



Australian Resuscitation Advisory Network

BLS Guideline 2 – Ventilation

Scope

Who does this guideline apply to?

This guideline applies to all persons who need assisted ventilation and may benefit from rescuer support.

Who is the audience for this guideline?

This guideline is for use by BLS first responders, including bystanders, first aiders, and health professionals away from a clinical setting.

Age Classifications for Resuscitation

For the purposes of resuscitation:

- **Adult** is defined as a person > 8 years of age i.e. 9 or above or a person who physically appears to be that age e.g. an 8 year old child that weighs 70kg would be classified an adult because of physical appearance.
- **Child** is defined as a person between the ages > 12 months and ≤ 8 years old or a person who physically appears to be that age.
- **Infant** is defined as a person between the ages of 0 and ≤ 12 months or a person who physically appears to be that age e.g. a premature infant of 15 months of age, may be a similar size and weight to an 11 months old infant and therefore this person would be classified an infant.

Recommendations

The Australian Resuscitation Advisory Network (ARAN) makes the following recommendations:

1. Apart from the inability to respond to pain, persons who are gasping or breathing abnormally (agonal breathing – this occurs in between 35 -55% of person in cardiac arrest) require resuscitation. Agonal respirations can also be accompanied by mouth, head, chest and arm movement, however if the person is unresponsive to pain and breathing is not normal, these movements should not be considered signs of life.
2. When assessing breathing, rescuers should look, listen and feel: **LOOK** for movement of the upper abdomen or lower chest; **LISTEN** for the escape of air from nose and mouth; and **FEEL** for movement of air at the mouth and nose.

Disclaimer – The recommendations in this guideline are compiled by ARAN from advice available at the time. As ARAN cannot control the manner in which these recommendations are implemented, ARAN and its members accept no responsibility for injury or death resulting from the use or non-use of this guideline.

Acknowledgement - The material in this guideline is based on original work by the Australian Resuscitation Council.



3. If ventilations are to be included in resuscitation attempts, the ratio of compressions to ventilations should usually be 30 compressions : 2 ventilations (although in children and infants a ratio of 15:2 or less may be more beneficial).
4. Whilst mouth to mouth, mouth to nose, mouth to mouth and nose, mouth to mask and mouth to stoma are all viable methods of ventilation, rescuers should consider using a barrier device if this is available.
5. Those who are trained and willing to support ventilations should consider these if a person is unresponsive and not breathing normally and is most likely suffered a "hypoxic arrest".
6. Ventilations for the first responder are not a priority in the resuscitation of persons who have suffered a "sudden cardiac arrest" (SCA), however ventilations may be valuable (if implemented correctly) for persons who have suffered a "hypoxic arrest" i.e. a low availability of oxygen. This includes most children/infants and adults who have suffered drowning, choking or asphyxiation. Deep chest compressions provide adequate passive ventilation for persons in SCA (300-400ml of tidal volume with each compression in an adult).

General Principles

Causes of Acute Ineffective Breathing

Breathing may be absent or ineffective as a result of:

- Cardiac arrest or impending arrest
- Direct depression of, or damage to, the breathing control centre of the brain e.g. head injury
- Upper or lower airway obstruction
- Paralysis or impairment of the nerves and/or muscles of breathing e.g. spinal injury
- Injuries or diseases affecting the lungs
- Drowning
- Suffocation or asphyxiation
- Drug effects particularly narcotics

Assessment of Effective Breathing

In cardiac arrest, there is a high incidence of abnormal gasping (agonal gasps) All rescuers should use a combination of unresponsiveness to pain and absent or abnormal breathing to identify the need for resuscitation. The rescuer should maintain an airway and assess for normal breathing:

- **LOOK** for movement of the upper abdomen or lower chest
- **LISTEN** for the escape of air from nose and mouth
- **FEEL** for movement of air at the mouth and nose.

Movement of the lower chest and upper abdomen does not necessarily mean the person has a clear airway. Impairment or complete absence of breathing may develop before the person loses consciousness. Health professionals who are acting in a first responder role should consider supporting the hypo-ventilating person with ventilation only in the presence of an output (pulse).

Method

Ventilation by first responders should only be attempted on persons who may benefit from their application i.e. persons who are most likely to have suffered a “hypoxic arrest” (see Recommendation 6). Ventilation involves two elements. Firstly the oxygenation of the cells through the lungs by supplying some oxygen and secondly to allow the build-up of carbon dioxide (stored as carbonic acid in the body) to be released and exhaled by the person.

When ventilation of persons is attempted is essential that:

- Ventilations are only attempted by persons trained and willing.
- Proper airway management is maintained during any ventilation, so as to minimise distension of the stomach, regurgitation and possible aspiration of vomit into the lungs.
- Persons are not over-ventilated, so as to decrease the risk of stomach distention, regurgitation and aspiration of vomit into the lungs. As a guide, each ventilation should result in the chest “just beginning to move” (regardless of the technique used).

Mouth-to-Mouth Ventilation

All “mouth-to” methods of resuscitation carrying a higher risk of regurgitation and must be used carefully.

1. Kneel beside the victim's head.
2. Maintain an open airway (refer to ARAN Guideline 1).
3. Seal the nostrils (this can be done by placing a thumb over the nostrils and using the nose as a lever to help maintain the airway or in cases the rescuer's hands a small and/or the person's head nose is large, the fingers can be inserted into the nostrils and used to seal the nose and maintain the airway).
4. Take a breath
5. Open your mouth as widely as possible and place it over the person's open mouth.
6. Blow to inflate the person's lungs until their chest just begins to move.
7. Look for the slight rise of the chest, during each ventilation. If the chest does not rise, possible causes are:
 - obstruction in the airway (tongue or foreign material, or inadequate head tilt, chin lift or need for jaw thrust)
 - insufficient air being blown into the lungs
 - inadequate air seal around mouth and/or nose.
8. After inflating the lungs, lift your mouth from the person's mouth, turn your head towards their chest and listen and feel for air being exhaled from the mouth and nose.

The limitations to the Mouth-to-mouth method are:

1. It is reliant on the rescuers mouth being as big or bigger than the person's.
2. It is reliant on the person being ventilated having intact dentures.

In these instances, it is better to use an alternative method such as mouth-to-nose.

Mouth-to-Nose Ventilation

The mouth to nose method may be used:

- where the rescuer chooses to do so
 - where the person's mouth is too large, they have no teeth or there is damage to the jaw
 - where the person's teeth are tightly clenched (this can happen in fitting and stroke/head injury)
 - when resuscitating small children
1. The technique for mouth to nose is the same as for mouth to mouth except for sealing the airway.
 2. Close the mouth with the hand supporting the jaw and push the lips together with the thumb.
 3. Take a breath and place your opened mouth over the person's nose (or mouth and nose in infants) and blow to inflate the lungs and until you see the chest just rise.
 4. Lift your mouth from the person's nose. Look for the fall of the chest, and listen and feel for the escape of air from the nose and/or mouth.
 5. If the chest does not move, there is an obstruction, an ineffective seal, or insufficient air being blown into the lungs.

Mouth to Mask Ventilation

The cleanest mouth-to method is mouth-to-mask, as there is barrier between the rescuer's and the person's mouth/nose. Rescuers should take appropriate safety precautions when feasible and when resources are available to do so, especially if a person is known to have a serious infection (e.g. HIV, tuberculosis, Hepatitis B virus or SARS). The mask should have a one-way-valve and a viral filter attached.

1. Position yourself behind the person's head and use both hands to maintain an open airway and to hold the mask in place to maximise the seal.
2. Maintain head tilt and jaw thrust. Place the narrow end of the mask on the bridge of the nose and apply the mask firmly to the face (Figure 1) using a thumb down each side of the mask and using the other fingers to maintain head-tilt and/or jaw thrust.
3. Inflate the lungs by blowing through the mouthpiece of the mask with sufficient volume and force to achieve slight chest movement. The exhaled air will be vented away from the rescuer via the inbuilt valve.



Figure 1 – Mouth-to Mask using Jaw Thrust



Mouth to Neck Stoma Ventilation

A person with a laryngectomy has had the larynx (voice box) removed and breathes through a hole in the front of their neck (stoma). A stoma will be more obvious when the person is on their back for Rescue Breathing and the head is tilted backwards. If a tube is seen in the stoma, always leave it in place as it keeps the hole open for breathing and resuscitation.

The rescuer should place their mouth over the stoma and perform rescue breathing as described above. If the chest fails to rise, this may be due to a poor seal over the stoma, or the person having a tracheostomy rather than laryngectomy thus allowing air to escape from the mouth and nose. In this case the hand may need to be placed over the mouth and nose to help seal it. If the stoma or tube is blocked use back blows and abdominal thrusts in an attempt to dislodge the obstruction (see Guideline 1).

Risks

The risk of disease transmission using mouth-to methods (where direct contact is made between the rescuer and person) is relatively low. However assisted ventilation is not a priority in the majority of cardiac arrest and should be reserved for person's who will benefit i.e. persons who suffer a Hypoxic Arrest that includes most children and adults who suffer drowning, choking, strangulation or asphyxiation.

As deep chest compressions produce passive ventilation, first responder rescuers should not feel a legal or social imperative to attempt unprotected ventilation on an unknown person.