/C	
DVT	
ERCP	
EUA	
FHx	
HNPU / HPU	
HTN	
Hx	
ICP	
IHD	
IOL	
IOP	
IVAB	
IVF	
MH	
MI	
MUA	
NKDA	
NWB	
ORIF	
PCA	
PE	
Phaco	
Obs	
PVD	
TIA	
TIVA	
TEDs	
TROC	
TVT	
TWB	
Tx	

Patient Assessment

Assessment is the first part of the nursing process and utilised to highlight aspects that need to be addressed. Genuineness and trusting relationships are instrumental in building a positive relationship with the patient to further facilitate the completion of the nursing process in PACU. The following assessments are integral for the PACU nurse.

Airway

- Do you have an artificial airway?
- Is it safe to remove?
- Is your airway patent afterwards?
- Is your patient talking in their normal way?

Breathing

- What are the saturations?
- What is the respiratory rate?
- Is fogging present?
- Is the chest moving?
- What is their pallor like?
- Do you need to auscultate the chest?
- Is oxygen or high flow required?

Circulation

- What is the blood pressure and heart rate?
- Do these observations replicate the patient's baseline observations?
- Is blood pressure support indicated?
- If so what and why?
- Do I need to commence ECG monitoring?
- What is the fluid balance?
- Does the peripheral assessment indicate anything?

Disability

- AVPU assessment
- Pupils – are they equal and reactive to light?
- GCS
- Is blood sugar within normal range?

Environment

- Temperature: what is their peripheral temperature?
- Wound assessments & skin assessments including drains and dressings

Other

Pain

- How do you assess pain?
- What are your pain assessment findings?
- Are any interventions indicated?

Nausea

- Is it present?
- How would you manage it?

Have you identified any other nursing aspects that are required to fulfil holistic care and maintain cultural safety?

Student activity

Complete an assessment and discuss your findings

A)

B)

C)

D)

E)

Other)

Anaesthesia – an overview

There are various types of anaesthesia and they may be used individually or combined. The aim of anaesthesia is to facilitate the balance between hypnosis, analgesia and muscle relaxation. There are 4 types:

1. Local
2. Regional
3. Sedation
4. General

Local anaesthesia (LA)

LA involves the administration of a specific medication into the tissues near the surgical site. It produces a reversible blockade of neural transmission in autonomic, sensory and motor nerve fibres, depending upon the concentration of the medication given. It is active peripherally and at the CNS. The medication binds to sodium channels in the axon membrane from within preventing sodium entry during depolarisation. The threshold potential is thus not reached and the action potential of the nerve is not propagated.

Regional Anaesthesia

Regional anaesthetic uses LA around major nerve bundles which produce transient loss of sensory motor and autonomic function in a discrete portion of the body and is commonly referred to as “**block**”. Spinal block involves infiltration into the subarachnoid space, and epidural blockade involved infiltration of the epidural space. Nerve plexus or nerve blocks involve injection of anaesthetic agents around a nerve plexus (brachial plexus) or single nerve trunk (femoral or ulnar). Local anaesthetics may also be given directly into affected tissues. In some cases, intravenous regional (IVRA, Bier’s block) administration may be used, where the injection is made into a limb whose circulation is occluded by a tourniquet.

Sedation

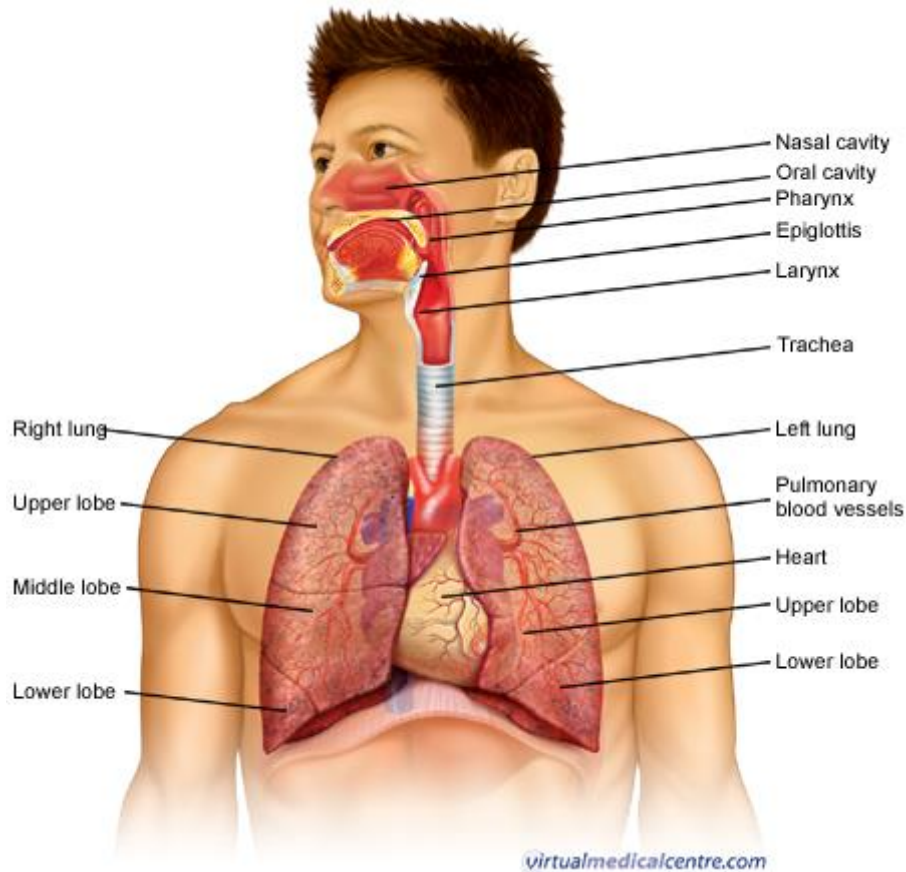
Sedation is used to reduce the level of consciousness with the level depending on the amount of medication used. As long as the patient is maintaining their own airway, it could be considered sedation even if they are barely rousable. Sedation is used in combination with another technique such as a block or local anaesthetic. Premedication is a type of sedation.

General Anaesthesia

General anaesthesia is a drug induced reversible state of unconsciousness, with the abolition of some or all perceptions. No general anaesthetic is the same. A variety of drugs can be used and these can be broadly grouped into premedications, induction agents, and maintenance and reversal drugs.

Airway Management

Anatomy



Jaw support

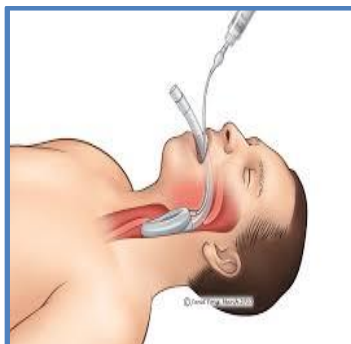
(jaw thrust manoeuvre)

Jaw support prevents the tongue obstructing the upper airways. The index finger and middle fingers physically push the posterior aspects of the mandible upward, whilst simultaneously the thumbs are pushing on the chin to open it. The displacement of the mandible pulls the tongue forward preventing obstruction.



Laryngeal mask airway(LMA)

The LMA is a frequently used airway adjunct and PACU nurses are responsible for their removal. Stimulating with an LMA is actively discouraged as it can lead to an an early extubation and resulting in an unsupported airway and hypoventilation.



There are both disposable and non-disposable LMA tubes used so please familiarise yourself and ask if in doubt. The non-disposable has a blue rubber attachment whereas the disposable has a gauge.



non-disposable



disposable

Once the patient has obtained their swallow and is awake the nurse can remove the LMA. The following instructions are given to the patient;

**Open your mouth
Poke out your tongue.**

Oxygen is given via a Hudson mask and continued as per prescription and targeted saturation range. The LMA does not protect the patient from aspiration and if vomiting is evident then the adjunct must be removed and the airway reassessed and managed as indicated.

Oropharyngeal Airway (OPA)

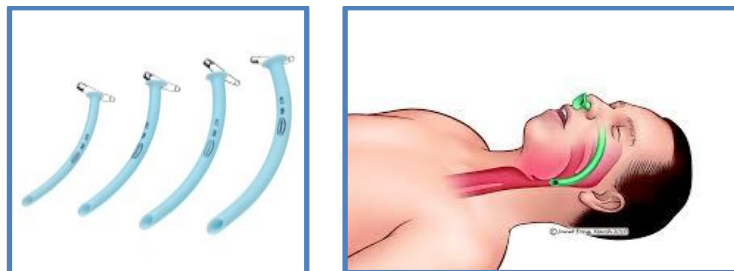
(Guedel airways)

The insertion of this airway adjunct prevents the tongue covering the epiglottis and only used in unconscious patients due to the gag reflex stimulation. To obtain the correct size, an OPA is placed between the base of the earlobe and the corner of the mouth. In adults, the OPA is inserted upside down and rotated 180 degrees. For paediatrics, a tongue depressor is used and the OPA inserted the correct way immediately. When the patient is awake, the OPA is removed.

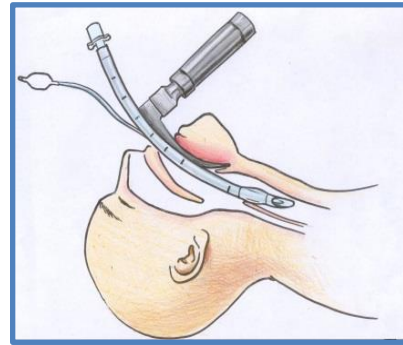


Nasopharyngeal airway (NPA)

This adjunct can maintain a patient's airway and used to suction airway upper airway secretions. It is sized by measuring from the patient's nostril to the meatus of the ear and placed with the concave side facing away from the nasal septum. It is advanced along the septum horizontally and rotated 90 degrees to lie in the nasopharynx. The purpose of the flared end is to prevent the device from becoming lost inside the patient's nose and usually safety pins are placed just behind the flared end as another precaution.



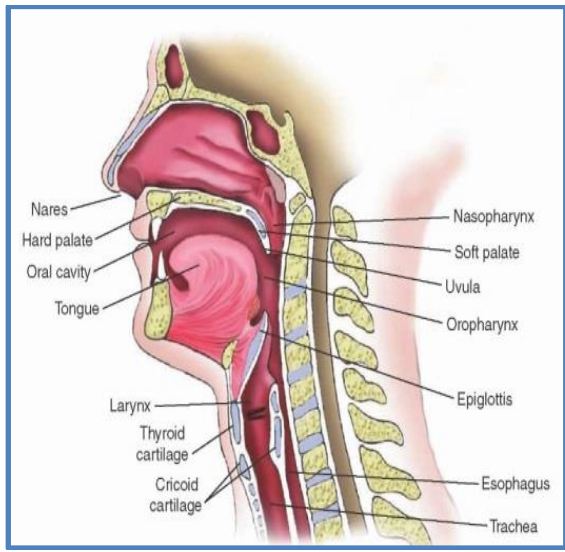
Endotracheal Intubation



Endotracheal intubation is a medical procedure in which a tube is inserted into the trachea via the mouth. Waveform capnography has emerged as the gold standard for the confirmation of tube placement within the trachea. Guidelines for an intubation within PACU are available on the resuscitation trolley.

Breathing

Anatomy



Assessment

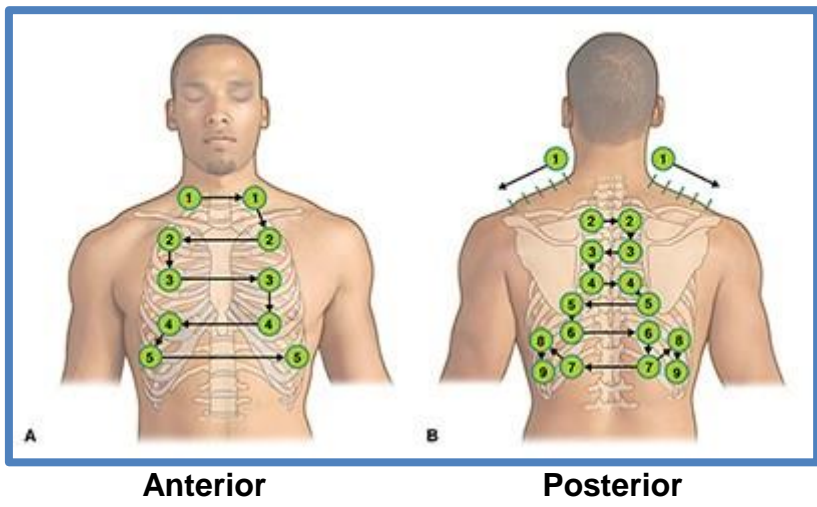
- **Look**

What is the respiratory rate and pattern?

- **Listen**

What can you hear?

Auscultation



How do we breathe?

.....

.....

.....

.....

.....

.....

Oxygen Delivery

Oxygen is administered to **relieve hypoxaemia** and maintain adequate oxygenation of tissues and vital organs, as assessed by SpO₂ /SaO₂ monitoring and clinical signs.

Device	Litres per minute
Nasal prongs	
Adult	1-4
Paediatric	0.125-2 use low flow if less than 1 L/min
Hudson mask	
Adult	5-10
Paediatric	2-6
High flow nasal prongs	
Adult	30-60
Paediatrics	2 litres per kilogram
Non rebreather/emergency	Maximum to inflate the reservoir bag

The C&C DHB policies instruct that oxygen is delivered in the above way.

Discussion point

Not all patients have a post-operative oxygen requirement.

Does your patient need oxygen or flow?

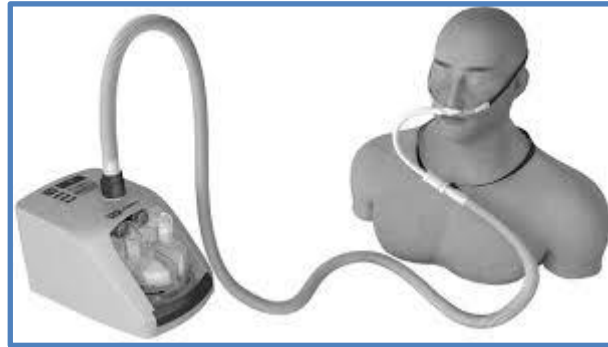
If so why?

Does this fit with their expected post-operative outcome?

Remember to get the oxygen prescribed with the target saturations highlighted.

High Flow Nasal Prongs via the Airvo™

The Airvo™ is a device that delivers high flow for both paediatrics and adults. This therapy provides a small amount of extrinsic PEEP if required and is an alternative to CPAP. This machine cannot support a transfer of a patient so if the patient continues to require one post PACU discharge, then the ward staff must arrange it.



1. Explain the therapy to the patient and whanau if present
2. Obtain verbal consent
3. Commence therapy with flow $\geq 30\text{L}/\text{minute}$
4. Administer supplementary oxygen to obtain desired saturation target
5. **Increase flow as tolerated**
6. Remain with patient until stable
7. Prescribe the final therapy settings
8. Document in the notes

Cardiovascular

An expected outcome for the patient is to be discharged from PACU with a stable blood pressure. Fluids and vasopressors may be indicated at times to help support the patient in PACU. If this is indicated a full patient assessment should be conducted.

Crystalloid Fluids

Crystalloid fluids are volume expanders that provide volume for the circulatory system to maintain hydration and blood pressure. The electrolyte formulation varies for each solution but all are very similar to our physiological plasma electrolyte concentrations, osmolality and pH. These are the main ones used in PACU.

- Plasmalyte (P148)
- Normal Saline 0.9%
- Dextrose 5% Saline

Vasopressors

Vasoconstrictors are medicines used to raise blood pressure via the vasoconstriction of the blood vessels. Hypotension can be caused by a multitude of reasons, which can be discussed with your mentor. The main vasopressors are phenylephrine and metaraminol.

Phenylephrine

Phenylephrine Hydrochloride is an alpha-1 adrenergic receptor agonist indicated for increasing blood pressure in adults with clinically important hypotension resulting primarily from vasodilation, in such settings as septic shock or anaesthesia.

Metaraminol

Metaraminol is a sympathomimetic drug that directly and indirectly stimulates the alpha receptors in the sympathetic nervous system. Alpha stimulation causes vasoconstriction resulting in an increase in both the systolic and diastolic pressure.

Administration.

10mgs per ml ampoule.

Dilute 10mgs into 20 mls of sodium chloride to give a final dose of 0.5mgs per ml.

Dilute 20mgs into 40 mls of sodium chloride to give a final dose of 0.5mgs per ml.

Infuse via an Alaris pump.

PACU Monitoring

Arterial Lines

Indication and Use

Continuous monitoring for:

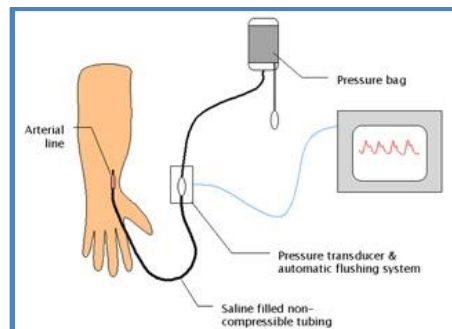
- Evaluation of perfusion during dysrhythmias
- Evaluation of response to fluid therapy
- Frequent arterial blood gas determination
- Haemodynamic instability
- Patients at risk of sudden deterioration

Cannulation Sites

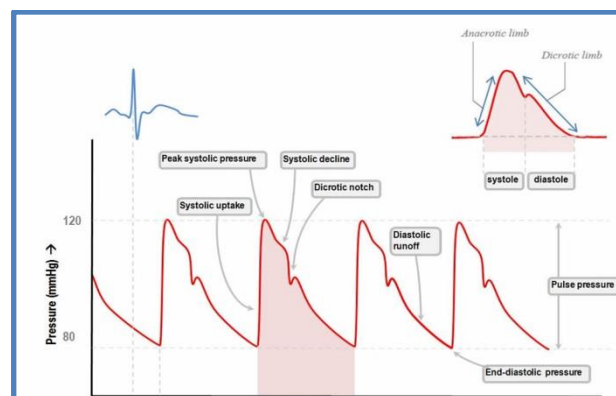
- Radial artery
- Brachial artery
- Femoral artery
- Dorsalis Pedis (Infrequently)

Equipment

- Arterial circuit
- 500mls saline bag
- Monitoring cables
- Pressure bag



PROPERTIES OF ARTERIAL LINE WAVEFORM



Systole

The area beneath the wave indicates pulse volume, with a normal sharp upstroke indicating healthy ventricular function and shallower upstrokes are indicative of poor left ventricular outflow (left ventricular function, and aortic stenosis). Upstrokes should normally be uninterrupted, but extensive systemic vasodilation and low systemic vascular resistance (Systemic Inflammatory Response Syndrome) can cause an anacrotic notch on upstrokes, with widening of the diacrotic notch.

Diacrotic Notch

After the peak, there should be a small second peak on descent – the diacrotic notch, when the aortic valve closes. Poorly defined or absent diacrotic notches indicate aortic valve incompetence.

Diastole

The pressure exerted on the arterial wall during resting phase of the cardiac cycle.

Mean Arterial Pressure (MAP)

MAP is the average pressure across the whole pulse cycle including systole and diastole and normal values range from 70-100mmHg. It can be calculated by the following formulas:

$$\frac{(2 \times \text{diastolic}) + \text{systolic}}{3} \quad \text{or} \quad \frac{\text{diastolic} + (\text{systolic} - \text{diastolic})}{3}$$

Pulse Pressure

Pulse pressure is the pressure created by each pulse (systolic minus diastolic) and indicates blood vessel response to pulse. Stereotypical normal pulse pressure is:

$$120 - 80 = 40\text{mmHg}$$

Wide pulse pressures usually indicates vascular disease, such as atherosclerosis while narrow pulse pressure usually indicates arterial hypovolaemia.

Factors that influence arterial pressures:

- Cardiac output and resistance.
- Size of blood vessels.
- Distance from the aorta (as the site becomes more distal, the systolic pressure rises and the diastolic pressure falls).

Troubleshooting Waveforms

- If you have problems with the arterial line trace start at the top of the system and work your way down to the patient
- Check the pressure in the bag
- Check there is fluid in the bag
- Check there are no kinks in the line
- Check all connections are tight
- Check transducer level.
- Re-zero
- Check system for air bubbles
- Check cannula is not kinked under dressing

Always aspirate first then flush when trying to restore patency. Seek help from senior nursing or medical staff if patency is questionable.

Preventing Complication

A 20 gauge arterial catheter can cause loss of up to 200mls of blood in four to five minutes. To prevent this you must:

- Use dead-end caps on all stopcocks
- Check connections are tight when lines are inserted
- Sites should be covered with occlusive dressings
- Keep the site visible
- Set alarms appropriate for the patient
- Always place the saturation probe on that limb

Complications of Arterial Cannulation

Monitor the insertion site regularly and report any problems immediately:

- Accidental drug injection
- Haematoma formation
- Infection
- Line disconnection
- Skin necrosis
- Nerve damage
- Vascular embolisation
- Vascular thrombosis
- Vascular spasm



Accidental drug administration in to an arterial line

Removal of Arterial lines

- Ensure you use appropriate PPE
- Apply direct pressure to the site until bleeding has stopped
- Place a gauze square over the site and secure with Elastoplast
- Observe site closely for further bleeding

Capnography

This parameter measures the amount of expired Carbon dioxide with respiration by drawing airway gases into an analyser from tubing connected to an artificial airway or mask.

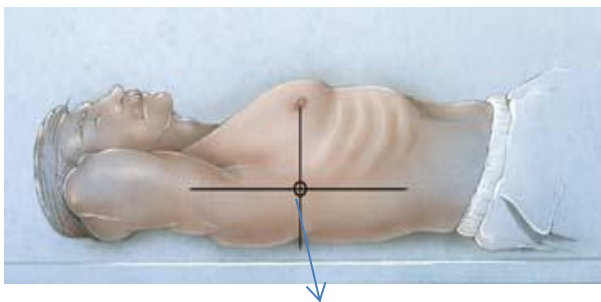
Use of this parameter is particularly useful when titrating opiates or in deeply sedated patients or assessing the effectiveness of an artificial airway in maintaining patency. Capnography is also used to confirm correct endotracheal tube placement and in the management of cardiac arrest.

Central Venous Pressure

Central venous pressure (CVP) is the pressure recorded from the right atrium or superior vena cava and is representative of the amount of blood returning to the heart and the hearts ability to pump the blood into the arterial systemic. CVP reflects ventricular preload and predicts fluid responsiveness and the reading should be used in conjunction with other observations and clinical assessment.

Measurement

Normal values are 0-6mmHg in a spontaneously breathing non-ventilated patient. To ensure accuracy of the measurement is obtained by the placement of the CVP transducer level to the patient's phlebostatic point and is recorded at the end of expiration.

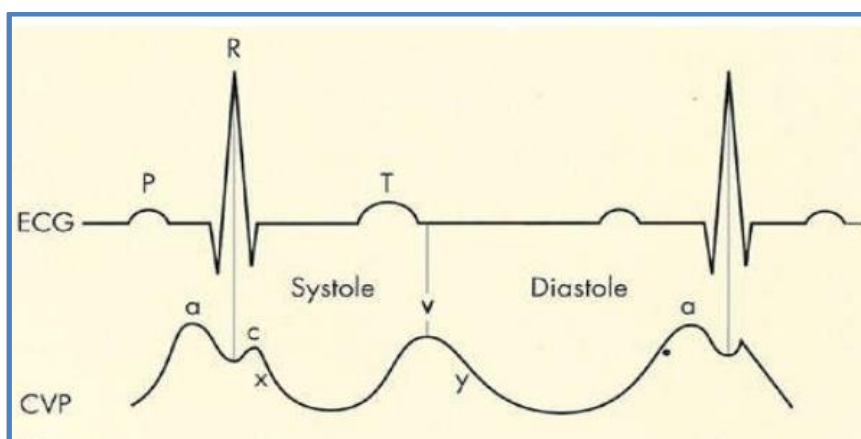


Phlebostatic Axis



measuring point

The CVP waveform reflects the changes in the right atrial pressure during the cardiac cycle and should look like this:



Component	Cycle	Event
a wave	End diastole	atrial contraction
c wave	Early systole	closing and bulging of the tricuspid valve
v wave	Late systole	passive systolic filling of the atrium
x wave	Mid systole	atrial relaxation
y wave	Early diastole	opening of the tricuspid valve and early ventricular filling

Complications and Interventions

During insertion:

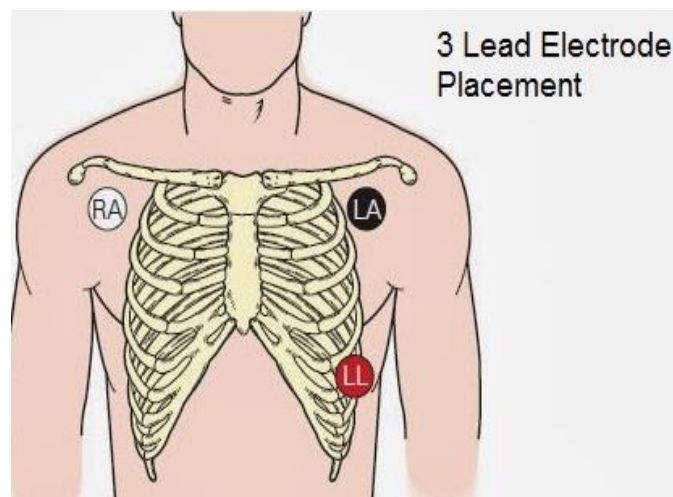
- Cardiac dysrhythmias
- Pneumothorax, haemothorax or chylothorax (lymph fluid from puncture of the thoracic duct)

Post insertion:

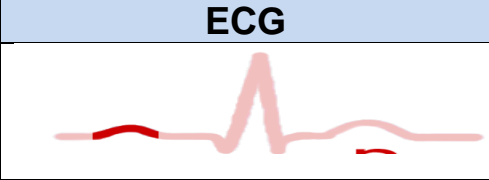

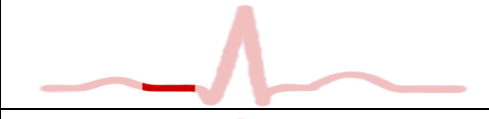



- Air embolism
- Mechanical irritation and thrombophlebitis
- Poor infusion of fluid may be secondary to clots or kinking of the line
- Haemorrhage, ecchymosis or frank haemorrhage if line becomes disconnected
- Thromboembolism
- Sepsis

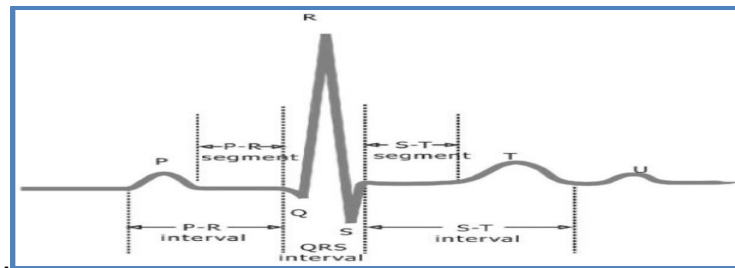
ECG monitoring

During your orientation it is important to grasp an understanding of the components of normal cardiac conduction and recognition of lethal arrhythmias. The simulation suite has a computer program that will help facilitate your learning and you will spend some time there with the CNE analysing various rhythms.



An ECG trace can be obtained by attaching three electrodes as shown.

Component	Event	ECG
P wave	depolarisation of the right and left atria	
PR interval	onset of atrial depolarisation	
PR segment	activation of the Bundle of His	
QRS segment	depolarisation of the right and left ventricles	
ST segment	ventricular repolarisation	
T wave	ventricular repolarisation	



Heart rate

Heart rate (HR) is the number of contractions the heart is conducting per minute (bpm). The normal resting heart rate is 60 – 100 bpm and all abnormal heart rates must be investigated especially if HR has compromised the patient's cardiac output .

$$\text{CO} = \text{HR} \times \text{SV}$$

Do you know what this formula means?

Non-invasive blood pressure monitoring (NIBP)

Non-invasive blood pressure measurement is a simple and effective way of assessing cardiac output. All PACU patient monitors will perform this measurement every 5 minutes by default as this is the recommended interval for PACU patients without an arterial line. NIBP measurement is effected by irregular heart rhythms, shivering, and inappropriate size of cuff and height of limb with cuff in relation to the patient's heart.

Saturations

Oxygen saturation (SpO₂) is one of the main forms of electronic monitoring within PACU and obtained by using a finger or ear probe. This parameter is used as an indicator to escalate or reduce supplemental oxygen, identify arrhythmias, identify fluctuations in cardiac output, and even assess perfusion to a limb affected by surgery or one that has an arterial line in-situ. All PACU patient monitors emit an audible pulse tone that changes in pitch according to saturation, allowing audible detection of abnormality from anywhere in the unit.

Oxygen saturations are less accurate when:

- Peripheral perfusion is poor (peripheral vascular disease, shock, hypothermia)
- Jaundice is present
- There is excessive ambient light or radiation
- Methylene blue/patent blue is used
- Shivering is present
- There is interference from other electrical devices.

To assess for accuracy the pleth on the patient monitor must be clearly defined with little interference. Saturations and heart rate in the presence of poorly defined pleth traces should be disregarded and alternative measures found for monitoring.

Respiration (Impedance Based)

This parameter via the ECG measures changes in electrical resistance as the chest moves with respiration. This is useful in monitoring respiratory rate only and does not indicate the efficiency of respiratory effort. Chest movement will still occur in the patient with an obstructed airway.

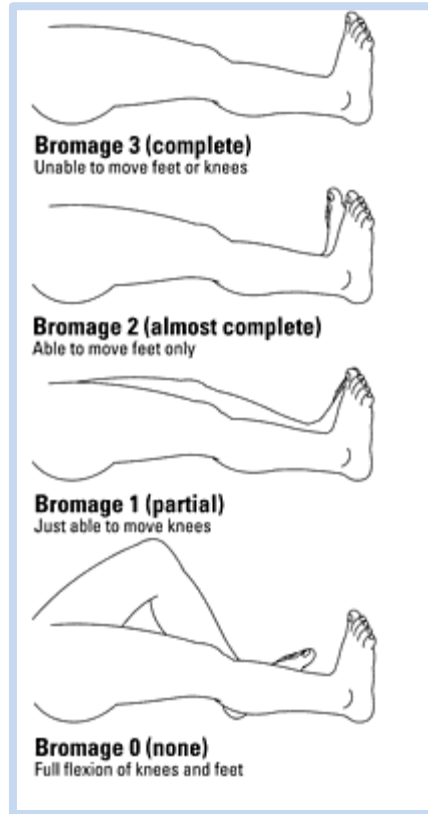
Temperature

A temperature measurement should be performed continuously during anaesthesia and on every patient during their admission and at discharge. Hypothermia is common, if not inevitable, during and after anaesthesia and must be corrected. Tympanic thermometry should be used as a first line of measurement.

Bromage Scale

The most frequently used assessment tool of motor block is the Bromage Scale. The intensity of block is assessed by the ability to move the lower extremities.

The Dermatome assessment concludes the return of sensation experienced.



Rule out epidural injury

All patients must display return of lower motor function before discharge

Medications and induction agents A-Z

Analgesia

There are many types of pain relief used within PACU which range from mild non-steroidal to opiates.

Alfentanil

Alfentanil is a potent and short acting opioid analgesic and can be used for sedation purposes when combined with other medications for general anaesthesia. It is more potent than Remifentanil and can cause longer respiratory depression.

Atracurium

Atracurium besylate is a non-depolarising neuromuscular blocking agent used adjunctively to facilitate endotracheal intubation and provide skeletal muscle relaxation during surgery or mechanical ventilation. This can sometimes lead to a histamine release which may explain a hypotensive, tachycardic or cutaneous flush response.

Depolarizing agents have rapid onset of 40-60 seconds to achieve profound relaxation. The duration of these agents is typically 4-6 minutes which allows time for tracheal intubation to be performed. It is then broken down by an enzyme with return of normal neuromuscular activity (it should be noted that there are preconditions which may impede this!) Suxamethonium is a common example.

Etomidate

Etomidate is an IV anaesthetic agent which produces a rapid onset induction, lasting up to 8minutes after a single administration. It is rapidly metabolised by the liver within 70minutes and is largely excreted in the urine. This medication is preferred with the hypotensive patient but does not contain analgesic activity.

Fentanyl

Fentanyl is synthetic opioid analgesia with approximately 80-100 times more potent than morphine. It has a rapid onset and rapid recovery.

Glycopyrate and Atropine are used in conjunction with Neostigmine to **reverse NBA**, to correct the inevitable bradycardia and excessive secretion production associated with the drug.

Halothane

Halothane is an inhalation anaesthetic and is preferred over diethyl ether or cyclopropane due to its great potency, ease of use, non irritability and non inflammability. It has rapid induction and recovery but has been linked to halothane related hepatitis.

Induction and maintenance agents

This can be either Volatiles and/or I.V drugs. Most I.V drugs work within 1 minute and generally last 5-10 minutes. Volatiles are drugs that are inhaled, achieving their effect by up take from the alveolus to the circulation. Some anaesthetics may be based purely on inhaled gases or IV medications (TIVA: totally IV anaesthetic).

Isoflurane

Isoflurane is an inhalation anaesthetic agent which has a rapid onset and recovery period. This is 9 times more expensive than halothane.

Ketamine

Ketamine is an IV anaesthetic agent which produces a state of dissociative anaesthesia which is intense analgesia with light sleep. Elimination half-life is about 3 hours and metabolised by the liver to weakly active metabolites and excreted in the urine.

Midazolam

Midazolam is a benzodiazepine used for sedation. It is used as a premedication and induction agent. It is antagonised by flumazenil.

Morphine

Morphine is an opioid which acts directly on the central nervous system to decrease the sensation of pain. Its peak analgesic effect is 20 minutes and can cause respiratory depression within 3 to 7 minutes of administration. Morphine is excreted in the urine so check the patient's renal function

Muscle relaxation

Muscle relaxation is measured by way of DC current passed through voluntary muscle tissue, usually the wrist or facial muscles using as nerve stimulator. Muscle tone must return before a patient can be safely extubated, this is usually measured by response to a **Train of Four** DC shocks (TOF.) A visual muscle contraction to all four currents represents full return of muscle tone. Absence of contraction or fading contractions indicates residual NBA.

Neuromuscular blocking agents

In situations where intubation is required or complete paralysis is necessary to allow surgery, a neuromuscular blocking agent is administered. These agents act by interfering with the action of acetylcholine blocking the receptors on the post synaptic muscle membrane: Neuromuscular signals from the motor nerves are prevented reaching voluntary muscle tissue. There are two types of NBA: non depolarizing and depolarising.

Nitrous oxide

Nitrous oxide is an inhaled anaesthetic agent which produces a rapid onset of induction and recovery. This agent can increase ICP and cerebral blood flow and has been linked to increasing the size of a pneumothorax and an air embolism.

Non depolarizing agents

Non depolarising agents act by preventing the absorption acetylcholine to cholinergic receptors and prevent changes to the end plate which causes muscular tone and contraction. They are administered intravenously and have a slower peak onset of 1.5-3 minutes depending on the drug and dose, and a longer, variable half life. Non depolarizing muscle relaxants either wear off by the end of the procedure or the patient is given a reversal agent (Neostigmine). It is important to remember that Neostigmine has a shorter half life than most non depolarizing agents

Parecoxib (Dynastat)

Parecoxib is a Selective COX-2 inhibitors are a type of non-steroidal anti-inflammatory drug (NSAID) that directly targets cyclooxygenase-2, COX-2, an enzyme responsible for inflammation and pain.

Pethidine

Pethidine is a narcotic analgesic and has similarities to morphine. It exerts agonist activity at the opioid receptors located in the central and peripheral nervous system. Its main effects are on the central nervous system resulting in analgesia, sedation, euphoria and respiratory depression. Pethidine also increases smooth muscle tone, causing spasm. Clinically pethidine is used for the relief of moderate to severe pain (including the pain of labour) and in other dosage forms as a pre-operative medication and as an adjunct to anaesthesia. Its analgesic effect is shorter than morphine, usually 2 to 4 hours.

Propofol

Propofol is an IV anaesthetic agent which presents in a 1% or 2% concentration and is administered undiluted by bolus or infusion. Distribution and elimination half lives are 1-2 minutes and 1-5 hours respectively, with hepatic and renal elimination. Recovery is rapid with minimal residual effects. Prolonged administration is not recommended due to the risks of developing Propofol infusion syndrome.

Rocuronium

Rocuronium bromide is an aminosteroid non depolarising neuromuscular blocking agent. It is reversed by sugammadex.

Remifentanyl

Remifentanyl is a potent and short acting opioid analgesic and can be used for sedation purposes when combined with other medications for general anaesthesia.

Sevoflurane

Sevoflurane is an inhaled anaesthetic which produces a rapid onset of induction and recovery. This is regarded as the preferred agent to use for paediatrics.

Sodium Pentothal

Sodium pentothal is an IV anaesthetic agent which has a rapid onset and is short acting barbiturate.

Suxamethonium

Suxamethonium or succinylcholine is a depolarising neuromuscular blocking agent which induces short term paralysis usually to facilitate endotracheal intubation. This has the fastest onset and shortest duration of action of all the muscle relaxants and is the preferred choice for rapid sequence induction (RSI). This is incompatible with thiopentone.

Thiopentone

Thiopentone is an ultrashort acting depressant of the central nervous system which induces hypnosis and anaesthesia, but not analgesia. Induction occurs within one arm-brain circulation time, which is the time taken for a substance injected into an arm to reach the brain which is usually 10 – 20 seconds and recovery occurs within 5 – 10 minutes after a single administered dose. Repeated intravenous doses leads to a prolonged anaesthesia

because fatty tissues act as a reservoir. It is also used in the treatment of status epilepticus and intracranial hypertension. This is a Section 29 medicine when administered IV.

Tramadol

Tramadol is a centrally acting synthetic analgesic of the aminocyclohexanol group with opioid like effects. It works by binding to μ opioid receptors and inhibition of re-uptake of noradrenaline and serotonin.

Vecuronium

Vecuronium bromide is a non depolarising neuro muscular blocking agent

Common Surgeries

At Wellington Hospital we have 15 operating theatres on level 3, 1 caesarean theatre on level 4, brachytherapy on level 2, angio suite, MRI, CT scanning, radiology, lithotripsy bus and the PACU procedure room. We cover the post-operative care for all of these areas.

As a tertiary level hospital we cover all specialties including cardiothoracics, eyes, urology, general, orthopaedics, vascular, ENT, gynaecology, neurosurgery and obstetrics. We cover these 24/7.

The most common post-operative patients you will see during your time includes:

- Caesarean sections
- Thoracotomy
- Vitrectomy
- TURP & TURBT
- Laparotomy
- I & D of an abscess
- ORIF
- Thrombectomy
- Adenoids, Tonsils and Grommets
- Hysteroscopy
- D & C
- Burr holes
- Craniotomy

It would be good for you to gain a basic understanding of these surgeries. There are great resources online and (*if you aren't too squeamish*) check out some videos of the surgeries on YouTube! During your time here you will also spend a day in theatre so you may get to see some of these in action.

Post-operative complications

Patients are at risk of several post-operative complications.

Think about how and why would you manage the following Post op complications?

- Bleeding
- Hypotension
- Hypothermia
- Low respirations
- Low saturations
- Nausea
- Obstructed airway
- Pain
- Vomiting

Aspiration

Foreign bodies inhaled into the trachea and lower airways. These can be vomit, gastric contents, blood, secretion, pharyngeal or laryngeal oedema, a piece of tooth, a throat pack, a fragment of adenoid tissue.

Signs and Symptoms

- Strider
- Evidence of vomit or foreign body in mouth / nose
- Cyanosed low SpO₂ that is not relieved by high flow oxygen

At Risk Patients

- Emergency surgery
- Obesity
- Hiatus hernia
- Pregnancy
- Bowel Obstruction
- Trauma surgery
- Not fasted
- Diabetes (where there are automatic or other neuropathies)
- Abnormal pharyngeal, laryngeal, or upper airway anatomy
- Neuromuscular disease
- Scleroderma
- Unprotected airway
- Patient positioned on back post extubation

Treatment

- Immediate
- Get help
- Clear airway (Suction)
- Give high flow oxygen (consider CPAP)
- Monitor ECG, SpO₂, BP, Blood Gasses, Chest x-ray

Prevention

- Anaesthetic assessment (loose teeth, nil by mouth, or last time had oral intake)
- H₂ receptor antagonist pre-operative (ranitidine)
- Patients recovered on left lateral position

Bronchospasm

Bronchospasm results due to an increase in bronchial smooth muscle tone with closure or significant narrowing of the small airways. Airway oedema develops causing secretions to build up.

Signs and Symptoms

- Wheezing
- Dyspnea
- Use of accessory muscles
- Tachypnea

At Risk Patients

Patients with pre-existing pulmonary disease (emphysema, asthma, COPD)

May result from

- Aspiration
- Intubation
- Suctioning of trachea or pharynx
- Allergic response

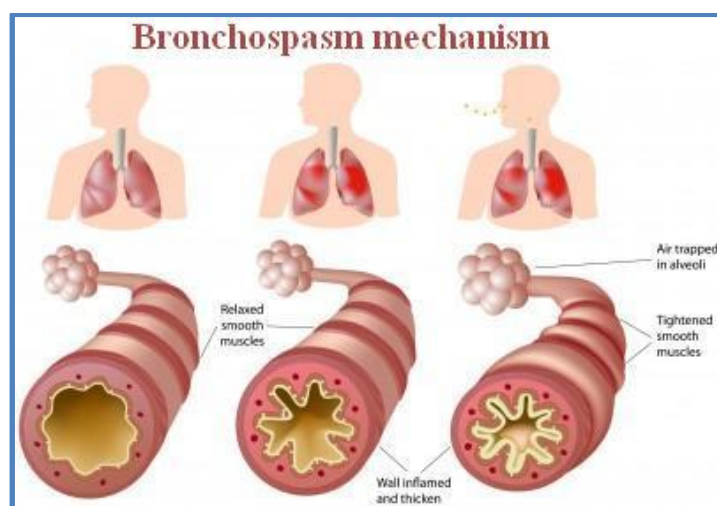
Treatment

Immediate removal of precipitating cause

Pharmacological intervention with the aim of decreasing airway irritability (anti-allergy)

Promote Dilatation drugs used include –

- Salbutamol (neb)
- Aminophylline
- Adrenaline (neb)
- Atropine
- Glycopyrate (neb)
- Steroids



Laryngospasm

Laryngospasm is a contraction of the laryngeal muscle tissue. This may be complete with complete closure of the vocal cords or incomplete where the vocal cords are partially closed.

Signs and Symptoms

- Patients are awake and agitated
- Feels they are suffocating
- Unable to get 'air' in
- Dyspnoea
- Hypoxia
- Hypoventilation
- Paradoxical rocking motion of the chest wall
- Incomplete may present as a crowing sound or strider

At Risk Patients

- Secretions on larynx e.g. from tonsillectomy.

Can be initiated by:

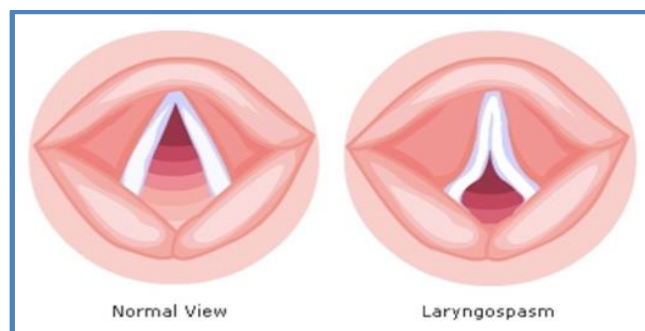
- Pre-op: Asthma, COPD, Smoking
- Intra-op: Endotracheal tube, multiple attempts at intubations
- Post-op: Coughing, bucking on ET tube, repeated suctioning

Treatment

- Immediate
- Jaw support
- Positive pressure ventilation with mask, ambubag and oxygen
- If above is ineffective then intubation is considered

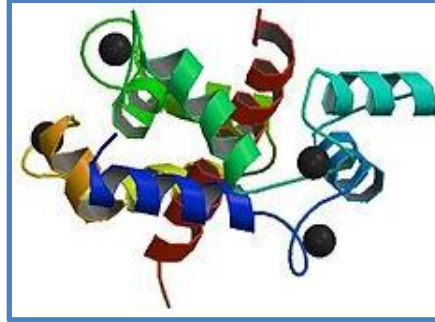
Prevention

- The use of muscle relaxants intra-op can prevent intermittent laryngospasm
- Extubate very deep or very light



Malignant Hyperthermia

Malignant Hyperthermia is a rare but extremely dangerous muscular genetic abnormality, usually with the ryanodine receptor 1 gene, that prevents the re-uptake of calcium ions from the neuromuscular pathway. The triggering agents are Suxamethonium and volatile anaesthetic gases. The muscle cells have an abnormal protein on their surfaces and when the calcium stored in muscle cells is released, life threatening events develop. Symptoms usually present within the first hour but can be delayed for 12 hours.



ryanodine receptor 1

Signs and symptoms

- Breathlessness
- Brown coloured urine due to rhabdomyolysis
- Confusion
- Diaphoresis
- Flushed skin
- Hypercapnia
- Hyperthermia
- Hypotension
- Hypoxia
- Muscle contraction and rigidity
- Pain especially in the jaw
- Tachycardia
- Tachypnoea



At risk patients

- Genetic link – autosomal dominant pattern

Treatment

- Dantrolene
- Cooling
- Symptom management
- Malignant hypertension trolley and guidelines



MH trolley in PACU



Dantrolene IV

The primary medication used for the treatment and prevention of MH is Dantrolene sodium. It is a postsynaptic muscle relaxant that lessens excitation-contraction coupling in muscle cells. It achieves this by inhibiting Ca²⁺ ions release from sarcoplasmic reticulum stores by antagonizing ryanodine receptors.

Dantrolene is a hydantoin derivative that directly interferes with muscle contraction by inhibiting calcium ion release from the sarcoplasmic reticulum, possibly by binding to ryanodine receptor type 1 (RYR-1)

Obstruction

Airway obstruction can be either complete or partial after a general anaesthetic. It can happen anywhere between the lips or nose, and the alveoli.

Signs and Symptoms

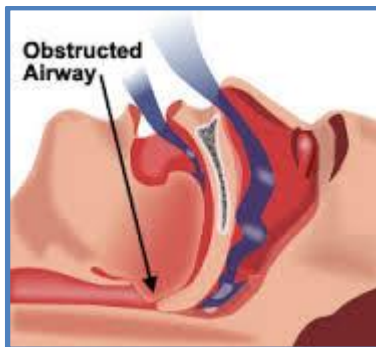
- Noise with breathing – if partial obstructed (can be like snoring)
- Quiet – if completely obstructed
- See-sawing abdomen or rocking (the diaphragm is still moving up and down)

At risk patients

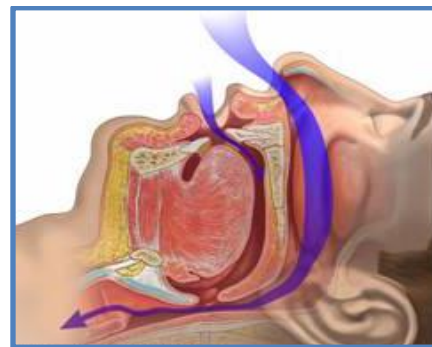
- Short or fat bull necks
- Stiff necks
- Previous cervical spinal surgery or injury
- Prominent protuberant upper teeth
- Under slung jaws or receding chin
- Down's syndrome
- Patients who cannot open their mouth widely

Treatment

- Immediate
- Inspect patient's mouth and nose
- Suction out secretions or foreign bodies
- Give 100% oxygen by mask
- Give jaw support
- Insert an oral airway
- Sometimes a well lubricated nasal pharyngeal airway can be useful to maintain a difficult airway



Obstruction caused by the tongue

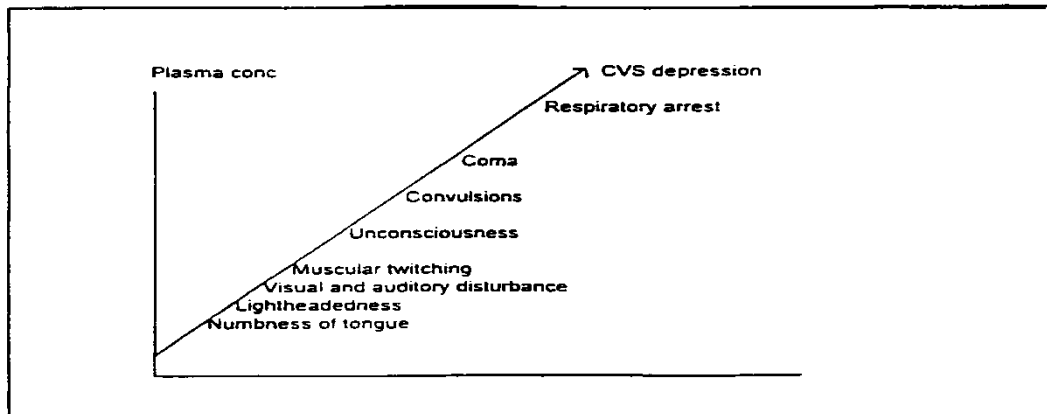


jaw support applied to open airway

Local Anaesthetic Toxicity

Local anaesthetics act on the nerve cells at toxic levels and on the central nervous system and cardio vascular system. Toxicity can occur as a result of inadvertent overdoses or accidental intravenous injection. It can occur with accumulation of the drug over a period of time. The central nervous system is the first affected with symptoms progressing from oral numbness and tingling to convulsions, coma - cardiovascular toxicity may ensue leading to arrhythmias or asystole.

Progression of signs and symptoms of local anaesthetic toxicity.



Actions if you suspect Local Anaesthetic Toxicity:

- Stop bolus/infusion
- Contact APMS or on call Anaesthetist #6449 immediately for advice
- If emergency assistance is required, dial 777 and activate a Medical Emergency call
- Follow usual resuscitation guidelines

Intralipid therapy may be required. (Intralipid bags and specific administration guidelines are stored in PACU).



Writing Notes in PACU

Using a format is really helpful for writing comprehensive notes in PACU, so you don't forget to document anything. Your notes also need to be **concise, eligible, appropriate and accurate**.

Most RNs in PACU use the following format:

On arrival: A V P U (this is level of consciousness- and you circle the appropriate letter).

A: Airway, write your assessment of the patient's airway on arrival.

B: Breathing, write your assessment of the patients breathing on arrival

C: Cardiovascular, write your assessment of the patients cardiovascular system on arrival

D: Disability and don't forget glucose (if applicable). Write your assessment of their LOC.

E: Environment, write your assessment of their temperature, drains, dressings and other information.

After your initial assessment it is useful to write the time and your assessment of the patient, plan and actions.

Pain Assessment Tips

In PACU, one of our main jobs is managing post-operative pain. We may use different words to help patients describe their pain to us. For example, "what is your comfort level like", "could you go to sleep right now", "is your pain manageable". Using these phrases help to better understand patient's current pain level and when it starts to improve. These can be used concurrently with your normal pain assessment, however they provide a broader picture of how the patient manages pain. Your preceptors will guide you in different ways to assess pain levels.

For example:

On arrival:

A V P U.

A: Patent, Maintaining own airway, talking, nil distress

B: Regular spontaneous breaths, nil respiratory distress.

C: Warm and well perfused, radial pulse strong, regular, normotensive.

D: Alert, GCS 15, BGL 8.2mmol/L. No complaints of pain or nausea.

E: T: 36.5 tympanic. Dressing intact and dry, wound site soft. IDC draining good amounts of clear urine. IVC patent, IVF running at 100ml/hr (2nd litre from OT). Good colour, warmth, movement and sensation in all limbs. Patient moving self around bed well.

1335: Pt comfortable, no pain or nausea, sleeping on and off. Dressing remains dry. NOK called and informed patient in PACU and doing well.

1400: Pt awake, had sips of water, meets discharge criteria, ready for ward. Await ward nurse to collect.

PLACEMENT EVALUATION

Please complete as much of the following with your allocated nurse. They can be discussed or observed to complete the competency. Always consider why you are doing the intervention.	Achieved.
Cardiovascular	
Explain deep vein thrombosis and pulmonary embolism prophylaxis	
ECG interpretation – What is sinus rhythm?	
ECG – obtain a 12 lead	
Hypo/hyperglycaemia management – find the policy and discuss	
Hypotensive causes and management	
Hypertensive causes and management	
Perform a manual blood pressure	
Neuro	
Explain the components of a Glasgow Coma Scale assessment	
What is an External ventricular drain (EVD)	
Neurovascular	
What observations would you do on a fractured limb	
Explain why you elevate the fractured limb	
Pain Management	
Analgesia – name 3	
Antiemetics – name 3	
Dermatome assessment	
Pain assessment tools	
Reversal agents to opioids	
PACU	
Bedspace check	
Complete the documentation from admission to discharge	
Discuss the daily checks and why are they necessary	
Respiratory	
Jaw thrust or chin lift	
Laryngeal mask airway removal	
Management of <ul style="list-style-type: none"> • Aspiration • Atelectasis • Laryngospasm 	
Oral or nasal pharyngeal airway insertion or removal	
Oxygen application via nasal cannula or Hudson mask	
Oxygen prescription	
Other	
Prime an intravenous line	
Attend a pain team round	
Follow a patient through theatre	
What Infection, prevention and control measures are there in PACU	
Doppler pulses	
Explain the 5 moments of hand hygiene	

Please return this to the CNE on your last day of placement.

We would like to know of any ideas or suggestions you have that may help us to ensure that future students have a positive experience.

Did you feel welcomed and well supported during your placement?

How did the preceptors help you fulfil your objectives?

What did you like the most?

What changes could PACU make to improve your placement experience?

Other comments / suggestions:

