Diver Rescue
- some considerations and uncertainties

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About the Author

John Lippmann has been diving for more than 20 years and has held scuba instructor qualifications with several agencies. He has specialised in teaching diver rescue, deep diving and oxygen administration courses. He has been an instructor and examiner in oxygen resuscitation with the Royal Life-Saving Society of Australia (RLSSA) for the past 10 years, and is the Immediate Past Chairman of the Oxygen Resuscitation Panel of the Victorian Branch of the Society. John currently represents RLSS (Vic) on the Australian Resuscitation Council. He is also certified to-teach oxygen first aid courses under the sanction of the Divers Alert Network, and is a certified first aid instructor.

John is the major author of *The DES/DAN Emergency Handbook*, and is the author of *Deeper Into Diving, The Essentials of Deeper Sport Diving* and *Oxygen First Aid for Divers*; all of which have gained worldwide acclaim. John's numerous articles on diving safety are published throughout the world.

At some time, a diver may find himself in a situation where it is necessary to rescue an unconscious diver, either submerged or on the surface. Fortunately, such situations are rare.[1]

Some training agencies include a protocol for the rescue of an unconscious diver during their basic (openwater) dive course. Other agencies don't teach the skills until the Rescue Diver level. **Rescue and resuscitation skills are very valuable tools that *all* divers should acquire as soon as possible. Once learned, these skills need to be practiced reasonably often (ie at least twice annually) to maintain the required level of performance.**

The actual protocols currently taught vary between agencies, and from instructor to instructor. One common problem is that many dive students leave the course with the belief that there is only one correct method to perform such a rescue. Although within the time constraints of a commercially oriented dive course it is often only practical to train the students in one particular protocol, the divers should be made aware that unconscious diver rescues are not necessarily so straight forward. There is still a lot of uncertainty surrounding various aspects of diver recovery since there is a paucity of data to support or refute the rationales behind certain suggested techniques. In addition, diver rescue is not a black and white situation where one set of specific actions universally applies. Divers should be made aware of general principals of rescue, so they are better equipped to adapt to a particular situation, should it arise.

The purpose of this chapter is to present issues that some divers may not have considered, and to encourage thought and discussion on this important topic.

One point to consider is the degree of urgency of the situation. Whether the outcome will be a possible rescue or a body recovery depends on a variety of factors, which include: (1) whether or not the diver is still breathing from his regulator; (2) how much time has elapsed since the diver stopped breathing; and (3) the temperature of the water and insulation of the diver, among other factors.

The partial pressure of oxygen (pO_2) in arterial blood supplying the brain is normally 80-90 mmHg. When a person stops breathing, the pO_2 falls rapidly and by the time it reaches 40 mmHg, consciousness is seriously impaired.

Dr George Harpur, a Canadian hyperbaric physician, has argued that it normally takes approximately 90 seconds from the time consciousness is seriously impaired (40mmHg), for the pO_2 to drop to levels where permanent damage to the central nervous system occurs (approximately 20mmHg).[2] Consequently, Dr Harpur has suggested that, where possible, rescuers should aim to have the non-breathing, injured diver brought to the surface and ventilated within 90 seconds of losing consciousness.

However, although this time frame appears to be reasonable on land, the situation may be very different with a diver underwater.

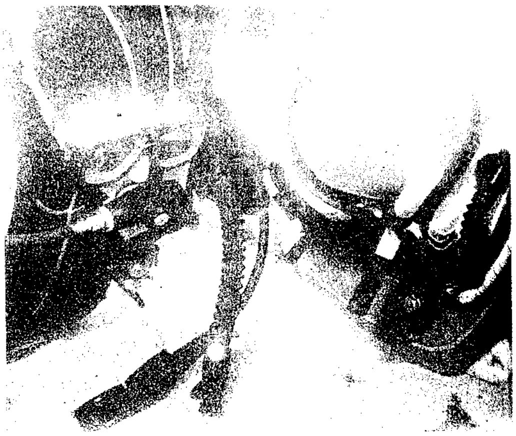
Non-diving casualties have at times made dramatic and successful recoveries after resuscitation following long periods (up to about 60 minutes) of immersion without breathing in very cold water.[3] The lower oxygen usage resulting from the reduced blood flow to the non-vital organs (diving reflex) and slowed metabolic rate from hypothermia, together with the higher oxygen partial pressures associated with depth, have been used to explain this phenomenon.

In one series of 50 cases of individuals who had been submerged in cold water for periods of between six to sixty minutes, 45 had suffered no detectable neurological impairment after being resuscitated and rewarmed.[1] Consequently, it is recommended that resuscitation and rewarming be attempted on any casualty who has been submerged for up to 60 minutes in water of 21°C or cooler.

Unfortunately, there is a lack of data to indicate how the wearing of an exposure suit and diving mask effect the survivability of a diver who is unconscious, submerged and not breathing. It is possible that such equipment could reduce the chances of survival by delaying or reducing the protective effects of hypothermia and the diving reflex.

Consider the scenario where a diver encounters an apparently unconscious diver underwater.

Normally, the first step is to determine whether or not the diver is really unconscious. This may be done by approaching and quickly observing the diver. Exhaust bubbles indicate that the diver is breathing and may, or may not be conscious. The absence of bubbles for more than about 5-10 seconds indicates that a diver is not breathing. A slumped position, eyes closed or blankly staring may indicate impaired consciousness. Gently shaking the diver should elicit a response if he is fully conscious. A diver who doesn't react at all, or only reacts very weakly, should be brought to the surface.



Normally, the first step is to determine whether or not the diver is unconscious. *Photo courtesy of Wayne Rolley*

The rescuer should get a firm grip on the injured diver, and take a couple of seconds to compose himself and assess the best course of action to take, while quickly locating the diver's weightbelt and BC inflate/deflate mechanisms. **Although it is important not to waste time, the few seconds taken to assess the situation may save unnecessary complications down the track.**

Whether the diver is breathing or not, the rescuer should support the regulator in the diver's mouth to ensure that it doesn't become dislodged. Positioning the injured diver's head with backward head tilt should maintain an adequate airway.

Backward head tilt is normally used to open the airway of an unconscious person on land. When an unconscious person is lying on his back, the tongue falls against the back of the throat and can obstruct the airway. Tilting the head back and lifting the lower jaw minimises this.

Some rescue protocols suggest that the rescuer should support the victim's head in a neutral position (i.e. not tilted back or forward).[5,6] Whether or not a neutral head position will provide an adequate airway in this situation is debatable. It has been suggested that because the unconscious victim underwater should normally be brought to the surface in an upright position, airway obstruction from the tongue is less likely, and, therefore, a neutral head position should be adequate to allow air to enter the lungs of an unconscious, breathing diver (with an air supply), or to vent from the lungs of a breathing or non-breathing diver. One argument put forward against using backward head tilt is that any water that has collected in the diver's mouth could be encouraged to enter the throat if the head was tilted back. If the diver is not fully unconscious, this water could cause a reflex spasm of the larynx, known as laryngospasm. Laryngospasm may last for minutes. It usually abates as the diver becomes very short of oxygen (deeply hypoxic). The likelihood of laryngospasm decreases as the injured diver lapses further into unconsciousness.

If laryngospasm is occurring during the ascent, expanding air in the lungs may not escape effectively, increasing the possibility of a pulmonary barotrauma. Although it has been asserted that air can still escape from an unconscious person's lungs despite laryngospasm[2], this assertion has not always been supported by anaesthetic experience. In anaesthesia, in fully developed laryngospasm, both inhalation and exhalation may be impossible. However, this situation only occurs in a partially conscious person and not in the fully unconscious person.

Some rescue protocols urge the rescuer to inspect the victim's mask. If there is no water in it, it is usually recommended to leave the mask in place, although a possible exception to this is discussed later. However, if there is water in the mask, it has been argued that the mask should be removed.[7] The rationale is as follows: If the mask contains air and water, the air will expand on the way to the surface. The expanding air will force water through the victim's nose and into the throat, possibly causing laryngospasm, if the diver is not fully unconscious.

If the mask is full of water, it can either be removed underwater, or on reaching the surface. It probably won't make much difference.

If the diver is breathing and the mask is removed, the rescuer can pinch the injured diver's nose to prevent water entering during the ascent.

Certain protocols suggest that the victim's weightbelt be removed.[6,8,9] The injured diver is often heavy (many being substantially overweighted[10]) and it may be necessary to remove his weightbelt to increase the diver's buoyancy. If the victim's belt is removed, the rescuer must have a firm grip on the diver prior to removing the belt, as mentioned earlier. It is also a good idea to locate the injured diver's BC inflate/deflate mechanism, since it may save time finding it later. The weightbelt may then be removed and pulled well clear to prevent it tangling with other gear, and dropped.

However, not all rescuers find it necessary, or desire, to remove the victim's weightbelt underwater. The main reason put forward is the difficulty in controlling the subsequent ascent.[11] Some suggest to add air to the victim's BC, via the direct feed, to provide the necessary positive buoyancy.[12] Unfortunately, this will

Certain protocols suggest that the victim's weightbelt be removed. *Photo courtesy of Wayne Rolley.*

not be possible if there is no air in the victim's tank. It may not be practicable even if the air supply is not depleted, especially in deep water. Various tests have demonstrated that it can take up to a minute or more to inflate certain BCs at depth, and at low supply pressures.[13,14] This delay could be detrimental to the outcome of the rescue.

Alternatively, the required buoyancy may be achieved by the rescuer inflating his own BC.[5,12] The advantage of this is that it is usually easier for a rescuer to control buoyancy using his own familiar device. However, this may mean that the injured diver remains negatively buoyant, at least for some of the ascent. Again, a firm grip on the victim is essential.

Where possible, the injured diver should be positively buoyant throughout the ascent in case contact is lost. If the divers separate for any reason during the ascent, the victim's positive buoyancy should ensure that the victim will continue to ascend towards the surface, where he can be more easily located. If the victim is negatively buoyant and contact is lost, he will sink and may be difficult to relocate. This is one of the potential problems with leaving the victim's weightbelt on and using the rescuer's BC to provide sufficient buoyancy for ascent. It is also one reason why the removal of the rescuer's weightbelt is not recommended.

Positive buoyancy may not be appropriate if direct access to the surface is hindered, such as in a cave. In such situations, it may be necessary to leave the injured diver's weightbelt in place, try to achieve neutral buoyancy for both rescuer and victim, and swim the diver out.

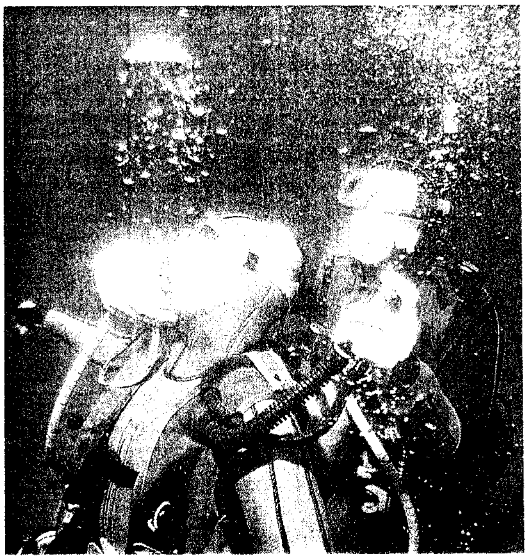
Although it is taught by some instructors, there appears to be little justification for the rescuer to release both the victim's and his own weightbelts, even in shallow water.[8] Some divers forget that the risk of a lung overexpansion injury is greatest during the last metres before the surface. The rescuer should normally retain his own weightbelt, at least until after reaching the surface and after making the victim positively buoyant. In addition to creating an uncontrolled and rapid ascent, a rescuer who ditched his own weightbelt, would be unable to interrupt the ascent if it became necessary, possibly due to his dropping the victim, to entanglement or to some other unforeseen circumstance.

The next decision is a somewhat controversial one. The rescuer has to decide whether to maintain contact with the victim throughout the ascent, which is the usual teaching, or to ensure the victim is positively buoyant, let him go and follow him up. The decision may be influenced by the depth of the water, and the rescuer's own situation.

The most commonly taught technique is to maintain contact with the victim throughout the ascent. In this procedure, the rescuer ensures positive buoyancy by initially removing the victim's weightbelt and/or adding air to either the victim's or his own BC. Contact is maintained, and both divers ascend towards the surface, driven by positive buoyancy. If the diver is breathing, it is possible that he could regain consciousness during the ascent. If this occurs, the diver will be very disoriented and may panic. Therefore, the rescuer should have a firm hold of the injured diver, possibly better from behind, to enable the rescuer to restrain the injured diver if necessary and to ensure his own safety.

The rescuer can control the ascent rate to some extent by releasing air from his own BC and/or the victim's. This is a time when skill acquired by prior practice, and an extra pair of hands would be very helpful!

The rate of ascent can vary considerably. If both divers are wearing full 7mm wetsuits and the victim's weightbelt has been ditched, very fast rates can occur near the surface, especially if expanding air hasn't been dumped from the BCs on the way up. The rescuer should ensure that he breathes in and out, possibly exhaling more than normally (although not continuously) when approaching the surface. Angling the fins and arching the body to create extra drag can also help reduce the ascent rate.



The rescuer can control the ascent rate, to some extent, by releasing air from the BCs. *Photo courtesy of Geoff Stebbing.*

In 1974, Dr George Harpur suggested a radically different protocol which has been adopted, to varying degrees, by some rescuers, despite the absence of substantial supporting data.

When a non-breathing diver is brought to the surface, the partial pressure of oxygen in the diver's body rapidly falls due to the reduction in ambient pressure and the body's oxygen consumption. Dr Harpur argued that, as the gases in the chest expand and escape during the ascent, oxygen will be quickly drawn away from the body tissues and transported to the lungs. This would rapidly deplete the oxygen in the blood and tissues and could lead to oxygen starvation (anoxia) and death. The deeper the victim is found, the greater the potential for oxygen drain due to the larger pressure differential and increased distance and time of ascent. Harpur argued that the injured diver must be brought to the surface as rapidly as possible to minimise the oxygen drain from the tissues. Consequently, he suggested that if a diver is found unconscious (eg. at 18m) with his regulator out, the rescuer should remove the injured diver's weightbelt and mask, raise him to the vertical position, inflate the victim's BC and let him go. It was suggested that the rescuer follow at a safe rate of ascent, retrieve the victim on the surface and commence expired air resuscitation. The procedure was recommended as an option of last resort in circumstances where the victim is not breathing, the surface is clear of obstructions, calm and there is concern that the rescuer cannot make a safe, reasonably rapid ascent.

It was argued that, by positioning the diver vertically with the head up, the pressure on the lower chest will be greater than that on the upper chest. This pressure differential should force excess air out from the mouth and prevent further water from entering the larynx. As the diver ascends, expanding air should vent from the lungs and out from the mouth, so preventing a pulmonary barotrauma. Some preliminary tests were conducted to investigate the effect of positioning a person vertically with the head up in the water. The few tests conducted did appear to support the claim that the upright position encourages airflow from the lungs. Harpur further reasoned that, on arrival at the surface, the diver would shoot from the water and then fall back into a horizontal face up position, provided he was wearing a BC that will float him on his back (which many current BCs will not do).

The vision of an unconscious diver rocketing to the surface, probably with his chin down against the chest, raises the obvious concern of pulmonary barotrauma and associated complications. However, whereas a conscious, panicking diver can initiate a variety of responses that can prevent air from venting adequately from his lungs during ascent, Harpur theorised that the unconscious victim may be in less danger from a lung overpressure injury, even at the excessive ascent rates that could be achieved with his suggested rescue procedure.

Air cannot enter the lungs when an unconscious person has the head slumped forward. However, Harpur asserts that, even if the unconscious diver's head has slumped forward, expanding air from the lungs can passively open the airway from below and escape safely. In support of this idea, it has been pointed out that a conscious person who takes a deep breath and then tucks his head down so that his chin is firmly against his chest can still exhale easily. In addition, medical experience has shown that people with laryngeal cancers blocking the vocal cords who have great difficulty breathing in, can vent air or oxygen introduced into the trachea quite successfully. However, the belief that air can always escape from an unconscious person's lungs has not been verified by anaesthetic experience, which is normally conducted with the patient lying flat.

So, the rescuer must decide how to get the victim and himself to the surface as quickly and as safely as possible. The best way to achieve this must be assessed according to the prevailing circumstances.

The rescuer who was trained to leave the victim's weightbelt on may in fact need to remove it to raise the victim. A rescuer who had planned to maintain contact with the victim throughout the ascent may be forced to release the victim in order to prevent himself rocketing to the surface.

The rescuer should be able to quickly adapt if circumstances become different to what was expected. If the rescuer had planned to bring the victim to the surface in a controlled man-ner and finds that he is forced to allow the victim to rapidly ascend alone, he should not abort the rescue in the belief that he has prejudiced a successful outcome. Upon reaching the surface, the rescuer should locate the victim and continue the rescue as appropriate. If Dr Harpur is correct, the rapid ascent may have in fact increased the injured diver's chances of survival.

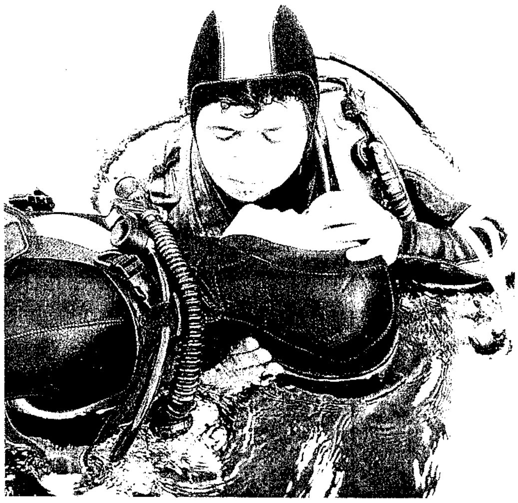
Once both divers are on the surface, it is important to establish a clear and open (patent) airway and ventilate a non-breathing victim as soon as possible. To achieve this effectively in the water, the rescuer should ensure that both he and the victim are sufficiently **buoyant** prior to attempting ventilations. It is also essential to **remove the injured diver from the water as soon as possible so that more effective assessment and resuscitation procedures can be implemented.**

Various protocols differ on how these aims are to be achieved.

One protocol recommends that the rescuer should attempt to ventilate the victim as soon as they reach the surface and prior to making any buoyancy adjustments. Buoyancy is adjusted after the first breaths of expired air resuscitation have been given.[8] Another protocol suggests that after checking for breathing and draining water from the victim's mouth, ventilations are initiated, if required, prior to adjusting buoyancy.[7] Other protocols recommend that buoyancy be increased before ventilation is attempted.[5,6,9,12]

The victim's face must be supported above the surface. This can usually be achieved effectively by the rescuer adopting the do-si-do position, by placing a hand under and cradling the victim's neck and various other means.

The amount of buoyancy required to enable the rescuer to deliver "dry breaths" to the victim depends on a number of factors which include the skill of the rescuer and the surface conditions.



The victim's face must be supported above the surface.

The victim's weightbelt should have been ditched underwater or on reaching the surface. There is normally no advantage in leaving on the victim's weightbelt at this stage. Many rescuers, especially those carrying a lot of lead, may be better off ditching their own weightbelt at the surface, ensuring it is pulled clear and held away from themselves and the victim, before dropping it. However, some divers find it difficult to maintain the desired orientation in the water without a weightbelt. This may sometimes occur with a diver wearing a full and very buoyant exposure suit. Occasionally, the rescuer might be reluctant to remove his weightbelt in case he may need to resubmerge for some reason.

Partial inflation of the victim's BC usually provides sufficient support for the victim. Fully inflating the BC may restrict the victim's chest movement and may also make it more difficult to get close to the victim's head for ventilation. As long as the rescuer has ditched his weightbelt, it is usually unnecessary to inflate his own BC, although it may sometimes be useful, especially if little buoyancy is provided by the wetsuit. If both BCs are substantially inflated, it can be more difficult to get close enough to the victim to ventilate him without pushing his head underwater. This depends to some extent on the types of BCs worn and is more of a problem with jacket-type BCs. Some people have used the analogy of two very obese people trying to make love – it's important to approach at the right angle!

The rescuer should position himself appropriately when assessing breathing, establishing a patent airway and/or attempting ventilations. It is usually better to approach the victim from behind the shoulder, rather than from beside the chest. This reduces the chances of pushing the victim under while attempting ventilations. The rescuer can often turn the victim's head slightly towards him to get a little closer, if surface conditions permit.

On the surface it may be very difficult to determine whether or not the injured diver is breathing. Unless the diver was breathing during the ascent, it is unlikely he will be breathing on surfacing.

If the injured diver was breathing during the ascent and if surface conditions are choppy, it may be better to leave the regulator in the diver's mouth, as long as there is enough air in the victim's tank. Holding the regulator in place (and leaving on the mask, if present) should help prevent the victim from inhaling water. The diver's head should be tilted back and chin supported, if possible, to open the airway. If the diver is breathing effectively from the regulator, the rescuer should hear the demand valve being triggered.

If the diver was not breathing underwater it is highly unlikely that spontaneous breathing would have begun on reaching the surface. As mentioned previously, it is also very difficult to detect breathing in this situation. Consequently, some protocols don't include a breathing check prior to commencing expired air resuscitation.

If the diver can be landed very quickly, it may be better not to lose time trying to ventilate him in the water.

Over the years there has been debate about whether or not the rescuer should try to drain the airway before beginning resuscitation. Although on land it is relatively easy to roll the victim onto the side to clear the airway, the situation is a lot more complicated in the water.

The victim may have vomited or regurgitated, or there may be frothy sputum coming from his mouth. The rescuer can attempt to scoop out any obvious material with his fingers, although this will be difficult to do effectively in the water.

Although it has been suggested that the rescuer pull down the corner of the victim's mouth to allow water to drain out[7], this may often be unsuccessful and can allow water in from a passing wave.

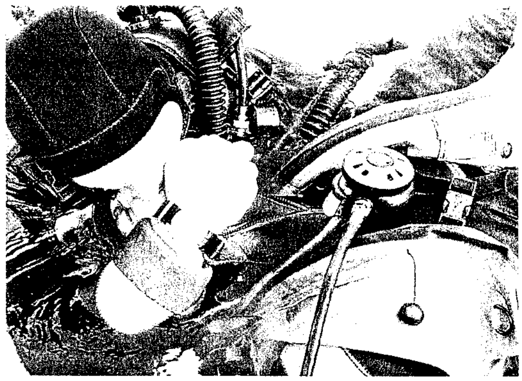
Most protocols don't require the rescuer to attempt to clear foreign matter from the airway. When resuscitation is commenced, any foreign matter blown into the larynx will not cause laryngospasm, unless the victim is not fully unconscious. Complications caused by inhalation of foreign matter will be addressed, if necessary, when the victim arrives at the hospital.

It is important to try to open the victim's airway as widely as possible when delivering the breaths. The first step in achieving this is to tilt the victim's head back maximally. In addition, the injured diver's chin should be supported, if possible. If performing mouth-to-mouth ventilations, chin support may be more easily provided if the rescuer can use a cheek seal (rather than his fingers) to seal the victim's nose, so freeing one hand for chin support. Jaw support can also be provided relatively easily if mouth-to-nose ventilations are used. It may also be easier to obtain a good contact seal with mouth-to-nose, rather than mouth-to-mouth ventilation. Mouth-to-nose ventilation may be the only alternative if the victim's jaw is clenched and the mouth cannot be opened.

A pocket-style resuscitation mask can be very useful in this situation. Working from behind the victim's head, the rescuer can use jaw thrust to lift the jaw and tilt the head back. In this way, easier and more effective ventilations can be achieved. Only masks that float should be used.

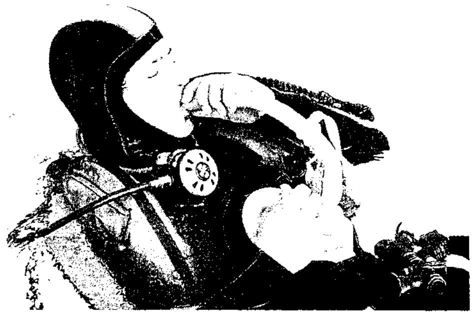
Some rescuers are taught to use a snorkel as an aid to ventilation. Mouth-to-snorkel resuscitation can reduce rescuer fatigue by enabling the rescuer to stay lower in the water. The rescuer can sometimes provide chin support with the same hand that is sealing the snorkel in the injured diver's mouth. However, the technique can be cumbersome and difficult to perform, requires regular practice, and cannot be done effectively with certain snorkels.

The Australian Resuscitation Council (ARC), which is the guiding body for resuscitation protocol in Australia, recommends that expired air resuscitation be commenced with five full breaths delivered over approximately ten seconds, followed by a check for a carotid pulse. If a pulse is detected, ventilations are delivered at the rate of one every 4 seconds.[15]



The injured divers' chin should be supported, where possible, during ventilations

A pocket-style mask can be used.



Some rescuers are taught to use a snormel as an aid to ventilations.

Unfortunately, it is often very difficult and impractical to maintain the recommended sequence when rescuing an injured scuba diver in the water.

Most rescue protocols don't require a pulse check in the water because of the difficulty of detecting a pulse when hindered by cold hands and diving gear, and because in-water CPR is near impossible. The majority of procedures make the assumption that a pulse is present and call for ventilations to be maintained until the diver is landed and further assessed.

If a pulse is in fact present, effective ventilations should provide the necessary oxygen to preserve life. However, if the victim's heart is not beating effectively (cardiac arrest), the ventilations will serve no useful purpose and are likely to delay transport of the victim to the boat or shoreline where CPR can be implemented.

If the victim is pulseless, it is very important to begin CPR as soon as possible and to ensure that an ambulance is called without delay. Data from the United States have indicated that the highest hospital discharge rate has been achieved in those patients for whom CPR was initiated within 4 minutes of the time the heart stopped beating effectively, and who, in addition, were provided with advanced cardiac life support within 8 minutes of cardiac arrest.[16]

Obviously, time is crucial to the non-breathing, and especially to the pulseless victim. If the rescuer suspects that the victim's heart has arrested, which is likely if he was submerged without breathing for more than about 3-5 minutes, it may be better not to attempt ventilations if the shore or the boat can be reached fairly quickly.

Several years ago, a study was conducted to assess whether it was possible to perform effective CPR in the water. The technique was demonstrated on an instrumented aquatic manikin, which was ventilated with a specially modified, pressure limited second stage regulator. The trials were performed in full scuba gear by trained rescuers. The results achieved on the manikin met the minimum limits for CPR.[17] However, the technique requires that the victim be positioned head up in the water and it is doubtful whether adequate circulation would reach the victim's brain in this position. In addition, the procedure requires a specially modified regulator if performed by a single rescuer. Not surprisingly, the technique never caught on.

If ventilations are continued while towing the diver to a boat or shore, the rescuer should endeavour to maintain a regular rate of ventilation and prevent water from entering the injured diver's upper airway.

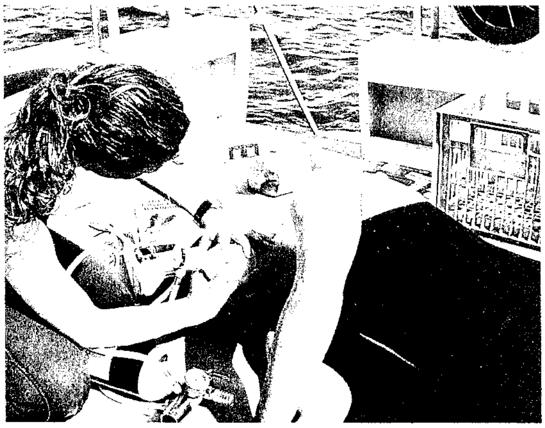
It is difficult, physically tiring and time consuming to try to maintain the sequence of one breath every 4 seconds as recommended by the ARC. No sooner has the rescuer begun to get underway when he has to stop to ventilate the victim. Consequently, it may be a reasonable compromise to provide a sequence of 2 slow breaths every 10-15 seconds. The rescuer can tow for about 5 seconds before stopping to interpose the 2 slow breaths. If surface conditions are choppy, the rescuer can often cover the victim's mouth and nose water while towing, to prevent more water from entering the airway.

The rescuer should pace the physical exertion to avoid exhaustion. Unnecessary equipment can be removed to reduce weight and drag. What gear to ditch and when to do so depends on the particular circumstances. Any assistance that is available should be utilised to hasten the rescue and reduce rescuer fatigue. Techniques for removal of a victim from the water are important and demand regular practice beforehand.

Once the injured diver is landed on a solid surface, the normal resuscitation protocol should be followed. The injured diver should be rolled into the recovery (lateral) position, the airway cleared and the breathing and pulse checked. Resuscitation should be continued, as appropriate, until medical aid arrives and takes over the management of the victim. Oxygen, at the highest possible inspired concentration, should be administered, if available.

The attending medical personnel should be urged to contact DES/DAN Australia and/or the local hyperbaric facility if sufficient personnel are present.

Once the victim is landed, the normal resuscitation protocol should be followed.



Oxygen, at the highest possible inspired concentration, should be administered as soon as possible.

If the injured diver regains consciousness he should not be prompted to sit up, in case he has an arterial gas embolism, and to minimise the effects of shock. The diver must go to hospital for observation and/or treatment, even if he appears to have recovered. This is because a proportion of victims of near drowning develop lung problems some hours after apparent recovery.

It is stressed again that there is no one correct way to perform all rescues. There are so many variables that can influence the management of the emergency and affect the eventual outcome. Each rescue and resuscitation is likely to be unique. The potential rescuer should have an overview of various possible rescue protocols and an understanding of the basic underlying principles.

Some key points to remember are:

- Unless the victim reaches the surface he will certainly die.
- The rescuer should get the non-breathing diver to the surface as quickly as possible without endangering himself.
- Once on the surface, sufficient buoyancy should be obtained to provide dry ventilations, if required.
- The diver should be landed as quickly as possible to enable proper assessment and management.
- The rescuer should enlist help as soon as possible and ensure an ambulance is contacted with minimal delay.
- The rescue should be paced to avoid exhaustion of the rescuer.
- The introduction of 100% oxygen for the victim is desirable if the necessary skills and equipment are available.
- The diver should be kept in a horizontal position.
- The victim must be medically assessed, even if he appears to have recovered.

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