

BASIC AIRWAY RESUSCITATION STRATEGY



student handbook

All materials regarding the Basic Airway Resuscitation Strategy Course were written and developed by Dr. Richard Morris and associates. AbbVie Pty. Ltd. is proud to be the sponsor of the Basic Airway Resuscitation Strategy Course, but was not involved with the writing and development of this course material.

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COURSE NOTES FOR BASIC AIRWAY RESUSCITATION STRATEGY

Introduction

Assess the Patient

Open the Airway

Bag Mask Ventilation

Supraglottic Airways

Endotracheal Intubation

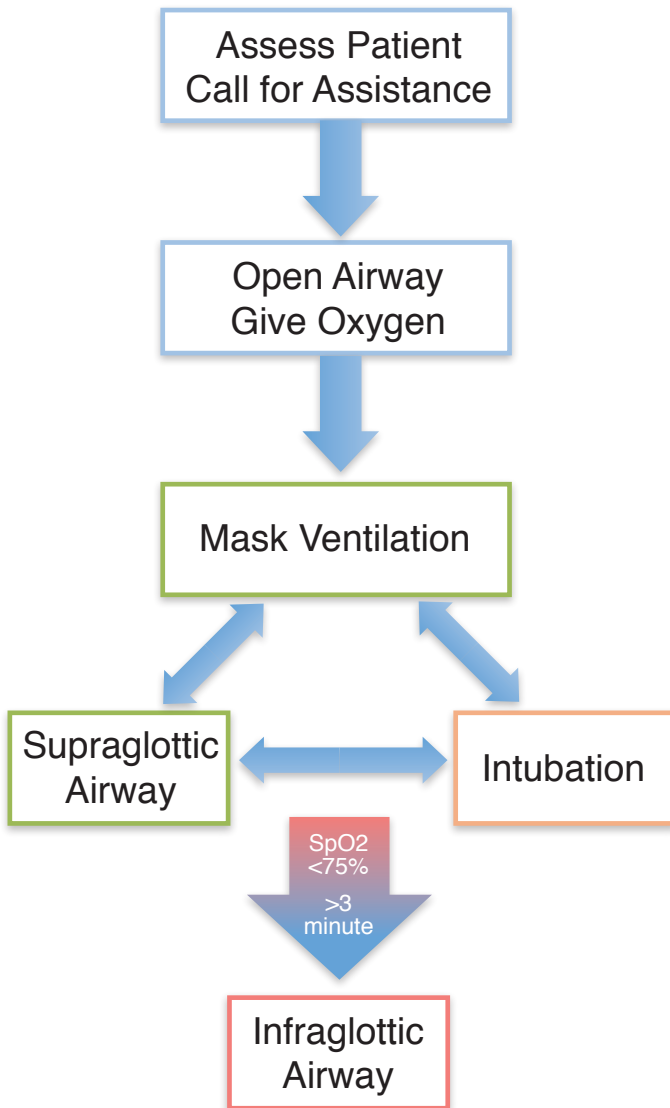
Transtracheal Oxygenation

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BASIC AIRWAY RESUSCITATION STRATEGY



Assess Patient/ Call for Assistance

Responsive? Look, feel & listen. Attach Pulse Oximeter
If no response, no breathing. Call cardiac arrest.

Give Oxygen / Open Airway

Head tilt with chin lift, jaw thrust. Oral +/- nasal airways

Bag Mask Ventilation

Check bag: No leak when occluded.
Oxygen reservoir filling

Supraglottic Airway [3F, 4M]

Two attempts only. Insert with jaw thrust
Confirm with capnography.

Intubation [7.0 F, 8.0 M]

Set up equipment before starting.
Two attempts only. Patient unresponsive to pain.
Consider head position, Laryngeal manipulation,
Bougie, Smaller tube, Alternate laryngoscope blade.
Confirm with capnography.

Infraglottic Airway

Use cannula with high-pressure oxygen source.
Keep mask ventilating at the same time.
Attempt emergency surgical airway if trained.

If In Doubt Take It Out

If saturation <85% try an alternative.
If saturation <75% for >3 minutes try infraglottic airway.
Airway pressure high = blocked, low = leak.

INTRODUCTION

Objectives

- Prevent Hypoxia
- Open and Protect the Airway
- Support Ventilation

Levels of Response

- Bag Mask Ventilation
- Insertion of a Supraglottic Airway
- Insertion of an Endotracheal Tube
- Transtracheal Oxygenation

Measures of Success

- Monitor Oxygen Saturation & End Tidal CO₂
- Look, Listen and Feel
- Assess Inspiratory Pressures

If airway problems lead to severe hypoxia for more than a few minutes then brain injury becomes likely. If hypoxia is present then escalation of response needs to be achieved with timely backup by extra personnel, equipment.

BARS [the Basic Airway Resuscitation Strategy] is a systematic approach to dealing with a compromised airway that is similar to the BLS approach to a cardiac arrest or the ATLS approach to the initial presentation of the trauma patient.

The BARS workshop will provide:

- Slides to understand the strategy
- Skill stations to practice the manoeuvres
- Scenarios to practice putting it all together

ASSESS THE PATIENT

The commonest cause of airway and breathing problems is a reduced level of consciousness. This may be secondary to trauma, drugs, or brain injury.

Always **assess consciousness** – is the patient responsive?

Look to see if the patient is breathing – check both the chest and the abdomen. Look also for signs of partial obstruction – tracheal tug, use of accessory muscles.

Listen for abnormal breath sounds – noisy breathing, snoring sounds and stridor. Absence of sound is not always a good sign.

Feel by placing your hands on the chest and abdomen.
With airway obstruction the chest and abdomen may be moving abnormally (asynchrony).

***If** the patient is not responsive **and** they are not breathing normally, activate the cardiac arrest protocol and start CPR*

Attach Pulse Oximetry if available. Is the saturation >85%?

Call for Assistance

As you are assessing the patient, call for assistance.

This is an active process. There is always somebody available who can help you.

***What** is the telephone number to call for assistance in your institution? **Where** is the emergency bell?*

OPEN THE AIRWAY

Unconsciousness can lead to loss of tone of the pharyngeal structures responsible for maintaining a patent airway.

In an unconscious patient, the most common site of obstruction is the tongue falling back against the posterior pharyngeal wall, blocking the oropharynx (Figure 1). The epiglottis itself can also cause obstruction.

Quickly check that blood clot, stomach contents or foreign objects are not causing obstruction. If this is the case clear the material, using suction if available for liquid material.



Figure 1. Airway obstruction caused by the tongue falling back on the posterior pharyngeal wall, soft palate and epiglottis.

Manoeuvres to open an obstructed airway

There are five simple manoeuvres that can help open a partially or completely obstructed airway.

- Head Tilt with Chin Lift
- Jaw Thrust
- Insert an Oral Airway
- Insert a Nasal Airway
- Lateral Positioning

These can be used individually or in any combination. They are effective when the patient is breathing spontaneously. They are also used with Bag Mask Ventilation to open the airway when positive pressure ventilation is being used.

Head Tilt with Chin Lift

This simple manoeuvre is often all that is required to open a partially or completely obstructed airway.

Place one or two fingers under the anterior mandible to raise the chin and gently tilt the head.

Care should be taken with trauma victims and with children under 5 years of age. These patients should be managed with the head in the neutral position. In small children take care as adult fingers can push on the soft tissue of the neck and worsen airway obstruction unless care is taken.

Jaw Thrust

Place two fingers behind the ramus of the mandible on both sides. The jaw should move forward (= translation) and the lower teeth should ideally be level or in front of the top teeth.

Jaw thrust is safe to perform in trauma patients. Pressure on the facial nerve will cause pain unless the patient is completely unconscious.

Oral and Nasal Airways

An oral airway (or Guedel's airway) creates a physical channel between the mouth and the glottis (Figure 2).

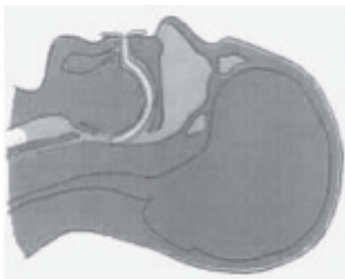


Figure 2. The oral airway lifts up the base of the tongue from the posterior pharyngeal wall to relieve the obstruction.

Check the correct size for the oral airway. Place the airway next to the patient - it should reach from the corner of the mouth to the angle of the jaw.

Insertion of an oral airway may cause gagging if the patient is not deeply unconscious. A nasal airway may be a better alternative in such cases.

A nasal airway sits with the flange just outside the nostril and ends above the level of the epiglottis (Figure 3). Check the correct size by placing the airway next to the patient - it should reach from the tip of the nose to the angle of the jaw.

After lubricating the nasal airway, insert it parallel to the hard palate, perpendicular to the floor. There should be minimal resistance to insertion.

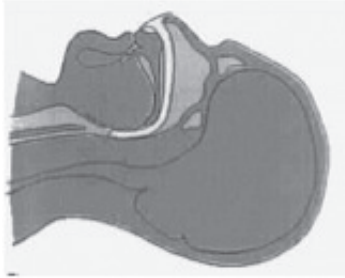


Figure 3. The nasopharyngeal airway sits above the epiglottis, but below the base of the tongue, to relieve airway obstruction.

Nasal airways are contraindicated in base of skull fractures.

Lateral Positioning

The lateral position, also called the recovery position, helps to open the airway. If safe to do so, positioning the patient may help to open the airway.

Airway Obstruction in the Conscious Patient

There are two cases where a conscious patient may have airway obstruction

- Choking
- Airway swelling / oedema

Choking

There is usually a history of recent eating or evidence of food nearby.

The patient clutches at their throat.

Encourage coughing, as this will usually dislodge the food bolus. If coughing is ineffective, treat with back slaps.

Airway Swelling

The airway may obstruct as a result of bleeding, infection or inflammation. Signs include noisy breathing (stridor) and difficulty breathing. Laying flat may worsen the problem.

Follow the airway algorithm as for the unconscious patient. Summon expert assistance quickly.

Measures of success

Success in opening the airway reduces obstruction with improvement in chest movement and air entry. Evidence of obstructed breathing such as noisy breathing should improve in the spontaneously breathing patient.

BAG MASK VENTILATION

Bag mask ventilation (BMV) is a critical primary skill in the management and maintenance of a patient's airway. Bag mask ventilation in a spontaneously breathing patient gives high inspired concentrations of oxygen. Positive pressure ventilation using BMV can be used for short term or long term oxygenation and ventilation of the patient.

Failure to intubate the trachea is much less of a problem if a patient can be oxygenated using bag mask ventilation.

Mask selection and application

The mask should sit over the bridge of the nose, press against the cheeks and rest lightly on the chin or groove between chin and lip. A correctly sized mask should yield a tight seal, with no air leak when using positive pressure ventilation.

Bag mask ventilation is a difficult skill to learn and should be practised in non-emergency situations. Two person BMV should be the initial choice of technique unless the operator is experienced in the technique, where one person BMV may be used. Mask ventilation is more difficult in patients with beards, the obese and edentulous patients.

Two Person Bag Mask Ventilation

One person concentrates on maintaining a mask seal, and keeping the airway open with head tilt / chin lift and jaw thrust. A second person can then squeeze the bag to provide positive pressure ventilation. Good communication is necessary, as small changes in patient positioning can affect the ease of bag ventilation. The operator ventilating the patient should relay any changes in compliance should they occur, which reveal obstruction of the airway or a leak around the mask.

One Person Bag Mask Ventilation

The mask is held with the left hand. The thumb and index finger are placed on the mask and apply gentle downwards force to maintain a seal. The other three fingers are placed under the mandible and pull the jaw up into the mask and also apply chin lift. The little finger can be placed behind the ramus of the mandible to apply jaw thrust.

During mask ventilation appropriate ventilatory pressures can be felt while squeezing the bag. Too low indicates a leak, too high suggests ongoing airway obstruction or poor respiratory compliance.

Bag Mask Ventilation

It is important to avoid pressures of greater than 25 cmH₂O for long periods, as high pressures increase the possibility of distending the stomach with air, increasing the risk of aspiration. Positive End Expiratory Pressure (PEEP) may be applied using an adjustable valve.

Before using a self-inflating bag confirm it is functioning correctly with the following steps:

- Occlude the patient connector with your thumb, squeeze the bag and confirm there is forward flow with no leak
- Check oxygen is connected, it is turned on and the reservoir bag inflates
- If a PEEP valve is present, set it to 5–10 cmH₂O

SUPRAGLOTTIC AIRWAY

Supraglottic airways are designed to sit in the pharynx above the glottis. They do not need any other equipment such as laryngoscopes for insertion. There are a large number of different devices that have evolved from the original Laryngeal Mask Airway (LMA™). Success rates of insertion of over 90% can be achieved with minimal training.

Supraglottic airways are inserted into the mouth until the distal tip sits in the upper oesophagus and the opening presses firmly against the laryngeal inlet. They have a cuff or cushion to enable a seal to be formed between the mouth and the glottis. They do not provide a seal against oesophageal contents entering the airway, however, many devices have a second lumen that can be used for suction or insertion of a gastric tube.

Successful insertion of a supraglottic airway is confirmed by:

- Capnography trace
- Evidence of air movement, chest movement and auscultation
- Maintenance of oxygen saturation > 85%
- Inflation pressures of <25 mmHg
- No distension of the stomach
- No air leak around the cuff

If in Doubt – Take it Out

If the first attempt at inserting a supraglottic airway is unsuccessful:

- Give oxygen by Bag Mask Ventilation
- Call for Assistance
- Consider changing the patient position
- Consider inflating / deflating the cuff
- Consider using a larger or smaller size supraglottic airway

No more than two attempts should be made at insertion of a supraglottic airway.

Supraglottic Airway

When ventilating through a supraglottic airway, it is important to avoid pressures of greater than 25 cmH₂O for long periods, as high pressures increase the possibility of distending the stomach with air, increasing the risk of aspiration.



Figure 5. The components of a LMA are an inflatable mask, airway tube and inflation line.

Confirm that the bag empties with appropriate inspiratory pressures. Too low indicates a leak, too high suggests ongoing airway obstruction or poor compliance.

Capnography is the most reliable method of confirming success using a supraglottic airway.

ENDOTRACHEAL INTUBATION

Placing an endotracheal tube can provide oxygenation, with the additional benefit of a cuff to reduce the risk of pulmonary aspiration.

Endotracheal intubation is a difficult skill to master. Prolonged attempts at intubation should **not** be performed if oxygenation is less than 85%. No more than two attempts should be made at endotracheal intubation.

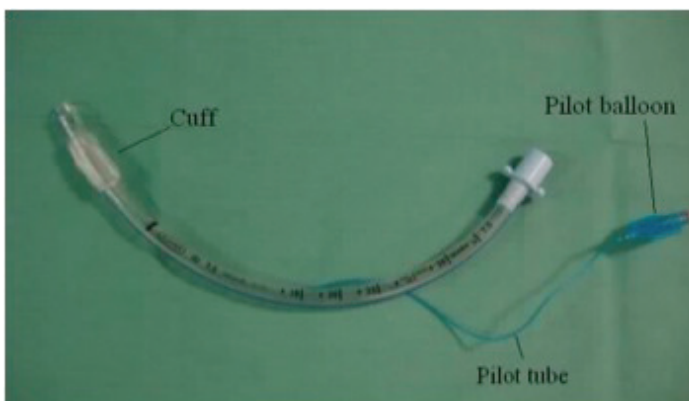


Figure 4. Standard endotracheal tube. Markings on the outside of the tube indicate the distance from the tip of the tube and the size of the tube (in this case a 7.5 mm internal diameter).

The minimum equipment for intubation of a patient is:

- Laryngoscope
- Correct sized tube
- Syringe to inflate cuff
- Tie to secure tube
- Self inflating bag or ventilation circuit
- Capnography or device to confirm tracheal intubation
- Suction

The laryngoscope

Choose the appropriate blade for the size of the patient and confirm that the light is functional prior to use. Videolaryngoscopes are an alternative that provide excellent vision and light and may improve the success rate of intubation, particularly among novice users.

The endotracheal tube

A 7.5 mm ID for adult women with 8.0mm for men is generally appropriate. For children the formula $\text{age}/4 + 4$ provides a guide. Always press the connector firmly into the tube prior to insertion.

The process of intubation

Place a low pillow under the patient's head. Position the head in the sniffing position (unless there is a contraindication). Insert the blade into the mouth, just to the right of the midline. Advance the tip down the tongue until it is in the fossa anterior to the epiglottis.

Lift the jaw anteriorly and inferiorly to bring the larynx into view. The handle should be at a 45-degree angle to the long axis of the patient and the vector of force should be along the handle itself. If the blade is inserted too deeply the entire larynx will be lifted up and only the oesophagus visualised.

Pass the tube down the right hand side of the mouth, trying to maintain a view of the tip of the tube passing through the cords. Insert it only until the cuff has just passed the cords. In an adult the tube markings should be 21–22 cm at the teeth. Inserting too far will cause an endobronchial intubation permitting ventilation of only one lung. Inflate the cuff until there is no leak and secure the tube with a tie to prevent it being displaced.

If the first attempt at intubation is unsuccessful run through a 7-point checklist before trying a second time:

- Give oxygen via Bag Mask Ventilation
- Call for assistance
- Consider changing the pillow or patient position
- Consider changing the blade or using a videolaryngoscope
- Consider using a bougie or introducer
- Consider using a smaller tube
- Apply external laryngeal manipulation

If cricoid pressure is impeding the process of intubation, it should be removed. A videolaryngoscope allows the assistant giving cricoid pressure or laryngeal manipulation to visualise whether they are helping or hindering the intubation attempt.

No more than two attempts should be made at insertion of an endotracheal tube.

If intubation is unsuccessful, use a supraglottic airway such as an LMA, or use bag mask ventilation.

Drugs to facilitate intubation should never be administered until appropriate staff and appropriate equipment and monitors are available.

Measures of Success

Capnography is the **only** reliable method of confirming tracheal placement. If the capnograph does not detect carbon dioxide consider the tube to be in the oesophagus and remove it. Blowing through the capnograph can quickly confirm that it is working. If a capnograph is not available, use a CO₂ detection device. If this is not available use an oesophageal detector device.

Unrecognised oesophageal intubation still remains a cause of death when capnography is not available or is ignored.

Look, listen and feel for the following:

- Symmetrical chest movement
- Air entry audible in both axillae on auscultation
- No air leak around the cuff
- Tube inserted to 21-22cm in adults.

Confirm that the bag empties with appropriate inspiratory pressures. Too low indicates a leak, too high suggests ongoing airway obstruction or poor compliance.

If in Doubt – Take it Out

TRANSTRACHEAL OXYGENATION

With prolonged hypoxia, the risk of permanent brain damage increases. When attempts at bag mask ventilation, insertion of a supraglottic airway and endotracheal intubation have not improved oxygenation, the next step is to oxygenate using a transtracheal technique.

The decision to perform this manoeuvre is difficult, but it may be life saving. A useful guide to this is if the oxygen saturation is **below** 75% for **more than** three minutes. It then maintains oxygenation until further expertise is available.

Three things are required for successfully oxygenating through the anterior neck:

- The decision to go ahead
- The equipment required
- Training in the technique

Cannula Cricothyrotomy

A large bore cannula is passed between the thyroid and cricoid cartilages angled towards the feet [Figure 6].

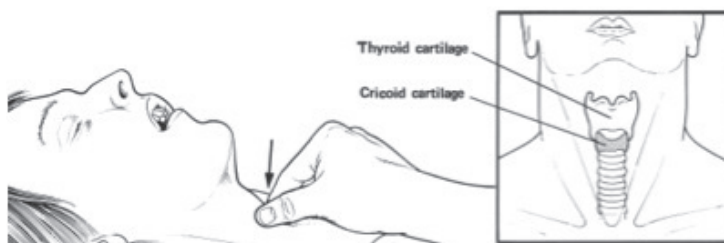


Figure 6. Palpation of the thyroid cartilage. The cricoid cartilage lies directly inferiorly

Insert the cannula while checking that it is in the trachea by aspiration of air. The cannula is then held in position to prevent movement and dislodgement. The Luer lock (intravenous connection) of the cannula is then connected to a source of high pressure, high flow oxygen. Options for this are a purpose-designed circuit such as the Enk Oxygen Flow Modulator, a dedicated Jet Ventilator or a homemade circuit.

Continue attempts at oxygenation through the mouth during the procedure

A homemade circuit can be constructed by inserting the spike of a simple giving set into the green oxygen tubing. A 5mm hole must be cut in the drip chamber with heavy scissors to act as a vent. Lower flow rates and a higher chance of kinking are problems with this homemade rig.

The steps of the procedure are:

- Attach a syringe to the cannula
- Extend the neck if appropriate
- Stabilise the larynx with your non-dominant hand
- Identify the cricoid membrane by palpation
- Insert cannula into the airway angling 45 degrees down and back
- Aspirate air to confirm correct placement
- Thread cannula off the needle advancing it into trachea
- Confirm air aspiration through the cannula with syringe again
- Continue to hold the cannula in position with your fingers to prevent displacement until it is removed
- Connect circuit between cannula and oxygen flow meter
- Intermittently occlude vent to direct oxygen to the lungs
- Attempt to synchronise this with continued mask ventilation from above
- Seek a long-term solution to the problem.

Measures of Success

- Improvement of oxygen saturation

Watch to ensure that the cannula is not kinking. Confirm adequate inflation and deflation between breaths by observation of chest expansion.

Subcutaneous emphysema or pneumothorax indicates cannula malposition in the tissues of the neck and it needs to be replaced.

Surgical Airway

An emergency airway can be established using a scalpel and an endotracheal tube.

Whatever technique is chosen, practise beforehand and have equipment accessible

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