



GUIDELINE 9.3.2

RESUSCITATION OF THE DROWNING VICTIM

INTRODUCTION

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid. Drowning outcomes are classified as death, morbidity and no morbidity – the latter two now referred to as “non-fatal drownings”.¹

The most important consequence of drowning is interruption of the oxygen supply to the brain. Early rescue and resuscitation by trained first responders or first aiders at the scene offer the victim the best chance of survival.

POSSIBLE SEQUENCE OF EVENTS

- Immersion of the face in water (or other liquid). Water entering the mouth is spat out, swallowed or aspirated.
- Breath-holding, usually lasting no more than a minute.
- Vigorous breathing efforts. These may continue, even after loss of consciousness. Some amount of water is aspirated into the airways causing coughing and sometimes laryngeal spasm, which temporarily prevents further water entering the lungs.
- Swallowing of air and water, often in large amounts. This usually causes vomiting or regurgitation of stomach contents, which may be aspirated into the lungs.
- Respiratory impairment causes brain hypoxia, leading to unconsciousness and cessation of breathing efforts.
- The heart rate initially increases with exercise and panic. With hypoxia, the heart rate and blood pressure begin to fall, progressing finally to a cardiac arrest, requiring CPR.

MANAGEMENT

- Remove the victim from the water as soon as possible but do not endanger your own safety. Throw a rope or something to provide buoyancy to the victim. Call for help; plan and effect a safe rescue.

- In minor incidents, removal from the water is often followed by coughing and spontaneous resumption of breathing.
- In more serious incidents, assess the victim. If unconscious or not breathing normally, commence resuscitation following the Australian Resuscitation Council and New Zealand Resuscitation Council Basic Life Support flow chart . (Guideline 8).
- Assess the victim on the back with the head and the body at the same level, rather than in a head down position. This decreases the likelihood of regurgitation and vomiting and is associated with increased survival.²
- The victim should not be routinely rolled onto the side to assess airway and breathing. Assessing the airway of the victim without turning onto the side (i.e. leaving the victim on the back or in the position in which they have been found) has the advantages of simplified teaching, taking less time to perform and avoids movement (ARC Guideline 4).
- The exceptions to this would be where the airway is obstructed with fluid (water or blood) or particulate matter (sand, debris, vomit). In this instance the victim should be promptly rolled onto the side to clear the airway. The mouth should be opened and turned slightly downwards to allow any foreign material to drain using gravity (ARC Guideline 4).
- Vomiting and regurgitation often occur during the resuscitation of a drowned victim. If the victim has been rolled to the side to clear the airway, then reassess their condition. If breathing commences, the victim can be left on the side with appropriate head tilt. If not breathing normally, the victim should be promptly rolled onto the back and resuscitation recommenced as appropriate (ARC Guideline 4).
- Avoid delays or interruptions to CPR. Do not empty a distended stomach by applying external pressure. Do not attempt to expel or drain clear water or frothy fluid that may re-accumulate in the upper airway during resuscitation.
- Victims who appear to have been successfully rescued and resuscitated require close monitoring to detect a relapse into cardiopulmonary arrest. This can occur in the minutes or hours following return of spontaneous circulation and breathing, due to persisting lung damage and hypoxic injury to the heart.³
- Call an ambulance for all victims of an immersion event, even if seemingly minor or the victim appears recovered.

NOTES

Oxygen

The administration of oxygen is beneficial in the resuscitation of drowned victims, but resuscitation efforts should not be delayed while waiting for oxygen equipment to become available.

Medical conditions leading to sudden incapacitation in the water

Not all water related deaths are primary drowning. Sudden incapacitation leading to swim failure, unconsciousness and subsequent water in the airway can occur due to heart attacks, cardiac rhythm disturbances, seizure disorders, hyperventilation, drugs and alcohol, dementia, frailty and other conditions causing loss of consciousness, e.g. low blood sugar in a diabetic. These conditions should be suspected in known competent swimmers found drowned unexpectedly. In some victims these medical conditions can be aggravated by the shock of sudden immersion in cold water.

Spinal injuries occurring in the water

Spinal injury occurring concurrently with drowning is rare, estimated at less than 0.5% but should be suspected if the victim dived into shallow water, is found in an area of dumping surf, rocks or after an accident involving a boat or other aquatic craft.⁴ Remove the victim from the water taking care to keep the airway clear of wave splash while minimising movement of the spine in any direction. Airway management takes precedence over a suspected spinal injury and an unconscious, non-breathing victim should be removed immediately from the water by whatever means possible.

Concurrent hypothermia

There is no evidence that drowning in colder water has an increased survival rate compared with warmer water, yet the literature yields many case reports of successful outcomes of victims rescued from icy waters, even after prolonged resuscitation efforts. Hypothermia is more likely due to prolonged immersion time and ongoing cooling during resuscitation at the scene, in a wet, open environment.

In-water resuscitation

In-water resuscitation may improve survival of victims who are in the initial stages of the drowning sequence but delays time to full assessment and CPR.^{3,5} Remove the victim from the water as soon as possible, and only begin in water rescue breathing if immediate removal from the water is delayed or impossible. Rescue breathing in deep water requires an appropriately trained rescuer and floatation aid such as a rescue board, tube or buoyancy vest. In water, chest compressions are ineffective and should not be attempted.

Use of the AED

If available, the AED should be attached and the prompts followed. Dry the victim's chest before applying pads. Although the rhythm deterioration in drowning is usually to a non-shockable rhythm, the AED may be lifesaving in ~6% of drowning victims who, on initial assessment, are found to have a shockable cardiac rhythm.⁶

Compression-only CPR is not the recommended resuscitation method

The primary cause of cardiac arrest in drowning is a lack of breathing. Compression-only CPR circulates oxygen-poor blood and fails to address the victim's need for immediate ventilation. It is not the recommended resuscitation method in a victim of drowning and should only be used temporarily if the rescuer is unable or unwilling to perform rescue breathing before the arrival of a barrier device, face mask or bag-valve-mask device.

LEVEL OF EVIDENCE III

CLASS OF RECOMMENDATION A

REFERENCES

1. World Health Organization 2013
http://www.who.int/violence_injury_prevention/other_injury/drowning/en/
2. Szpilman, D, Idris, A, Cruz Filho, F 2002, 'Position of Drowning Resuscitation Victims on a Sloping Beach', abstract presented at the World Conference on Drowning, Amsterdam, The Netherlands, 26-28 June.
3. Manolis, N & Mackie, I 1988, 'Drowning and near-drowning on Australian beaches patrolled by life-savers: a 10-year study, 1973-1983'. *Medical Journal of Australia*, vol 148, pp 165-171.
4. Watson, RS, Cummings, P, Quan, L, Bratton s, Weiss, NS 2001, 'Cervical spine injuries among submersion victims'. *Journal of Trauma*, vol 51, pp 656-662.
5. Szpilman, D, Soares, M 2004, 'In-water resuscitation – is it worthwhile?' *Resuscitation*, vol 63, pp 25-31.
6. Dyson, K, Morgans, A, Bray, J, Matthews, B, Smith, K 2013, 'Drowning related out-of-hospital cardiac arrests: Characteristics and outcomes'. *Resuscitation*, vol 84, pp 1114-1118.

ADDITIONAL RESOURCES

- Surf Life Saving Australia: Public Safety and Aquatic Rescue Manual 33rd Edition Revised November 2011
- Royal Life Saving Society Australia: Lifeguarding 4th Edition

FURTHER READING

ARC Guideline 3 Unconsciousness
ARC Guideline 4 Airway
ARC Guideline 5 Breathing
ARC Guideline 8 Cardiopulmonary Resuscitation
ARC Guideline 9.1.6 Management of Suspected Spinal Injury
ARC Guideline 9.3.3 Hypothermia: First Aid and Management
ARC Guideline 10.4 The Use of Oxygen in Emergencies