Resuscitation of the drowned person in the era of COVID-19 disease: A common ground for recommendations, identification of research needs and a global call to action

This position statement is presented on behalf of the International Drowning Researchers' Alliance [IDRA], International Life Saving Federation – Medical Committee [ILS-MC] and International Maritime Rescue Federation [IMRF]

PREAMBLE

The following recommendations were developed in April-May 2020 and based on the current knowledge of the SARS-CoV-2 virus (COVID-19).
As countries, regions and aquatic organisations are at different stages of the disease and have different approaches to reducing the impact of the virus, there may be variations in practice that need to be considered before their implementation. There is also a wide variety in drowning and drowning resuscitation settings around the world. In some drowning resuscitation settings, these recommendations can be easily implemented. In other settings, there will be national recommendations or laws that overrule the situation. It should be recognised that many settings will deserve urgent improvisation or decision making beyond or in conflict with these recommendations. This may be either in the interest of the drowned person or the aquatic rescuer.
The COVID-19 places many common drowning resuscitation procedures into a different perspective. Alternative procedures are being implemented but have not yet been tested or validated for applicability. It is expected that during the next few months more information will become available which will further inform the evidence-base of these recommendations.

EXECUTIVE SUMMARY

This executive summary is an adjunct to the April-May 2020 recommendations. It is advised to read the complete document for full details and rationale. It is expected that during the next few months, more information becomes available that will further increase the evidence-base of these recommendations.
The most up to date version of the complete document, the CPR algorithm and this summary document can be found at: http://idra.world/covid

Prevention of drowning

- Forbidding or reducing all water activities is a reasonable consideration, in areas and times where and when the burden of disease is high.
- Drowning prevention programs should be updated to reflect the changes in rescue and resuscitation procedures due to COVID-19.
- Drowning prevention and education programs should be increased to prepare for re-opening of aquatic facilities occurs.
- Consider innovative media strategies to spread drowning and COVID-19 prevention messages, such as video messaging, social media and other.

Infection risk mitigation

- Mouth-to-mouth ventilations without any barrier device is considered a procedure that carries a high-risk of SARS-CoV-2 transmission during resuscitation and is therefore not recommended.
- Profiling of users in aquatic facilities and natural waterways, and their level of adoption of protection measures during the pandemic, may be a useful tool to dynamically assess infection risk levels and signal the need for the step-up of rescuer protection measures.
- Organisations are advised to develop methods for screening patrons entering the facilities under their responsibility for potential COVID-19 signs and symptoms.

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- Rescuers belonging to high-risk groups for developing severe COVID-19 disease should not be assigned duties that include direct contact with people.

- Organisations should adhere to national guidelines regarding work absence and return-to-work safety standards for their rescuers.

- Organisations should advocate for rescuers to be among the first to access a vaccine (once developed) and to have priority access to testing along with other first responders.

- Organisations should develop clear criteria regarding the identification of when it is reasonable for rescuers to not start resuscitation. Submersion time is the only criterium that is based on evidence.

- Although there is potential for serious infection, the majority of infected individuals have been exhibiting no or mild symptoms.

Personal Protective Equipment (PPE)

- For all resuscitations, rescuers should wear gloves, a face mask and eye protection. They should also conduct proper hand-hygiene following each intervention or personal contact.

- Organisations should ensure adequate PPE is available, at hand, and that staff are instructed how to safely apply or remove the PPE.

- Organisations, scientists and industry should partner to develop improved equipment and PPE that meets the specific requirements of the aquatic environment, protecting rescuers in the COVID-19 era.

- Further research is needed to understand the effectiveness of PPE in the aquatic environment.

Resuscitation of drowned persons during COVID-19 era

- Organisations should develop new protocols and provide additional training for resuscitation. These protocols may include bag-filter-mask-ventilation with two persons, mouth-filter-mask ventilation with two or one person, and/or passive oxygenation with a mask. Each technique has advantages and disadvantages regarding the required skill level, infection prevention, oxygen delivery, and costs for equipment and training.

- The COVID CPR algorithm provides more detail about when to put on PPE and when other interventions should occur during the resuscitation of a drowned person.

- The preferred technique is a bag-filter-mask ventilation with an HEPA filter.

Education and training programs

- Before implementation of the proposed resuscitation techniques with equipment, rescuers should receive appropriate training on their use and the underlying new protocols.

- Face-to-face training should be suspended in areas with high disease burden or under quarantine.

- Principles of risk mitigation should still apply once facilities and agencies resume training courses.

- The practicing of resuscitation techniques should be done using manikins and protective equipment, but only if the equipment can be properly cleaned and decontaminated, and hand hygiene is observed before and after training.

Organisations unable to meet recommended guidance

- If unable to meet these recommendations, rescuers should adhere to ILCOR's general guidelines and perform compression-only CPR while covering the person's mouth/nose with a cloth.

Responsibilities of aquatic rescue organisations and other ethical aspects

- Organisations and employers have an ethical obligation to act in the interest of the rescuer's safety.

- Organisations should have clear guidance in place for their staff and inform them of the procedures to follow.

- Organisations should create awareness campaigns of risk mitigation strategies, monitor local prevalence of COVID-19, create opportunities for training in new resuscitation equipment/techniques, and assess each resuscitation attempt to evaluate the potential for further improvements of the resuscitation of drowned persons during the COVID-19 era.

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Introduction

The emergence of the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) has led to a pandemic of the COVID-19 disease. The virus spreads through respiratory secretions and by touching contaminated surfaces. Maintaining physical distance from other people is one of the most important preventive public health measures at this point in time. Initiatives are urgently needed to progress towards COVID-resilient organisations. This document provides guidance to aquatic rescue organisations and other aquatic organisations (called *"organisations"* in this paper) about how to deal with the resuscitation of drowned persons where it is not possible to maintain distance. Drowning is a hypoxic event that can occur in a setting with rescuers who have a duty to respond.[1] COVID-19 has confronted individuals who respond to aquatic emergencies, such as lifesavers, lifeguards and lifeboat crews (called *"rescuers"* in this paper), with a unique challenge. Rescuers who are tasked with the duty and responsibility to respond to life-threatening emergencies such as drowning, have an intrinsic motivation to help others and are trained in resuscitation. Since January 2020, the decision to provide resuscitation to a drowned person is not as straightforward as it was previously. Contact with persons may put a rescuer's safety at risk and this risk is greater while performing resuscitation. The risk of infection creates conflicting practical and ethical dilemmas for rescuers and potentially may decrease their willingness to perform drowning resuscitations.

Unlike other injuries, survival from drowning is almost exclusively determined at the scene and depends on how quickly a person is removed from the water and resuscitation is started. Prior to the heart stopping, reversal of the hypoxic state by ventilating is the most effective measure.[2-4]

However in the setting of COVID-19, resuscitation is likely to result in the transmission of the SARS-CoV-2 via droplets or aerosols from the drowned person to the rescuer.[5-6] In this complex and unpredictable situation, national and international organisations will have to continue to deal with drowning resuscitations. However these organisations have the paramount responsibility of establishing procedures and practices to keep rescuers safe. The recommendations in this document are provided to assist these organisations and cover the topics of drowning prevention, risk mitigation, personal protective equipment, resuscitation (including a flow diagram), training programs, advice for those organisations unable to meet the recommendations, research and development, responsibilities of organisations, and ethical considerations.

These recommendations are not designed to replace formal national recommendations and regulations but rather serve to supplement them with more detailed information specifically regarding the resuscitation of the drowned person.

Organisations are strongly advised to contact the legal and health inspective authorities in their regions or countries to fully clarify the legal consequences that may result from procedures adopted in their new protocols, including the possibility of not starting drowning resuscitation in situations with anticipated poor outcomes (dead or neurologically severely impaired).

Accountability of the consensus process

The need for a COVID-19 specific position statement was identified by the lifesaving community. A survey was sent to all members of the International Drowning Researchers' Alliance [IDRA] and the International Life Saving Federation – Medical Committee [ILS-MC], as well as nominated representatives of the International Maritime Rescue Federation [IMRF].

These three organisations represent major global aquatic rescue networks and include members from various income settings and diverse backgrounds, including medical research, policy development, education, programming, and lifeguarding.

Members were asked to comment on or provide evidence for three areas:

- What regional and national protocols exist in their country regarding resuscitation in the COVID-19 era with or without drowning specific recommendations?
- Is there a need for a COVID-19 specific protocol for drowning resuscitation for rescuers? If so, what format?
- What recommendations do they support that will optimise drowned person outcomes and minimise the risk to rescuers during drowning resuscitation?

Members of IDRA, ILS-MC, and IMRF were contacted for their initial input. The individuals represented resuscitation councils and organisations from 17 countries including: Argentina, Australia, Belgium, Brazil, Canada, Denmark, Greece, Italy, Ireland, New Zealand, Norway, Portugal, Spain, Sweden, The Netherlands, the United Kingdom, and the United States of America.

The collected responses were summarised and distributed to members of a working group drawn from IDRA, ILS-MC, and IMRF. This group reviewed the responses and identified eight elements for clarification that would benefit rescuers worldwide.

For each element, the working group chose to highlight three features:

- Recommendations for rescuers
- Interventions that are urgently required to improve the safety of rescuers
- Data that is needed urgently to help inform best practices

A draft was created and distributed to the working group for feedback. An iterative review process was conducted that resulted in three drafts.

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Each draft was distributed to, and feedback invited from, the members of the three global organisations, as well as additional drowning prevention organisations and individuals who wished to be involved during the course of this process.
Feedback was assessed by the working group and the final paper was prepared for dissemination. Through these multiple rounds of commenting, 56 individuals contributed to the final version.

Recommendations

Prevention of drowning
While forbidding or reducing all water related activities is a potential option to be considered, especially when the burden of COVID-19 disease is high, it is not practical. Adherence may be low, particularly in natural waterways, unless strict restrictions are enforced. Nonetheless, both the individual rescuer and society at large will likely benefit from such rigorous measures. Because drowning will continue to occur, organisations are advised to intensify their strategies, both regarding drowning prevention in the areas under their surveillance and in preventing their employees or members from becoming infected.
Video instructions, webinars, and other innovative media communications are evolving rapidly to convey prevention messages and some water safety conferences are moving online.[7]
Organisations should become more active in the initiation of national public awareness campaigns to reduce drowning beyond their immediate fields of activities and responsibilities at pools, beaches, and other natural waterways.[8-9]
The World Health Organisation's Global Report on Drowning and Preventing Drowning: An Implementation Guide is the authoritative, evidence-based document that endorses this recommendation.[10-11] It also outlines other practical strategies for reducing drowning in high, middle and low income countries.

Infection risk mitigation
Complete risk aversion is unrealistic. However, through risk mitigation, it is possible to reduce potential harms to the rescuer. Mitigating the risk of infection in the resuscitation setting requires rescuers to attempt to identify drowned persons with known or suspected COVID-19 infection.
Any drowned person should be treated as potentially infectious if they (advised by those with them) report a fever, have prolonged coughing, have changes in taste or smell, have returned a confirmed test, or when the drowned person's family or close contacts have COVID-19 signs or symptoms.[12-14] Crucially, this information will be extremely difficult to obtain at the time of the resuscitation.
Where possible, organisations need to implement a screening process for anyone entering the facility under their responsibility or anyone who requires assistance.
Two simple mitigation measures are to have as few persons as needed at the site and always keep the drowned person downwind from the rescuers.
A more complicated mitigation strategy for persons with unknown COVID-19 infectious status is to decide when not to resuscitate if survival chances are low or futile.
Prolonged submersion time, prolonged time before the start of resuscitation, and prolonged time to arrival of advanced care are all poor prognostic factors[15-19]
Rescuers need to consider critically whether resuscitation efforts have a likelihood of benefit before proceeding. Organisations should define legally applicable guidelines indicating when resuscitation should not be started. In practice, the rescuers will ask for a specific length of time, which is understandable. However, in reality, the exact cut-off is unknown. There are several publications that may be helpful to guide recommendations on when to abstain from resuscitation.[15-19]
If the rescuer decides to proceed with a resuscitation attempt, it must be acknowledged that the potential to become infected (and spread the virus) will always be present. It is now clear that the majority of those infected with COVID-19 will only experience a mild disease course. Nevertheless, it is important to realise the morbidity and mortality of the disease is greater in persons older than 60 years of age, and persons with comorbidities.[12-14,19-22]
Thus, organisations should avoid deploying their rescuers belonging to higher risk groups on duties that may place them in direct contact with other persons who are known to have or suspected of having COVID-19, especially during resuscitation attempts.
Another important risk mitigation step is adhering to national recommendations regarding not attending work, self-isolating, and return-to-work timelines when rescuers become ill. Where no national policy exists, rescuers who are symptomatic should not attend work, should be quarantined and tested if exposed via coworkers or the public, and should adhere to a symptom-free period before returning to duty.[23]
The specific recommendations for testing and quarantine periods before returning to work are region and country specific. Infection spread is expected to become less prevalent in the future when rescuers have been vaccinated or have become immune due to a previous infection, although the existence and duration of this immunity is currently unknown.
Organisations should strongly advocate that their members be among the first to be tested and vaccinated as soon as such procedures become available, as is the case with other first responders.

Personal Protective Equipment (PPE)
The common rule of keeping a safe distance cannot be applied in a resuscitation setting. Viral spread can occur during any close contact, including during chest compressions or the attachment of an automated external defibrillator (AED).[6]

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If direct contact with the drowned person is necessary for resuscitation, personal protective equipment (PPE) should be used.[23] If the minimum PPE (gloves, face mask and eye protection) is not at hand, assessment of the respiratory and neurological status should be made from a prescribed distance until PPE is sourced and fitted.
Organisations should provide their staff with PPE and protocols for its use during interventions. They also need to advocate for their staff to be considered first responders when involved in medical emergency situations. In most countries, standards have been established regarding the facemasks used by pre-hospital teams. These standards can be used as reference.[24]
Staff training and instructional materials must be offered. Videos, posters, and other instructional tools can address topics such as putting on and taking off PPE and the importance of rescuers washing their hands thoroughly with soap and water or alcohol-based disinfectant following any direct contact with a drowned person. Additionally, organisations need to have a protocol in place for safely decontaminating and disposing of PPE.
Where PPE is unavailable, organisations should consider using recommendations set out in the section titled "*Organisations unable to meet the recommended guidance*". Further research is needed to understand the effectiveness of PPE in the aquatic environment.

Resuscitation of the drowned persons during COVID-19 era

The updated International Liaison Committee on Resuscitation (ILCOR) recommendations released for laypersons to reduce the risk of virus exposure state that most unconscious persons are not to be ventilated.[6] For drowned persons, however, this would mean that the probability of survival would be greatly reduced. As a result, rescuers will likely feel conflicted, as they weigh their duty to respond against the need to try and keep themselves safe during the rescue.
How, and under what circumstances, ventilations should be provided is likely to be the most difficult and controversial element of these recommendations. It is clear that a new way of working is needed to ensure the risk of infection is reduced in the COVID-19 era.

The **COVID** (**C**ompression-only **O**r **V**entilations **i**n **D**rowning) CPR algorithm (Figure 1) provides a detailed, step-by-step guide.

There are several situations where ventilations during drowning resuscitation are still best practice.
The first is where there is a low likelihood that the person is infected, such as in facilities that have an adequate admission screening process or in communities with low disease burden. Additionally, ventilations are still recommended in patients that are a low risk to the rescuer, such those with no medical comorbidities, or when appropriate PPE is available.
Ventilations are recommended when a child has drowned. At the moment there is sufficient data confirming that the prevalence of COVID-19 under children is very low.[25-27] Children also have played a very limited role in the spread of the virus. The ILCOR & ERC recommendations advise to perform mouth-to-mouth ventilations in children, as there is a high likelihood they will benefit from resuscitation.[6-28]
Ventilations should be performed in cases where a family member or close contact from the same household as the drowned person is present, trained, and willing to provide ventilations. Due to the close nature of their living situation, there is a high likelihood that infection spread between the contact and the drowned person has already occurred, thus resulting in minimal additional risk of infection to the family member or close contact.
If proceeding with CPR, including ventilations, in adults, there is expert consensus from the ILCOR and other international guidelines, that rescuers should abandon the practice of mouth-to-mouth/nose ventilations without any barrier device (e.g. pocket mask or bag-valve-mask).[6,28] In-water ventilations should not be attempted and instead rescuers should focus on removal from water where PPE and first aid equipment can be used.
Expert consensus recommendations regarding ventilations identify three techniques. Each technique is characterised by the manual skills required, the amount of oxygen delivered, the risk of infection, costs for purchase, maintenance and training, and is summarised in Table 1.
The values in the table are relative to the other techniques (for example, the cost of BVM with filter purchasing and training is higher than the other two but may not be significant overall). Also, this table assumes supplemental oxygen is added to each technique. Both bag-valve-mask and mouth-to-mask can be performed without supplemental oxygen, but oxygen delivery will be lower as a result. As filters can easily obstruct due to water and foam, several filters should be available with each mask.

	Skill level	O2 delivery	Infection risk	Costs
1. Two rescuer bag-mask-ventilation with HEPA filter (BVM)	Difficult	High	Low	High
2. Mouth-to-mask ventilation with HEPA filter	Moderate	Moderate	Moderate	Moderate
3. Passive oxygenation	Simple	Low	Low	Moderate

Table 1: Summary of characteristics for each recommended ventilation method (with supplemental oxygen)

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COVID (Compression-only Or Ventilations In Drowning) CPR Algorithm

English

Drowned person removed from water unconscious

Mouth-to-Mouth In-Water ventilations **SHOULD NOT** be performed!

- Call EMS/Ambulance
- Put on PPE (1)
- Get ventilation device

Perform Adapted Breathing Assessment (2)

Is the person breathing?

YES → Provide First Aid assessment and treatment → Monitor until emergency responders arrive

NO

Evaluate Resuscitation risk level (3)

Is this a Low-Risk Resuscitation?

YES → **CPR with ventilation + AED**

with safe ventilation method (4)

NO

Is the person a child?

YES → **CPR with ventilation + AED**

NO

Is there a trained relative or household member willing to ventilate?

YES → **CPR with ventilation + AED**

NO

Compression-Only CPR + AED

VERY IMPORTANT!

FOR A CORRECT APPLICATION OF THIS ALGORITHM, ORGANISATIONS SHOULD HAVE READ AND UNDERSTOOD THE FULL TEXT WITH RECOMMENDATIONS (AVAILABLE THROUGH THE QR CODE).

Additional Information

(1) Personal Protective Equipment (PPE)

Minimum required:
- Gloves
- Face mask with eye protection

(2) Adapted Breathing Asssessment

- Check if the chest is moving or if there are signs of breathing WITHOUT GETTING CLOSE
- DO NOT bring your cheek close to the mouth to feel the person's breathing.

(3) Low-Risk resuscitacion

- PPE available.
- Safe ventilation method can be used

And at least one of the following:

- Facility screening process in place.
- Low prevalence of disease locally.
- Low-risk Rescuer (younger age, healthy).

(4) Safe Ventilation Method

(in order of preference)
- 2-rescuer bag-mask ventilation (BVM) with HEPA filter.
- Mouth-to-mask with head strap and HEPA filter.
- Supplemental oxygen with non-rebreather mask and head strap.

Post-Resuscitation Care

- Wash hand with soap and water or an alcohol-based sanitizer.
- Dispose or decontaminate safely all equipment.

IDRA International DROWNING Researcher's Alliance

INTERNATIONAL ILS LIFE SAVING

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1. Two-Rescuer Bag-Mask-Ventilations with HEPA filter (BVM)

This technique provides adequate ventilation and presents a low risk of infecting the rescuer. One rescuer maintains a two-handed tight seal throughout ventilations and compressions in order to minimise expulsion of viral particles. The other rescuer performs chest compressions and then pauses to squeeze the bag. To further reduce expulsion, a high efficiency particulate air (HEPA) filter is attached to the bag-mask resuscitator. It is preferable to perform this technique with supplemental oxygen, but it can be done without.

This technique is difficult to learn it, and is also often difficult to perform even with regular training, and should always be performed by two rescuers. The cost of the equipment is high, but the cost of training is much higher.

2. Mouth-to-mask with HEPA filter

This technique also provides adequate ventilation but potentially poses a higher risk of infection for the rescuers. This procedure does not decrease the risk of disease transmission as effectively as a BVM due to the proximity to the person's airway. Preferably, the technique should be performed with two rescuers, with one maintaining the tight seal during ventilations and compressions with two hands. If the procedure is being undertaken by just one rescuer, tight head straps should be used to maintain a tight and fixed seal during compressions.

It is preferable to perform this technique with supplemental oxygen, but it can be done without. This technique is also difficult to learn and training includes both two-rescuer and one-rescuer applications. Equipment costs are lower than for BVM.

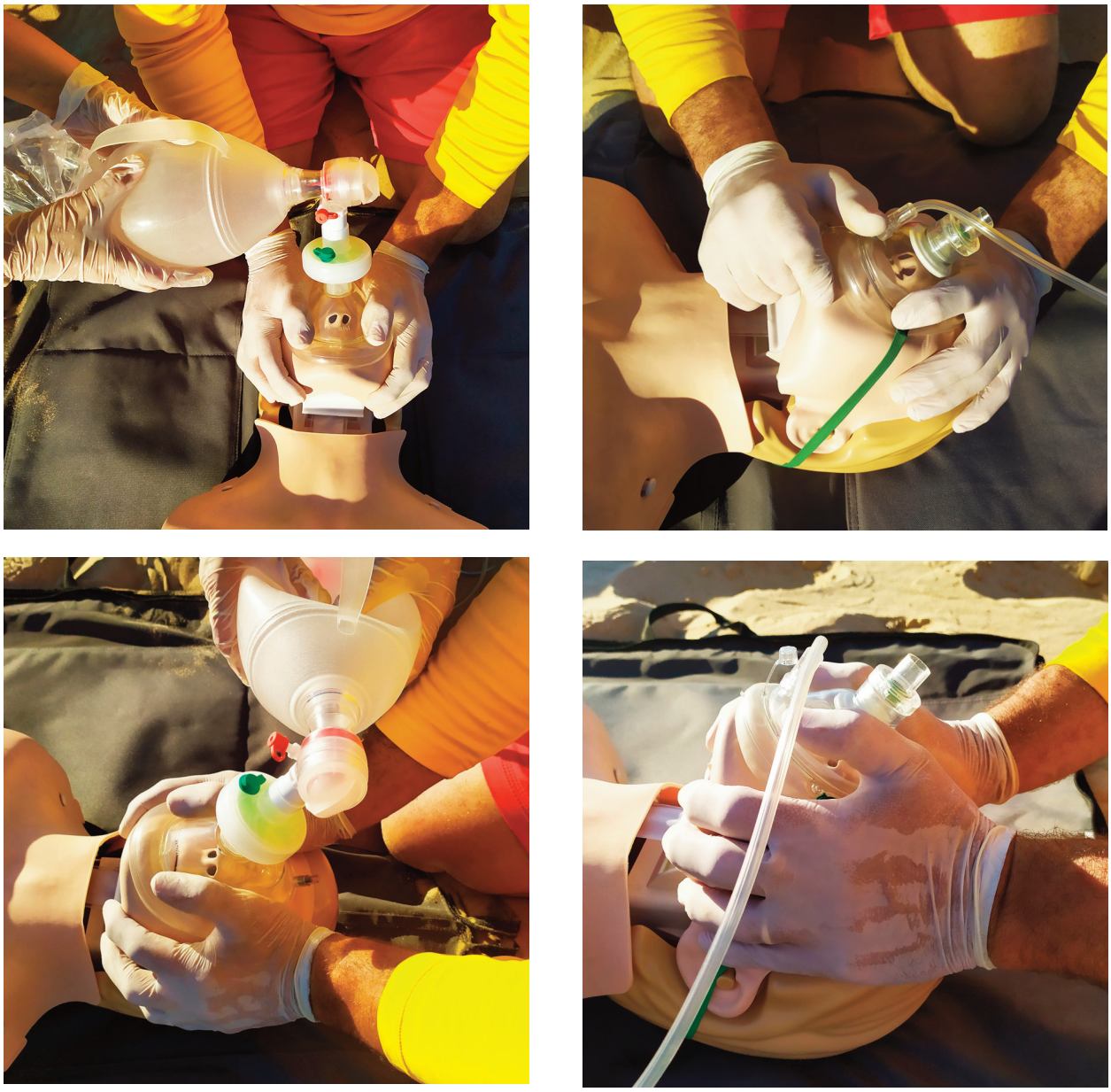


Figure 2: Demonstration of safer ventilation methods: Upper left: Two rescuer BVM with HEPA filter; Upper right: Single rescuer mouth-to-mask; Down left: head-tilt/chin-lift method; Down right: jaw-thrust method. Organisations can decide whether a PEEP valve is used or not, as in this picture. (Images provided by L. Manino).

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3. Passive Oxygenation (PO)
This technique should only be used when oxygen is available. A mask is tightly strapped to the face and supplemental oxygen is provided allowing for passive oxygenation while cardiac compressions are performed. In this method there is no active ventilation. The maintenance of an open airway is critical, and can be achieved using the jaw thrust or head tilt techniques.

4. Other techniques
Other techniques may be considered that were standard practice in an organisation before the COVID-19 disease.

If none of these techniques can be used, there is no PPE, or there is a high risk that the person may be infected, compression-only CPR is recommended. This is likely to result in a better outcome for the drowned person than no resuscitation attempt at all, and is deemed to be a low risk of generating aerosols.[29-30]
This procedure is described in detail in the ILCOR guidelines regarding COVID infection risk and resuscitation.[6]
Following any resuscitation attempt, rescuers should follow local health authority recommendations regarding screening after a potential exposure to SARS-CoV-2, and correct disposal of PPE and other potentially contaminated material.
Organisations should critically evaluate the advantages and disadvantages of all options available, making decisions and executing the practical changes that are needed for effective and safe resuscitations in their particular context. For example, if they decide to implement BVM ventilations, equipment needs to be purchased and maintained. Likewise, training programs, preferably using a train-the-trainer model, need to be developed urgently. Only after careful planning and training can the use of these devices be safely implemented.

Education and training programs
The international community of rescuers includes members with a wide variety of backgrounds, knowledge, skills, equipment, and access to qualified instructors. National organisations should consider the proficiency of their rescuers and implement the adaptations most applicable to their setting.
The safety of the rescuer needs to be prioritised in all training programs and messaging. Education and training are the most urgent actions that need to be undertaken. In-person educational programs should be suspended in areas with high disease burden or under strict quarantine.
Once formal national or regional decisions have been made that facilities and organisations are able to resume training, the principles of risk mitigation should still be applied, as transmission between trainees is still possible. All efforts should be taken to prevent viral spread.
Where possible, the practicing of resuscitation techniques should be done only on manikins and while using protective equipment. During these courses, thorough cleaning and disinfection of training equipment between usage, as well as hand-hygiene before and after training, is key.[31]
In the interim, some organisations have begun to use electronic means (such as video chat or teleconferencing software) to provide education and training updates to their members. This will be extremely useful in disseminating new recommendations during physical distancing periods. Some examples of new training content that may be useful in this era are: safely putting on and taking off personal protective equipment, proper hand hygiene techniques, and using a BVM with two-rescuers.
Recognising that not all organisations will be able to create new material, there are plenty of existing resources online that can be adapted as needed and used to improve knowledge.

Organisations unable to meet the recommended guidance
The public and clinical health impacts of COVID-19 in most countries are largely unknown at the moment and the scope of risk is not clear due to the early stage of disease surveillance. Some organisations and rescuers may face difficulties in obtaining the recommended training and equipment outlined in these recommendations.
Many organisations and individuals will struggle to obtain the adequate types of PPE and other equipment recommended for resuscitating drowning persons during the COVID-19 pandemic. They may not have access to, or have started, the training necessary to use this equipment safely and effectively.
Where the risk from COVID-19 is unknown and PPE is unavailable, it is recommended that rescuers do not give ventilations. In such circumstances, organisations may consider adopting the ILCOR recommendations for laypersons, which recommend using a mask or cloth to cover the face of the drowned person while undertaking compression-only CPR.[6]

Research and development
Currently, there is no monitoring of the impact of resuscitation of drowned persons and of the potential heightened infection rate of rescuers. Registration of each drowning resuscitation attempt would facilitate the evaluation of the policies in place.
Organisations should recognise that their feedback and close engagement with the industrial and scientific sectors is crucial for the swift development of modifications and innovations to equipments and procedures they so urgently need.
These include the development and assessment of full-face masks, oxygen delivery systems, viral filters, and PPE suitable for use in aquatic environments.

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Studies on the feasibility and acceptance of these new devices would be beneficial to organisations in evaluating their implementation, as well as for the risk-benefit analysis and the outcomes from using these devices.

Responsibilities of organisations and other ethical aspects

Organisations have a proud tradition of taking care of the safety of their rescuers, training them to recognise, prevent, respond, and manage personal risks in the aquatic environment.

There have always been situations where rescuers accepted a certain degree of risk when persons are in a life-threatening situation. However, the risk landscape surrounding the COVID-19 is much more difficult to assess, and the health effects of an infection are also still difficult to predict. This results in an ethical dilemma for both the organisations and the rescuers each time a decision must be made about whether to attempt to save a life at the potential cost of the health of the rescuers themselves, families, and colleagues.

The COVID-19 places the responsibilities of organisations and the ethical aspects of the resuscitation of a drowned person in a new and challenging perspective. It is the responsibility of organisations to reduce as much as possible the negative impact of COVID-19 resuscitations for both the drowned person and the rescuers involved. It is paramount to support the rescuer when confronted with a drowning resuscitation situation. This can be achieved by clear recommendations, educational campaigns aimed at the prevention and mitigation of infection spread, monitoring of the prevalence of COVID-19, and post-resuscitation follow-up, including psychological consequences and monitoring.

Conclusion

The goal of these recommendations is to empower and provide guidance and support to organisations concerning the resuscitation of drowned persons in the COVID-19 era. Suggestions for the implementation of several new initiatives for the benefit of both the drowned person and the rescuers have been formulated. The dilemma between maintaining an optimal resuscitation with ventilations and minimizing the risk of infection of the rescuer can be solved partly by providing information about, and measures which avoid or mitigate, the risk of infection while still permitting adequate CPR. Organisations and rescuers must be aware that, more than ever, there is not a 'one-size-fits-all' solution for all drowning resuscitation situations.

It is of urgent importance that the global community of organisations bring to the attention of their local, regional and national administrations, as well as industry partners, the issues of the COVID-19 which place their rescuers in such a critical position, and of the need for consideration when developing legal and public health policies and relevant personal protective equipment.

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