



**Additional information for trainees to underpin
PowerPoint presentations**

Trainer's notes to guide presentation

PACU Breathing : MANAGEMENT
[general + specific]

Learning and Teaching Resource

Additional Information : Breathing management [general guidelines]

Good management is all about understanding risk and preventing respiratory complications. An understanding of the risks of anaesthesia, surgery, patient factors are vital in pre-empting complications. If complications occur, intervention must be swift and appropriate. **At any given time in the continuum from normal to clear deterioration in respiratory function, the nurse must call for help if breathing does not improve after any given intervention.** There are many causes of post anaesthetic hypoxia, some single, some multifactorial and early signs should be looked out for. Risk assessment is of major value here. Intervention is directed towards immediate delivery of high flow oxygen even when the cause of the complication is not understood.

There are three sections in this section :

1. General guidelines in routine management of breathing
2. Management Stages 1:2:3 – guidelines to manage the deteriorating patient
3. Specific guidelines for management of known complications : i.e. central respiratory depression, residual paralysis.

1. General guidelines on respiratory management

On handover : physical assessment:

- a. Assess patency of airway [look listen feel : refer to Airway Presentation Supplementary notes for detail]
- b. Assess respirations : rate and depth, regularity, noise, colour, air entry. Monitor $\text{SaO}_2/\text{EtCO}_2$
- c. Level of consciousness : if unconscious, assess depth of status
- d. Cardio-Vascular status : BP and HR

Risk assessment : questions to ask :

- e. Type of anaesthesia : GA : drugs dosage and time delivered [anaesthetic agents, drugs, opioids, muscle relaxants, sedatives]
- f. Assisted ventilation [IPPV] or spontaneous?
- g. Position in theatre?
- h. Length of procedure?
- i. Nature of surgery?
- j. Patient age?
- k. Patient respiratory history / is patient a smoker?

From the above factors an understanding of possible risks of hypoventilation can be made [list or add up factors here].

Plan care to optimize respiratory performance

The objective of care must be to recruit alveoli and ensure optimal uptake of oxygen into the blood stream and elimination of CO₂ from the blood. This care plan applies to all patients who have had general anaesthesia.

- **Stir up regime** : designed to stimulate the unconscious, semi-conscious patient, orientate to surrounding and encourage to deep breathe. This involves calling the patient name, gentle facial touch to help stimulate patient to awareness and to test how deeply unconscious he is. If there is a prolonged delay in return to consciousness coupled with signs of respiratory depression an incremental dose of Narcan / or Dopram [anaesthetic decision] may be required. Once awake the patient is encouraged to deep breathe and cough to recruit the alveoli. Sitting the patient up as soon as he is able will help respiratory excursion. Sometimes a pillow will help support the thorax or abdomen when attempting to cough. It is very important to analgesia patients to ensure that they do not splint respirations. Incentive spirometry is also useful here.

- **Oxygen administration** : all patients receive oxygen 4-6 litres via mask or T piece to increase oxygenation and help eliminate anaesthetic volatile agents and nitrous oxide from the body. This also ensures the cardiovascular system is well supported until the initial effects of anaesthesia wear off. If the patient shows any sign of respiratory impairment deliver high flow oxygen fast.
- **Regular observations** of respiratory rate, depth, pattern of breathing are taken throughout the patient stay in PACU. If the risk factors are low the patient will usually make an uneventful recovery.
- If the patient has **multiple risk factors**, the likelihood of respiratory complications increases. It will take longer for the patient's respiratory homeostasis to return. Meticulous care to consider all the reasons for possible deterioration in respiratory performance is needed. For example if the patient is a smoker, is obese and has undergone a prolonged laparotomy the risk factors are high, but with meticulous planning there is no reason why complications should set in. This high risk patient should be sat up semi prone as soon as awake, this will allow the patient to deep breathe and cough up secretions, clear the airways and recruit alveoli. Sitting up will ensure that lung bases are relieved of pressure and aids pulmonary perfusion. Analgesia is critical to good performance here. Use of pillow to aid coughing and above all continual encouragement and reassurance to talk the patient through is key to success.

With careful assessment and consideration of risk factors and timely intervention, the patient regains control and optimises respiratory performance. However, even with the best plan, things can go wrong.

Respiratory impairment and hypoxia can occur fast. Sometimes in the acute event, it is not the time to analyse exactly why the patient is in trouble [for example if the patient is still unconscious the reason for deterioration may be a mixture of obstruction and central respiratory depression]. For this reason the following Management Stages 1 : 2 : 3 have been devised to rationalise decision making. Staging management interventions gives the practitioner confidence that, while waiting for help, they can deliver high flow oxygen to the patient even when deteriorating fast.

2. Management Stages 1 : 2 : 3 for the deteriorating patient

Stage one :

- **Stage one 'deteriorating patient'** - patient demonstrates signs of respiratory difficulty - falling SaO₂, rising ETCO₂ slow, shallow respirations, pallor, marked noise of breathing [wheeze], dyspnoea [increased work of breathing, use of accessory muscles], signs of confusion, agitation if patient awake.
- If patient shows one or more of the above signs aim to ensure airway clear and deliver full flow oxygen. Sit up if capable, encourage deep breathing, ensure pain free, check muscle strength. If patient condition continues to deteriorate move onto Stage 2 Management.
- If patient demonstrates all, or a mix of the above signs, get help and move onto Management Stage 2 immediately.
- In either of the above cases, early anaesthetic intervention and analysis of cause of the problem may deliver the appropriate therapeutic solution. Appropriate drugs/equipment should be drawn up and ready. If no improvement, summon help and move onto stage two.

Stage two :

- The patient show signs of deteriorating respiratory function despite interventions.
- Ensure clear airway
- Deliver positive pressure oxygenation via bag-valve-mask [2 person operation is easier / one to maintain airway and the other to deliver oxygen].
- Assemble emergency intubation equipment and drugs.

Stage three :

- Assist anaesthetist with endotracheal intubation / or insertion of LMA / iGel]
- Assist in hand ventilating patient or preparing the ventilator for use.
- CXR, arterial blood gases, reversal drugs if needed.

Trainer Notes : Breathing Management [general guidelines]

These notes are for the trainer using this presentation as an aid to teaching

Management [General Guidelines] Presentation slides :

*2 : emphasise that this presentation considers **general guidelines** for treatment. Systemizes intervention in 3 stages. For detail on management of specific breathing problems see the next PPP [Specific Respiratory Problems].*

3: a reminder of the effects of GA and surgery on the respiratory function is given here. These 'background' factors [prolonged ventilation, loss of surfactant etc] are often overlooked in critical assessment. Remind students of underpinning applied anatomy and physiology. A discussion on these factors at this point would be useful. Again constant revision of assessment criteria should be used throughout this presentation as precursor to management intervention

*5: these slides describe routine care for **all patients post general anaesthesia**. These interventions are crucial to good respiratory care, either to prevent, or treat complications. The overall aim is to open up airways, alveoli and get oxygen to all branches of the respiratory tree.*

6: oxygen delivery important part of routine recovery. Reasons for oxygen delivery not always understood. Remind students about Nitrous Oxide effect on the lungs.

7: stir-up regime is very important. Take time here to discuss in depth what it means, how it is used to wake patient and maximise respiratory effort.

Gauging the depth of unconsciousness by stimulating patient is part of routine physical assessment. Emphasise 'gentle stimulation' – it is no longer acceptable to deliver painful sternal rubs. Discuss how you use touch and voice to wake patient.

Risk appraisal [drugs doses, time of delivery, length of procedure] will further inform practitioner as to the likely length of unconscious state. Pin point pupils denote opioid overdose. If breathing shallow and slow may need reversing – narcan or dopram.

8: pain relief is vital in respiratory management. If breathing painful, full respiratory excursion will be avoided. A discussion around multi-modal analgesia would be useful.

9: deep breathing and coughing again crucial to open up airways. Emphasise here the important of talking through this with the patient to encourage them to 'cough on third breath out' while holding a pillow to support the effort.

10: use of incentive spirometer and CPAP is not routine in respiratory management but may be used to help ventilation in patients who greater respiratory support. Again the patient needs to be encouraged to use the spirometer. CPAP masks are very uncomfortable, again clear explanation as to the purpose and use of CPAP needs to be given and support while the mask is in situ.

13: emphasise the fact that normally recovery is 'routine' but that you can never take this for granted / meticulous observation and assessment is needed in the early recovery period.

15: as with Airway PPP – three stages of management have been set out here to give practitioners a guide to fall back on if respiratory performance is deteriorating fast. There is no need to panic – if you try out routine manoeuvres : establish airway, high flow oxygen and these fail to work – get help, and apply positive pressure ventilation via bag-valve-mask. On arrival of the emergency team the patient may be intubated and ventilated and the specific problem treated.

16: oxygen, oxygen, oxygen – it cannot be repeated too often! Avoid hypoxia and ventilate to exhale carbon dioxide.

17: Stage one interventions resemble interventions for 'normal recovery'. This should be quite familiar to novices by this stage.

18: Signs that patient is deteriorating will alert you that HELP IS NEEDED. When to call for help is the crucial decision - from the moment help arrives, the situation is taken over by senior management. This would be a good point to break for a discussion of 'when to call for help' and allow novices to voice their possible insecurities around this area.

19: This mantra cannot be over emphasised!

20: Bagging and delivering oxygen to patient gives time to consider the specific cause of the problem. Sometimes it is clear as signs are classic [i.e. pinpoint pupils = opioid overdose leading to hypoventilation]. At this point reversal drugs would be administered. If no cause is found and patient does not improve – proceed to Stage 3.

22 : Intubation and ventilation : practitioner needs to be skilled in assisting the anaesthetist [see Airway Module] – a reminder of the process and equipment needed for intubation would be useful here.

24 : An interesting high risk patient scenario for group discussion. Consider the risks and how this patient would be managed.



Additional information and Trainer's notes on presentation 'Specific Complications : Breathing

Trainer notes : Specific Respiratory Problems

These notes are for the trainer using this presentation as an aid to teaching

Specific Respiratory Problems Presentation slides :

This PPP focuses on specific respiratory problems a couple of which have already been reviewed in the Airway PPP [Residual Paralysis and Bronchospasm].

Hypoventilation. Like hypoxia this is a broad term which covers a multitude of factors. These two slides demonstrate the complexity attached to this term!

Central Respiratory Depression : this is a large subject simply because it is a common problem [to a greater or lesser degree]. All of the information has been already covered in this Breathing Pack in Basic Science, Anaesthesia and Assessment/Management. All the concepts should by now be very familiar. Actually it is quite a neat scenario / readily assessed with clear guidelines for treatment and drugs which can reverse the problem. The fact that with unconsciousness, there is always the risk of airway occlusion does complicate because airway obstruction must be the first priority to be managed. Sometimes you can miss respiratory depression because you assume the problem is solely due to airway.

Residual paralysis. This is another complication which once you have witnessed, you will easily recognize again. Classic signs of tremor, weak muscle tone, inability to coordinate breath, and failure to stick out tongue etc leave one in no doubt

as to the problem. Summoning help fast, then sitting up the patient, reassuring them, helping them to co-ordinate breaths will help the patient until the anaesthetist arrives to give more neostigmine, the treatment of choice.

Atelectasis : the shut down of a lung segment is very common post anaesthesia and can be due to one specific factor [i.e. obstruction to one bronchus] or a mixture of collapsed alveoli, due to loss of surfactant, secretions, loss of alveolar ventilation, respiratory reserve. Non specific hypoxia and diminished breath sounds are key to establishing this problem. The treatment is ongoing Stir up Regime to open up the lung fields – CPAP will be used if severe.

Pneumothorax : there are multiple causes of this in peri-anaesthesia nursing, however it is a rare event in the PACU. Sudden chest pain or difficulty in breathing, unequal chest wall movement should alert the nurse as to the nature of the respiratory problem. Listening for chest sounds will confirm the diagnosis. Oxygen is the treatment – small pneumothorax will dissolve on its own. Chest drain may be needed – an anaesthetic decision having studied CXR

Tension pneumothorax : this is an emergency where air escapes into the pleural cavity and cannot escape out but build up and pushes on into tissues. The trachea pushes over to one side, and heart can be squashed. Very frightening for the patient who struggles to breathe. There are no sounds on the affected side. Help must be summoned, high flow oxygen given and a needle inserted to aspirate the air. A chest drain needs to be inserted quickly.

Pulmonary embolism : a fat or blood clot from deep vein thrombosis can block major pulmonary vessels leading to serious hypoxia, breathlessness, anxiety, and CVS instability. This is a medical emergency. Confirmed with pulmonary angiography the patient will need high flow oxygen and cardio-vascular instability must be treated. Anticoagulation will be started immediately.

Pulmonary oedema : usually as a result of left sided heart failure which may be caused by fluid overload. Also chest injury or airway obstruction which can distort the relationship between hydrostatic and osmotic forces in the pulmonary capillaries. The end result is that blood diffuses across the pulmonary capillaries into the alveoli – the patient coughs up

pink frothy sputum, the classic sign of this problem. Severe hypoxia and dyspnoea occur. This is an emergency : diuretics are needed to drain off fluid which should be restricted. Oxygen, and IPPV if indicated. Reducing afterload will mean that the left ventricle will not work hard in ejecting blood into the circulation, and help to reduce the strain on the left heart which may have caused the pulmonary oedema.

Asthma : while patients with asthma should always travel with their nebulizer, and of course the condition must be signalled to the PACU nurse, really this problem is not a common one in post anaesthesia care as volatile agents dilate the bronchioles. Usually a metered dose of patient's own medication is enough to relieve the asthma.

Chronic obstructive pulmonary disease [COPD]. Smoking is a key factor here : this disease leads to mucous secretion, inflamed, irritable, floppy airways and loss of alveoli. These patient require extremely careful management. Ideally AGB's taken pre operatively should guide oxygen therapy post operatively via a controlled Venturi system delivering the appropriate oxygen % for the patient. Giving too much oxygen will prevent the patient breathing as he relies on oxygen lack, rather than CO₂ excess as his prime respiratory stimulus. Coughing with adequate pain management is a standard treatment while CPAP may be needed to help ventilate this patient and deep breathing,