



World Water Safety

## INTERNATIONAL LIFE SAVING FEDERATION

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### MEDICAL POSITION STATEMENT - MPS 09

## THE USE OF SUPPLEMENTAL OXYGEN BY LIFEGUARDS

**NOTE:** This statement is intended for those lifeguards, acting in a professional or volunteer capacity, who are trained in the techniques of water rescue and resuscitation and who assume a duty to safeguard members of the public at aquatic sites. They may be called lifeguards, lifesavers or both. This statement is not directed at members of the public trained in water safety and rescue techniques, but without a duty to respond, who may also be known, in some areas of the world, as lifesavers.

### BACKGROUND

Some drowning victims are in cardiac arrest or respiratory arrest. Other drowning victims are in respiratory distress, either due to respiratory muscle fatigue or airway and lung irritation due to the aspiration of water. Immediate oxygen therapy in anoxic or hypoxic situations can be life saving, decrease the chances of permanent damage to the brain and other vital organs, or facilitate recovery. Although there are strong arguments to use titrated oxygen during and after the resuscitation of a primarily cardiac arrest victim, there is no evidence that high flow oxygen may have adverse effects in drowning resuscitation.

In some lifeguard settings, there is a prolonged interval between start of Basic Life Support by lifeguards and the provision of Advanced Life Support with oxygen, either by ambulance crews or in the hospital. The longer this delay, the more important the value of oxygen in a lifeguard setting. Additional oxygen improves the arterial oxygenation. There is limited evidence that better oxygenation improves outcome in a cardiac arrest situation. In victims with respiratory distress, extra oxygen will facilitate the victim to return to a normal breathing pattern.

Before the implementation of an oxygen delivery program for lifeguards it is important to consider the maintenance and management of the equipment, the training of the lifeguards who will provide oxygen treatment and the integration of the care of the victim with the local emergency medical services/ambulance system.

### Situations to provide oxygen to a drowning victim

1. The drowning victim in cardiac arrest

2. In this situation, the heart has stopped due to overwhelming hypoxia. Re-oxygenation of the lungs, and the anoxic blood, is needed to make cardiac compressions effective and to supply oxygen from the lungs to the oxygen depleted myocardial cells of the arrested heart. This requires that drowning resuscitation starts with ventilations. The drowning victim in respiratory distress.

In this situation, the victim is hypoxic, either due to the period under water or due pulmonary shunting as result of aspiration. A severely hypoxic patient may show no signs of life but still has some circulation.

### **Provided oxygen concentrations**

Several methods are available to deliver oxygen to victims in respiratory arrest and to spontaneously breathing victims. During rescue breathing, the expired air from the rescuer consists of approximately 16% oxygen. Oxygen treatment can be provided with several devices, resulting in the delivery of 21-100% oxygen.

Examples to increase the amount of oxygen to the victim with no signs of life during ventilation include:

1. Mouth-to-mask with oxygen inlet (35 – 50% oxygen)
2. Bag-valve-mask resuscitator (90 – 100% oxygen)
3. Ventilator (21 – 100% oxygen)

Examples to increase the amount of oxygen to the victim with respiratory distress include:

1. Nasal cannula (24 – 40% oxygen)
2. Acute mask (face mask) (40 – 60% oxygen)
3. Non-rebreathing mask (Up to 90% oxygen)
4. Demand valve (100% oxygen)

Flow rates will vary depending on the item of equipment. Manufacturers should provide recommendations or standard operating procedures for correct flow rates.

### **Hyperoxygenation**

There is some evidence that hyperoxia may result in re-oxygenation injury and worsened neurological outcome after restoration of spontaneous circulation (ROSC), notably in children. The pulmonary problems in most drowning victims limit the diffusion of oxygen from the lungs to the pulmonary capillaries and it is therefore unlikely that a hyperoxic reperfusion injury occurs in drowning victims, even at high inspiratory oxygen concentrations. Ideally oxygen saturation should be measured, and controlled, by pulse oximetry, and remain between 94% and 98%. Unfortunately, pulse oximeters are unreliable in persons taken from the water.

### **The conditions to deliver oxygen**

The technique of oxygen delivery is likely to be more difficult to learn than Basic Life Support. There are several additional safety skills required as well as technical knowledge of the several parts of the oxygen delivery equipment such as oxygen cylinder, pressure regulator, flow-meter, oxygen delivery devices such as bag or mask.

No study data are available regarding necessary instruction time, retention time, and the quality of performance in real situations. Several national lifesaving organisations have developed effective instruction courses for lifeguards and others, involving as little as two hours of training. Experiences show positive results with the use of oxygen when the lifeguard has received good theoretical and practical training on a regular basis and when on-site supervision is available. In most cases, particularly in cases of non-breathing victims,

two (or preferably three) lifeguards can most effectively deliver oxygen to the victim by bag-mask technique.

### Legal aspects

In most countries, strict regulations on the use of oxygen are defined with respect to responsibilities, both for the equipment and the practical performance. These legal aspects must be considered, although lifesaving organisations may choose to work to modify legal barriers to allow lifeguards to provide oxygen.

### STATEMENT

1. The first priority in drowning is maintaining an open airway and adequate ventilation.
2. The physiological benefit of immediately providing additional oxygen to spontaneously breathing drowning victims or those requiring CPR is clear and advocates that oxygen should be used in all drowning victims, if possible.
3. The absence of oxygen equipment should not deter the rescuer from initiating CPR immediately. Immediate mouth-to-mouth ventilation is effective. (Refer ILS Medical Statement on Communicable Disease <sup>[18]</sup>)
4. The provision of oxygen to drowning victims by lifeguards should be encouraged once their lifesaving organisation has developed minimum training and competency standards, formal theoretical and practical training courses, an instruction manual, assessment, regular refresher courses and a designated person to oversee the program. Any such program should conform to applicable laws.
5. From a practical and educational point of view, the equipment should be simple, unambiguous, reliable, and simple to assemble. This means standardisation. A minimum of variety in oxygen delivery equipment should be available at local, regional and national level. From the available equipment, we recommend a non-rebreathing transparent mask with a high flow of oxygen per minute for spontaneously breathing victims, and a transparent CPR mask with one way valve and oxygen inlet for victims requiring CPR. Other types of oxygen delivery systems may be considered depending upon the level of training of the lifeguard. The oxygen cylinder should be large enough to allow oxygen delivery until Advanced Life Support providers can be expected to be available to assist the victim.
6. As is the case for any lifesaving equipment, the cost and training time required must be balanced against needs for other lifesaving equipment and training, as well as the relative value considering the availability of nearby Advanced Life Support. For example, drowning prevention campaigns, improved lifesaving equipment, and other steps may be appropriate before advanced medical equipment, such as oxygen, is acquired. (See ILS Medical Statement on priorities in lifesaving)
7. Responsibility, quality assurance and jurisdiction should be defined at a local, regional and national level. A responsible person should be in charge of the quality assurance.
8. Quality assurance also includes the regular control of equipment and level of performance. A formal report about each time that the oxygen equipment is used, could be an important element in quality assurance. Ideally, in each situation that the lifeguard has given oxygen to a victim should be evaluated after an intervention. The use of oxygen should be reported in yearly reports. Oxygen equipment needs to be regularly inspected/serviced, including cylinders which in most jurisdictions have to undergo testing at scheduled intervals?

## LEVEL OF EVIDENCE

The International Liaison Committee on Resuscitation (ILCOR) 2015 guidelines indicated that they were unable to make any recommendation for or against the use of oxygen by lifeguards due to the lack of evidence. They therefore concluded that “there was no evidence to change current practice of oxygen usage by lifeguards.”

This document is based on expert consensus.

## POTENTIAL CONFLICT OF INTEREST STATEMENT

None of the participants in the consensus process leading to this position statement has a conflict of interest with the stakeholder industry, technology, persons or organizations that are identified and/or impacted by the position statement.

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