

INTERNATIONAL LIFE SAVING FEDERATION

Gemeenteplein 26 – 3010 Leuven – Belgium
Tel: +32/ 16 896060 - E-mail: ils.hq@telenet.be - Web: www.ilsf.org

MEDICAL POSITION STATEMENT - MPS 23

RESUSCITATION IN AQUATIC FACILITIES IN LOW RESOURCE SETTINGS

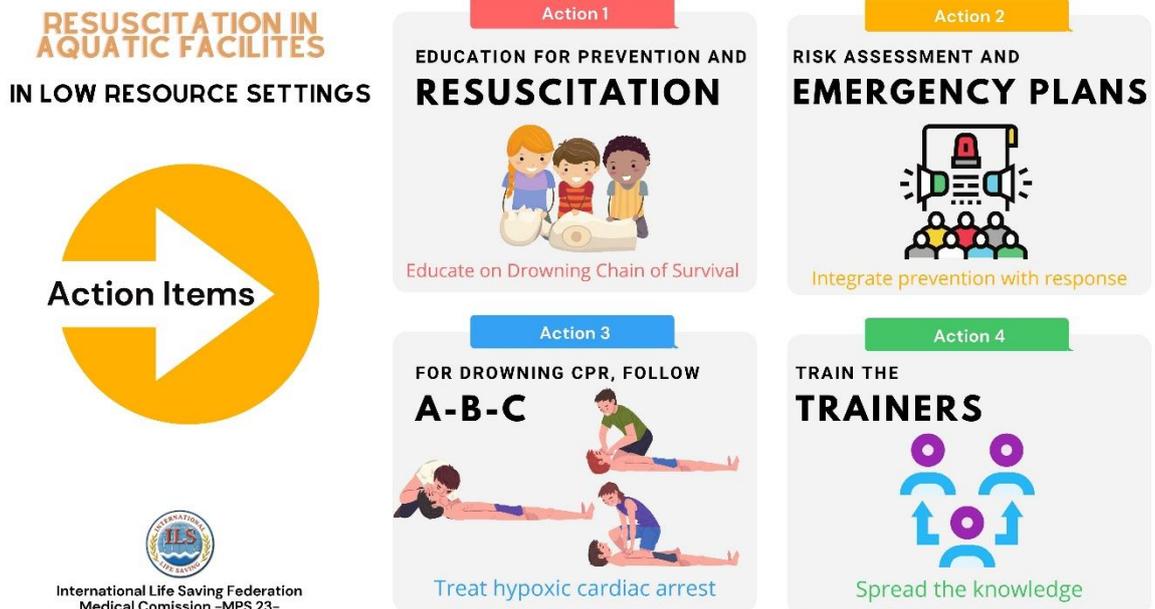
NOTE: Medical Position Statements are intended only for trained lifeguards with a duty to respond.

PLAIN LANGUAGE SUMMARY

Low and Middle Income Countries (LMIC) often do not have the infrastructure, equipment or national guidelines in place for resuscitation. Lifesaving agencies in resource deficit settings can often achieve better success with high quality training and education than with expensive equipment.

This statement provides guidance to lifeguards operating in low resource settings, either LMIC, disaster areas, or locally low resource settings within High Income Countries (HIC). This guideline addresses training, implementation, and termination of resuscitation.

SUMMARY INFOGRAPHIC



BACKGROUND

The World Health Organization (WHO) estimates that more than 90% of fatal drowning occurs in Low and Middle Income Countries (LMIC) ¹.

The exact ratio in LMIC is unknown, although drowning morbidity and mortality are expected to be much higher due to decreased access to prevention, rescue, and resuscitation. In Asia, Africa, and Central

America, the incidence of drowning is estimated to be 10 to 20 times higher than in high-income countries¹ (HIC).

The Drowning Chain of Survival (MPS-19) identifies a framework for reducing the morbidity and mortality associated with drowning and cardio-pulmonary arrest³. Many LMIC lack the infrastructure to effectively provide all the links in the drowning chain⁴. In LMIC, the rate of bystander initiated resuscitation is very low due to several reasons⁴. The lack of systemic infrastructure for basic and advanced emergency medical services (EMS) and post arrest care further complicates the downstream elements of drowning resuscitation². The existing cardiac 'chain of survival' systems are weak in LMIC and the 'drowning chain of survival' may be non-existent or unknown.

Prevention is the most important and cost-effective intervention to reduce drowning morbidity and mortality¹. When prevention fails, an effective rescue is essential⁵.

In an effective system, there would be adequate prevention, qualified rescue, then high-quality pre-hospital, hospital, and post-acute care management. In low resource settings, some systems may have adequate pre-hospital and hospital care, but lack infrastructure for prevention and rescue. With inadequate prevention and rescue, survival of drowned persons is more dependent on a short submersion time and immediate and effective application of cardiopulmonary resuscitation (CPR) by bystanders or professionals⁶. Conversely, there may be a highly effective lifeguard or rescue service that lacks medical support once the patient is rescued, despite effective CPR. Water safety, advanced EMS, and hospital capabilities require extensive financial and personnel resources that take many years to implement. Efforts to improve these domains may also be hampered by limited data on the true burden of local drowning morbidity and mortality.

The ILS Medical Position Statement 07 "Medical Priorities in Lifesaving"⁷ provides guidance to lifeguard services on the stepwise progression of training and equipment in resource limited settings. LMIC lifeguards services and rescue organizations should meet the first priority level, especially prevention, before seeking equipment or training at the higher levels, especially when the next step in the process (EMS; Emergency Department; Intensive Care Unit) is unable to follow and meet that standard. Given the unique challenges of LMIC, the greatest effort should be invested in prevention as an anticipatory strategy for resuscitation (Figure 1)



Figure1. Prevention is the most important intervention in the drowning chain of survival. Adaptation of the drowning survival chain following the proposal by Deakin CD. *The chain of survival: Not all links are equal. Resuscitation 2018 May;126:80–2*, based on Szpilman, et al.³

Lifeguards in LMIC may operate without formal national certification or training in lifeguarding or CPR. Existing training may be influenced by local tradition, outdated protocols, folklore, or lack resuscitation techniques specific to drowning⁸.

Even in HIC, less than 10% of lifeguards have experience performing CPR⁹. In a large Brazilian study, only 0.0009% of lifeguard actions involve resuscitation, with prevention accounting for more than 99.8%¹⁰. There has been an increased emphasis on compression-only CPR (CCPR) for the treatment of out of hospital sudden cardiac arrest (SCA) for cardiac causes of cardiac arrest. However, it has come

at the cost of a misunderstanding as to the proper treatment for cardiac arrest due to respiratory causes. Cardiac arrest due to drowning is typically caused by systemic hypoxemia. In these cases, CPR requires both ventilations and chest compressions aiming to reverse hypoxemia and provide coronary and cerebral perfusion. Because ventilations can be difficult to perform, more detailed CPR instruction following the traditional Airway–Breathing–Circulation (ABC) approach is required. This is especially important for lifeguards, parents with pools, water sport athletes, and emergency healthcare providers as well. In addition, peri-arrest drowning patients often have foamy material or vomit in their airway, which could easily dissuade a provider from providing ventilations if the importance of reversing hypoxemia is not understood. This is not a new concept, it has been included in resuscitation guidelines for many years, but sometimes is overshadowed by the push for CCPR that is used for SCA of a primarily cardiac origin¹¹.

Reporting of rescues, first aid, and resuscitations provides increased understanding of the local burden of drowning. This understanding helps to justify lifeguard and EMS services, allowing agencies to demand more and better resources to improve service implementation. Data in many LMIC are often limited, doesn't meet the inclusion criteria, are unavailable or aren't applicable¹², which hinders our understanding of the drowning problem and does not give the proper claim for policy solutions.

STATEMENT

1. National Certification Standards on resuscitation and training considerations

- Drowning management education should include all components of the drowning chain of survival, from prevention to resuscitation³.
- The CPR techniques should meet the standards set by the nearest national resuscitation council that is a member of the International Liaison Committee on Resuscitation (Table 1) in all settings including low and middle income countries or resource deficit settings where no national or regional guidelines exist.
- Training should emphasize local conditions and locally available resources. Agencies should adopt a “Train the Trainer” model of resuscitation education that includes “hands on” courses given by local facilitators including locally sourced mannequins and equipment¹³. This will encourage self-sustainable training and re-training and avoid “fly-in” training that is dependent on HIC personnel and resources. The digital teaching of resuscitation can be an alternative to provide knowledge and skills in locations without access to standard teaching. Components of online training might consider using blended learning approach with virtual patient, computer-screen based, learning theories and video-recorded assessment¹⁴. Once there is a good understanding and practice of performing the resuscitation techniques, further training and re-training should take place under common, real-life circumstances. This includes training on beaches, surfboards, and rescue boats (Medical Position Statement MPS-26)¹⁵ and in-water-resuscitation (IWR) (Medical Position Statement MPS-08)¹⁶. Special attention should be given to communication, task-delegation, and logistics. In this way, the quality of resuscitation skills can be improved without extra costs.
- Due to the infrequency in performing CPR⁹, lifeguards should emphasize regular training and re-training to achieve high-quality resuscitation individually or as part of a team. Regular training has been shown to improve CPR performance. Though the best interval is not known, 2-3 times per year is recommended¹⁷.
- Manufactured training manikins may be expensive or may simply not be supplied at LMIC. However, for frequent training there are numerous alternatives or low cost self-made manikins for personal use that can be used for training purposes^{17,18}. To build a manikin suitable for compressions and ventilations, follow the link below
<https://www.youtube.com/watch?v=DNnyGnovkPo>

2. Risk assessment and emergency actions plans

Aquatic facilities with public access should be have capacity for:

- Active prevention as a lifeguard duty (signaling dangerous rip currents or areas without surveillance). Develop protective actions plans in different situations for life safety (evacuation or shelter-in-place) including First Aid care. Implementation of public communication systems

to identify the patrolled areas and any environmental risks, implementing the ILS Lifesaving Position Statement LPS-14 “Beach safety and information flags”¹⁹.

- Communication among lifeguards²⁰ (hand signals LPS-12) and EMS activation systems in order to activate rescue and first aid protocols.
- Lift and transport methods with or without equipment to handle and carry the patient to a meeting emergency zone point.
- Establish approach plans with access zones as close as possible to the aquatic area to transport the patient to hospital if needed, and arrangements with local EMS services to integrate the plans in the EMS logistics.
- Critical Incident Stress Debriefing (CISD) should be done between 24-72 hours after a major incident, with follow-up sessions if necessary with the team involved. CISD should be offered, but not mandatory.

3. ABC vs CAB vs Hands-only protocol

- CPR with ventilations is the most beneficial technique for drowning patients²¹. Compression only CPR is indicated in cardiac causes of cardiac arrest as a bridge to defibrillation, and even then, just in those well-organized settings in which all elements of the cardiac chain of survival are available.
- In drowning, the primary inciting incident is hypoxia so early oxygenation is a critical component of drowning resuscitation including the IWR protocol when indicated.¹⁶ The uses of barrier devices with one-way valves for bag-mask and mouth-mask ventilation are standards practice for healthcare professionals and lifeguards in HIC’s. The cost, maintenance, training, and expiration dates are often barriers to implementation in LMIC’s. However, mouth to mouth ventilation without a barrier device or just a simple mask with viral filter (pocket-mask) remains a viable option in resource deficit areas. There are no published reports of Human Immunodeficiency Virus or Hepatitis B transmission during the CPR process using mouth to mouth ventilations. The risk of seroconversion in a rescuer providing CPR has been calculated to be less than one per billion resuscitations²². Nonetheless it’s strongly advised that all Lifeguards are immunized against Hepatitis B, whether there is legislation in their country or not²³. Local regulations, cultural considerations, and personal risk assessment should guide LMIC agencies in their development of CPR training and protocols that include mouth to mouth ventilation with no barrier devices. As training and resources become available, this can be transitioned to reusable barrier devices that are disinfected according to local health regulations and eventually to single use disposable devices.
- In the context of the global COVID-19 pandemic, additional resources can be found at http://idra.world/portfolio/covid_cpr_guidelines/

4. Automated External Defibrillators

- 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 all⁷.
- The decision to incorporate AEDs should be based on the population served, frequency and causes of cardiac arrests, financial resources, training, community resources, response times of other EMS providers, and cultural considerations of the agency²⁴.
- Integration with the local EMS or health system is an absolute prerequisite for the implementation of an AED.
- High quality CPR is the first priority and must include ventilations. An AED can be applied after CPR is started if it is available²⁵.
- AEDs are useful and worth having in a high-resource setting, but in low resource settings are less important than other resources for active prevention actions and equipment such as rescue boards and basic first aid material⁷. Placing an emphasis on prevention, rescue, and rescuer safety is a more cost-effective intervention.

5. Initiation and Termination of Resuscitation

- Considerations for the initiation and termination of CPR should be based on the available resources, medico-legal requirements, religious, ethical, and cultural needs. These factors

should be discussed and understood at the local level by all stakeholders prior to implementation of policies that dictate whether or not lifeguards should start resuscitation or when they should stop.

- In HIC's, CPR is typically continued until the arrival of the EMS. The EMS response is generally not present or significantly delayed in rural areas at HIC or LMIC's. Given absence of availability of all elements of the Out Hospital Cardiac Arrest (OHCA) chain of survival⁴, it is necessary to provide formal guidance on when to cease CPR. Responders should consider do CPR for a 30 minutes period, stopping if the victim shows signs of life, if the scene isn't safe, the rescuer is physically exhausted, or if professional medical assistance arrives, whichever occurs first.^{4 25}
- If the first responder chooses to do so, the victim's family or loved ones may be encouraged to stay by their side during resuscitation efforts, especially in pediatric patients^{25 26}. This is the current standard of practice in resuscitation, but should not be forced upon the family if they choose to grieve differently.
- The initiation and termination of resuscitation is heavily influenced by local practice. Religious custom, angry or violent crowds, medically inappropriate bystander techniques, and myriad other situations can complicate the resuscitation efforts. The safety of the rescuers is paramount and patients may be transported as a matter of rescuer safety, even if not indicated by EMS protocol.²⁶

6. Documentation

- Reporting incidents of fatal and non-fatal drowning cases and collecting data are also an important part to improve lifeguard preparedness on the resuscitation actions that could impact in drowning patient's outcomes.
- All medical interventions should be documented and recorded by lifeguards and first responders. Though no specific form is recommended, consideration should be given to the Utstein Style for Drowning²⁷.
- Minimum documentation should include the patient's name, age, and gender. There should be a narrative description of the interventions performed, estimated submersion time, weather and water conditions, signs of respiratory impairment, and disposition of the patient (death or non-fatal with transport to hospital, or home)²⁸.
- Agencies should review their fatal and non-fatal drowning cases through a performance improvement process to identify not only successes, but also areas of improvement.

SUMMARY

Lifesaving agencies in resource deficit settings can often achieve better success with high quality training and education than with expensive equipment. Agencies should be aware of the capabilities of the downstream elements in the chain of survival. These elements; Emergency Medical/Ambulance Services, Emergency Departments, Intensive Care Units, should be engaged as stakeholders in improving outcomes from drowning resuscitation.

LEVEL OF EVIDENCE

This document is based on expert consensus.

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.

AUTHORS

Manino, Leonardo
Sempsrott, Justin
Bierens, Joost
Szpilman, David
Barcala-Furelos, Roberto

Table 1: Members of the ILCOR General Assembly

-Australian and New Zealand Committee on Resuscitation -European Resuscitation Council -American Heart Association -Heart and Stroke Foundation of Canada	-Resuscitation Council of Southern Africa - Resuscitation Council of Asia - Inter American Heart Foundation
--	---

REFERENCES

1. Szpilman D, Bierens JJLM, Handley AJ, Orlowski JP. Drowning. *N Engl J Med*. 2012 May 31;366(22):2102–10. <https://doi.org/10.1056/NEJMra1013317>
2. Shams A, Raad M, Chams N, Chams S, Bachir R, El Sayed MJ. Community involvement in out of hospital cardiac arrest: A cross-sectional study assessing cardiopulmonary resuscitation awareness and barriers among the Lebanese youth. *Medicine (Baltimore)*. 2016 Oct;95(43):e5091. <https://doi.org/10.1097/MD.0000000000005091>
3. Szpilman D, Webber J, Quan L, Bierens J, Morizot-Leite L, Langendorfer SJ, et al. Creating a drowning chain of survival. *Resuscitation*. 2014 Sep;85(9):1149–52. <https://doi.org/>
4. Mecrow T, Nusrat N. Resuscitation in Low- and Middle-Income Countries: Issues to Be Considered. In: Bierens JJLM, editor. *Drowning: Prevention, Rescue, Treatment* [Internet]. Berlin, Heidelberg: Springer; 2014 [cited 2021 Dec 14]. p. 651–8. Available from: https://doi.org/10.1007/978-3-642-04253-9_100
5. Szpilman D, Orlowski JP, Bierens JJLM. Drowning. In: *Textbook of Critical Care*. 7th ed. Elsevier Health Sciences; 2014.
6. Quan L, Bierens JJLM, Lis R, Rowhani-Rahbar A, Morley P, Perkins GD. Predicting outcome of drowning at the scene: A systematic review and meta-analyses. *Resuscitation*. 2016;104:63–75. <https://doi.org/10.1016/j.resuscitation.2016.04.006>
7. International Life Saving Medical Position Statement 07. Medical Priorities in Lifesaving [Internet]. ILS; 2006. Available from: <https://www.ilsf.org/wp-content/uploads/2018/11/MPS-07-2006-Medical-Priorities.pdf>
8. Tate R, Quan L. Cultural Aspects of Rescue and Resuscitation of Drowning Victims. In: *Prevention, Rescue, Treatment*. Springer Berlin Heidelberg; 2014.
9. Moran K, Webber J. Surf Lifeguard Perceptions and Practice of Cardiopulmonary Resuscitation (CPR). *International Journal of Aquatic Research and Education* [Internet]. 2012 Feb 1;6(1). DOI: <https://doi.org/10.25035/ijare.06.01.05>
10. Szpilman D, de Barros Oliveira R, Mocellin O, Webber J. Is drowning a mere matter of resuscitation? *Resuscitation*. 2018;129:103–6. <https://doi.org/10.1016/j.resuscitation.2018.06.018>
11. Schmidt A, Szpilman D, Berg I, Sempsrott J, Morgan P. A call for the proper action on drowning resuscitation. *Resuscitation*. 2016;105:e9–10. <https://10.1016/j.resuscitation.2016.04.019>
12. Global report on drowning: preventing a leading killer [Internet]. Australian Policy Online. 2014 [cited 2014 Dec 6]. Available from: <http://apo.org.au/node/42350>
13. Anderson CR, Taira BR. The train the trainer model for the propagation of resuscitation knowledge in limited resource settings: A systematic review. *Resuscitation*. 2018 Jun;127:1–7. <https://doi.org/10.1016/j.resuscitation.2018.03.009>
14. Greif R, Lockey AS, Conaghan P, Lippert A, De Vries W, Monsieurs KG, et al. European Resuscitation Council Guidelines for Resuscitation 2015: Section 10. Education and implementation of resuscitation. *Resuscitation*. 2015 Oct;95:288–301. <https://doi.org/10.1016/j.resuscitation.2015.07.032>
15. International Life Saving Medical Position Statement 26. Resuscitation on-board Rescue Boats [Internet]. ILS; 2020. Available from: https://www.ilsf.org/wp-content/uploads/2020/11/MPS-26-resuscitation_on_boats_200217-FINAL.pdf
16. International Life Saving Medical Position Statement 08. In-water-resuscitation [Internet]. ILS; 2015. Available from: <https://www.ilsf.org/wp-content/uploads/2018/11/MPS-08-2015-In-water-resuscitation.pdf>
17. Van Raemdonck V, Monsieurs KG, Aerenhouts D, De Martelaer K. Teaching basic life support: a prospective randomized study on low-cost training strategies in secondary schools. *Eur J Emerg Med*. 2014 Aug;21(4):284–90. <https://doi.org/10.1097/MEJ.0000000000000071>

18. Nakagawa NK, Oliveira KMG, Lockey A, Semeraro F, Aikawa P, Macchione M, et al. Effectiveness of the 40-Minute Handmade Manikin Program to Teach Hands-on Cardiopulmonary Resuscitation at School Communities. *The American Journal of Cardiology*. 2021 Jan 15;139:126–30. <https://doi.org/10.1016/j.amjcard.2020.09.032>
19. International Life Saving. Lifesaving Position Statement 14. Beach safety and information flags [Internet]. ILS; 2010. Available from: <https://www.ilsf.org/wp-content/uploads/2019/01/LPS-14-2010-Flags.pdf>
20. International Life Saving Lifesaving Position Statement 12. Hand signals for lifeguards [Internet]. ILS; 2012. Available from: <https://www.ilsf.org/wp-content/uploads/2019/01/LPS-12-2012-Hand-Signals.pdf>
21. International Life Saving Medical Position Statement 15. Compression-only CPR and drowning [Internet]. ILS; 2008. Available from: <https://www.ilsf.org/wp-content/uploads/2018/11/MPS-15-2008-Compression-Only-CPR.pdf>
22. Bierens JJ, Berden HJ. Basic-CPR and AIDS: are volunteer life-savers prepared for a storm? *Resuscitation*. 1996 Oct;32(3):185–91. [https://doi.org/10.1016/0300-9572\(96\)00943-4](https://doi.org/10.1016/0300-9572(96)00943-4)
23. International Life Saving Medical Position Statement 03. Communicable diseases [Internet]. ILS; 2016. Available from: <https://www.ilsf.org/wp-content/uploads/2018/11/MPS-03-2016-Communicable-Disease.pdf>
24. International Life Saving Medical Position Statement 04. Automated external defibrillator use in drowning resuscitation [Internet]. ILS; 2016. Available from: <https://www.ilsf.org/wp-content/uploads/2018/11/MPS-04-2016-AED.pdf>
25. Truhlář A, Deakin CD, Soar J, Khalifa GEA, Alfonzo A, Bierens JJLM, et al. European Resuscitation Council Guidelines for Resuscitation 2015: Section 4. Cardiac arrest in special circumstances. *Resuscitation*. 2015 Oct;95:148–201. <https://doi.org/10.1016/j.resuscitation.2015.07.017>
26. Manino L, Pizzini D. Ahogamiento: Situación especial de reanimación Manejo pre-hospitalario. 2019. [doi 10.13140/RG.2.2.34870.55365](https://doi.org/10.13140/RG.2.2.34870.55365)
27. Idris AH, Bierens JJLM, Perkins GD, Wenzel V, Nadkarni V, Morley P, et al. 2015 revised Utstein-style recommended guidelines for uniform reporting of data from drowning-related resuscitation: An ILCOR advisory statement. *Resuscitation*. 2017 Sep;118:147–58. <https://doi.org/10.1161/HCQ.000000000000024>
28. Beerman S, Bierens JJLM, Clemens T, Meddings A, Rahman A, Szpilman D. Clarification and categorization of non-fatal drowning [Internet]. WHO. [cited 2021 Dec 14]. Available from: <https://www.who.int/publications/m/item/clarification-and-categorization-of-non-fatal-drowning>

APPROVAL

Approved by Medical Committee March 2022