



World Water Safety

INTERNATIONAL LIFE SAVING FEDERATION

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MEDICAL POSITION STATEMENT – MPS 04

AUTOMATED EXTERNAL DEFIBRILLATOR USE IN DROWNING RESUSCITATION

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

Survival of cardiac arrest depends on a series of critical interventions. The term *Chain of Survival* has been used to describe this sequence. This chain has five interdependent links: immediate recognition of cardiac arrest and activation of the emergency response system, early basic cardiopulmonary resuscitation (CPR), rapid defibrillation, effective advanced life support, and integrated post-cardiac arrest care^{1,2}. While all links are important, in cardiac arrest due to heart disease, rapid defibrillation is the most critical link in the *Chain of Survival*³.

Most victims who can be saved from cardiac arrest are in ventricular fibrillation (VF) or ventricular tachycardia (VT) rhythms³. Conversion of VF to a normal heart rhythm requires defibrillation within a few minutes of a cardiac arrest. The likelihood of success reduces rapidly over time^{3,4}. Therefore, many expert resuscitation organizations have recommended that non-medical individuals should be encouraged to use defibrillators^{1,5}. In a number of countries, lifeguards now receive training in the use of automated external defibrillators (AED) and have access to AED for resuscitation.

INTRODUCTION

Lifeguards have the unique challenge of providing rescue and resuscitation services in and around water. Resuscitation after a drowning is different to resuscitation after other cardiac arrests. Drowning is a hypoxic event with significant consequences¹⁵⁻¹⁷. The World Health Organisation defines drowning as the process of experiencing respiratory impairment from

submersion/immersion in liquid⁶. Unless the drowning is interrupted, lack of oxygen (hypoxia) causes cardiac arrest^{7,8,11,13,21}. Drowning is often unwitnessed, and requires rescue of the victim before any resuscitation can occur. The most common initially-recorded heart rhythm is asystole^{8,11,12,13,14}, which does not respond to defibrillation. VF can occur in the early stages after cardiac arrest following drowning, although the incidence of a documented shockable rhythm in a drowning patient is less than 10%⁸⁻¹¹.

The *Drowning Chain of Survival* described by Szpilman, provides useful guidance to all involved in preventing or taking action in a drowning incident^{18,19}. The prevention of drowning must remain a principle function of lifeguards. When rescue is needed, recognising victim distress early, providing flotation to prevent submersion, removing the victim from the water if safe to do so, and providing care as needed, are the ideal. The Drowning Chain of Survival attempts to reduce the mortality associated with drowning and attempted aquatic rescue. Fast rescue and early initiation of basic CPR will improve victim outcomes^{8,20}. This is easier, and faster, in some environments (pools) than in other environments (open water or surf). The priority in the resuscitation of drowning victims is ventilation to correct low oxygen (hypoxia)^{17,21}. In cases of land based cardiac arrest, and those drowning cases with fast rescue and early effective resuscitation, VF and VT may be present, so defibrillation could be helpful^{9,14}.



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Experience and peer reviewed literature on defibrillation in drowning resuscitation by lifeguards are limited. There is no clear evidence of the value of early defibrillation following drowning. Cost-benefit analysis for early defibrillation by lifeguard programs is also absent. The provision of early defibrillation by lifeguards must be considered in relation to other training and equipment priorities of lifeguards and lifeguard programs. The ILS Medical Committee produced a guideline *Medical Priorities in Lifesaving* to assist lifesaving services in deciding what first aid and resuscitation training and equipment to prioritise²². Lifeguards deal with a wide range of medical situations, and the incidence of these differs greatly between organisations and locality. In those lifesaving organisations where non-drowning cardiac arrests make up a large number of the resuscitation events, then greater emphasis may be placed upon providing AED and training lifeguards in the use of AED²³. To help further advance scientific knowledge in this area, outcome studies after AED use by lifeguards are needed.

STATEMENT

1. The primary objective for lifeguards is to prevent drowning and water related accidents through the series of steps which make up the *Drowning Chain of Survival* (prevention of drowning, recognition of distress, providing flotation, removing victim from water, and providing care as needed).

2. The provision of lifeguards with training and equipment for early recovery of victims from water, to stop the drowning process, is the highest priority.
3. All lifeguards should receive training in Basic Life Support and CPR.
4. This position statement mostly refers to the limited value of an AED in drowning situations.
5. Use of an AED on a drowned victim:
 - Drowning causes low oxygen (hypoxia), so it requires a different focus for resuscitation.
 - High quality CPR is the first priority and must include ventilations.
 - An AED can be applied after CPR is started if it is available.
 - An AED will rarely make a difference to survival in a drowned victim, as the most common initially-recorded rhythm in cardiac arrest following drowning is asystole. VF and VT may be present in some drowning resuscitations. Early application of AED may be an effective treatment in these cases.
6. Whilst the prevention of drowning, and management of drowning are the primary objectives of lifesaving organisations, many lifeguard services provide first aid and resuscitation to people in the aquatic environment who haven't drowned.
7. Use of an AED in a non-drowning victim, or a victim who has collapsed with presumed cardiac cause:
 - High quality CPR is the first priority.
 - An AED should be used as soon as possible.
 - Early defibrillation in cardiac arrest can convert the heart back to normal rhythm and lead to functional survival for the victim.
 - National and international protocols should be followed when possible.
8. The successful use of AEDs by an agency requires additional costs to purchase, maintain, and provide training. The decision to incorporate AEDs should be based on the population served, frequency and cause of cardiac arrests, financial resources, training, community resources, response times of other AED providers, and cultural considerations of the agency.
9. Based on the wide variety of lifeguard agencies in low, middle, and high income settings, the ILS Medical Committee cannot make a recommendation that AEDs be mandatory equipment for all.
10. We refer you to the ILS Medical Position Statement *Medical Priorities in Lifesaving*, in which we suggest that AEDs are useful and worth having in a high income setting, but in low income settings are less important than other equipment such as rescue boards and basic first aid equipment.
11. Outcome studies of the use of AED by lifeguards in aquatic settings should be encouraged.

LEVEL OF EVIDENCE

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 organisations that are identified and/or impacted by the position statement.

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