

## SPECIAL COLLABORATION

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## OCCUPATIONAL HEALTH RECOMMENDATIONS FOR LIFEGUARDS IN AQUATIC EMERGENCIES IN THE COVID-19 ERA: PREVENTION, RESCUE AND RESUSCITATION

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## ABSTRACT

Severe acute respiratory syndrome (SARS-CoV-2), which causes coronavirus disease 2019 (Covid-19), is highly contagious. Lifeguards are the first line of response in aquatic emergencies and they will suffer a strong exposure to risk this first summer of the Covid-19 era, so their occupational health must be rethought in their professional practice during the new normal. The main public health measure to prevent drowning is prevention, but when this fails and assistance or rescue is required, in most interventions, distancing will not be possible. The limitation of personal protective equipment (PPE) for rescue is a reality that must be known and that can affect the health of the lifeguard. A review of the current literature aimed at avoiding or minimizing the risk of contagion in the interventions carried out by rescuers in the Covid-19 era was performed. This article provides structured information on the prevention of contagion in lifeguards, the potential risks, the available PPE, and the recommendations for its proper use during rescue or prehospital care in aquatic settings.

**Key words:** Lifeguards, Occupational health, Covid-19, Prevention, Rescue, Reanimation.

## RESUMEN

**Recomendaciones de salud laboral para socorristas ante emergencias acuáticas en la era Covid-19: prevención, rescate y reanimación**

El síndrome respiratorio agudo severo (SARS-CoV-2), que causa la enfermedad por coronavirus 2019 (Covid-19), es altamente contagioso. Los socorristas son la primera línea de respuesta en las emergencias acuáticas y van a sufrir una fuerte exposición al riesgo este primer verano de la era Covid-19, por lo que su salud laboral debe ser replanteada en su práctica profesional durante la nueva normalidad. La principal medida de salud pública para evitar ahogamientos es la prevención, pero cuando esta falla y se requiere la asistencia o el rescate, en la mayor parte de las intervenciones el distanciamiento no será posible. La limitación de los equipos de protección personal (EPI) para el rescate es una realidad que debe conocerse y que puede afectar a la salud del socorrista. Se realizó una revisión de la literatura actual orientada a evitar o minimizar el riesgo de contagio en las intervenciones realizadas por rescatadores en la era Covid-19. Este artículo ofrece una información estructurada sobre la prevención del contagio en los socorristas, los riesgos potenciales, los EPI disponibles y las recomendaciones para su adecuado uso durante los rescates o la atención prehospitalaria en los entornos acuáticos.

**Palabras clave:** Socorristas, Salud laboral, Covid-19, Prevención, Rescate, Reanimación.

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## INTRODUCTION

The appearance at the end of 2019 of a new form of coronavirus called Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), responsible for Covid-19<sup>(1)</sup> disease, has led to a substantial modification in personal habits and care protocols. The World Health Organization (WHO) declared this disease a pandemic on March 11, 2020<sup>(2)</sup>. The high infectivity of SARS-CoV-2<sup>(3)</sup>, the worrying rate of contagion in health care personnel<sup>(4,5)</sup>, the fake news<sup>(6)</sup> and the still absence of specific treatments and a vaccine, have generated the need to review and/or modify numerous procedures in pre-hospital emergency care.

Lifeguards are the first line of prevention and response in aquatic emergencies. Its main professional competence is the prevention of drowning, a public health problem that is the third cause of death worldwide due to unintentional injury<sup>(7)</sup>, and which in Spain causes the death of more than 1,000 people annually in water-related incidents<sup>(8)</sup>.

The specificity of this work environment, together with the WHO's prediction of coexistence with the virus until the arrival of the vaccine, requires extending and updating the knowledge of lifeguards in relation to Covid-19 and adapting procedures in which contact is inevitable, with the aim of minimising the possibilities of contagion and promoting best practices in pre-hospital care, based on scientific evidence.

The uncertainty of this stage affects all areas of the emergency, making education and prevention more important than ever. However, where prevention does not reach, the urgent reaction will determine the patient's prognosis. In the case of lifeguarding, we talk about water rescue and vital first aid interventions.

This article aimed, based on current knowledge, to promote safer professional practice in aquatic environments, during the current Covid-19 pandemic conditions.

## PREVENTION OF CONTAGION, SCREENING FOR POSITIVES AND RISKS FOR THE LIFEGUARD

In aquatic environments, the main route of transmission of SARS-CoV-2 is through respiratory secretions, especially enhanced by coughing and person-to-person contact<sup>(9)</sup>. Droplets larger than 5 microns can reach distances of 1.5-2 meters<sup>(10,11)</sup>, although this may vary depending on wind, humidity or other as yet unknown factors. The duration of the virus is variable: in the air, in aerosol, it can exceed 3 hours<sup>(12)</sup>, and on surfaces such as cardboard, paper, plastic or steel it can survive from hours to days<sup>(13)</sup>. The beaches or swimming pools are likely to attract large crowds of people, with high occupancy of common spaces, especially during the summer. In addition, the flow of tourists at the national and international level has in the aquatic environments one of its major meeting points, at least until before the pandemic. In anticipation of a gradual return to normality in coexistence with SARS-CoV-2, general aspects of prevention and good practices are described to be taken in consideration by lifeguards during pre-hospital care of aquatic incidents.

**Social distance, wind and position.** Social distancing has been proposed as a strategy to prevent contagion. However, activities in aquatic environments may involve a loss of distancing measures<sup>(9)</sup>. The generic recommendation of a distance of 1-2 metres should be extended in marine environments<sup>(9)</sup>. Sporting activities<sup>(11)</sup> and the presence of a breeze<sup>(9)</sup> can amplify the projection distance of drops and secretions.

A recent study has shown how, with winds of 4 km/h, saliva drops can travel 6 meters in 5 seconds<sup>(14)</sup>. The wind is common in almost all sandy areas. A greater safety distance or positioning the lifeguard upwind and behind the victim are measures that should be considered. The use of elevated towers could be a preventive measure during lifeguard and surveillance.

Maintaining a safe distance is not possible in most rescues, as well as in first aid interventions. The lifeguard must be aware of the risks in order to prevent or minimize them. During drowning, coughing or sputum are common from non-aspiration cases to the initial stages of the aspiration drowning process<sup>(15)</sup>, and in vitro studies have shown the ability of SARS-CoV-2 to survive in these secretions<sup>(16)</sup>.

**Hand hygiene.** Hand hygiene with soap and water or hydroalcoholic solutions is an effective measure and should be carried out with recurrence. Currently, there are no data describing the frequency of hand contamination with a coronavirus or viral load after touching a patient or a contaminated surface<sup>(17)</sup>, so washing procedures should be performed before and after contacts in the provision of relief. They shall also be carried out before and after removal of personal protective equipment (PPE) following suspected contact with biological fluids or secretions, or following contact with objects or surfaces in patient care settings or in places likely to be frequented by infected persons. The hydro-alcoholic solution will be the preferential option for the lifeguard because of its portability and the characteristics of the surveillance environment, where the possibility of washing with soap and water is not always close by. Hydroalcoholic gels are highly effective against lipid-coated viruses<sup>(18)</sup>, although it requires active dermatological surveillance since it could cause sunburn.

For a professional practice with more security, the use of watches, rings, bracelets or other objects that hinder proper hygiene is not recommended for lifeguards who prefer to perform pre-hospital care. The nails should be kept short, and the wash includes the inside of the nails.

**Protection against environmental factors.** The aquatic environment can encourage coughing, eye irritation and discharge from exposure to sea breeze, sun, sand and water. The probability of infected sand or soil reaching the hands and then the mouth, nose or eyes of a bather is low, but not non-existent<sup>(9)</sup>. This probability will be determined by the exposure to risk (for lifeguards it is very high, as it is their working environment), the type of beach and/or the weather conditions (e.g. windy). Covering your nose and mouth to cough or sneeze is good practice. The lifeguard can do this by using a tissue or with the front of the elbow, so it is recommended to wear a long-sleeved shirt. This type of professional uniform will also provide greater protection against sun exposure.

Rescuers should wear sunglasses or protective gear on any outdoor task. Full protective goggles should be reserved for rescue interventions from boats or first aid on land. In swimming or training operations, swimming goggles are highly recommended in a model suitable for the water lifeguard (wide, not covering the nose, with soft and adherent edges, and with a slightly curved visor). For emergency communications with portable equipment (e.g. walkie talkies), it must be ensured that it is disinfected before use by another rescuer, including the protective cover. If this is not possible, the private mobile phone can be a safe and effective solution.

Employers must ensure the disinfection of those materials in common use (boats, rescue

equipment, common spaces, etc.), with special attention to the first aid module. This procedure should be performed at the beginning of each day and after each use.

**Suspected contact with Covid-19.** Any rescuer suspected of being a SARS-CoV-2 carrier, either due to the debut of symptoms compatible with Covid-19 or due to knowledge of contact with another infected person, must inform the employer and remain in isolation until receiving instructions from the competent health administration. Loss of taste and smell has been reported as the most common Covid-19 positive symptomatology of self-reported symptoms<sup>(19)</sup>. The most common clinical presentation described in the literature is objective or subjective fever, fatigue and dyspnea<sup>(20,21,22,23)</sup>. Although less frequent, other manifestations such as diarrhoea, headache or muscle pain have been reported<sup>(22)</sup>. Therefore, the lifeguard must remain alert and analyse other factors such as the incidence of the virus in the geographical area where he or she lives, works or frequents<sup>(20)</sup>, in addition to possible contact with infected people. WHO considers contact to be exposure to any of the following circumstances during the 2 days before and 14 days after the onset of symptoms of a possible or confirmed case of Covid-19<sup>(24)</sup>:

- Face to face, within one meter or for more than 15 minutes, with a possible or confirmed case of Covid-19.
- Physic contact with a possible or confirmed case of Covid-19
- Possible or confirmed Covid-19 patient care without use of proper PPE.
- Other situations indicated in the local risk assessment.

**Risk assessment in the lifeguard group.** Currently, there is no evidence of persistence of SARS-CoV-2 in seawater, and transmission in salt water or treated water (e.g., swimming pools) is unlikely. In inland water areas (rivers, lakes, swamps, etc.), extreme precautions must be taken because the survival of the virus may be superior<sup>(9)</sup>.

In beach sand, the combination of solar ultraviolet radiation, high temperature and salinity could promote the inactivation of the virus, but at present there is not enough evidence to know how long this is necessary and under what conditions<sup>(9)</sup>.

The aquatic environment is usually a space for leisure and sport, so the presence of people with symptoms is unlikely. This could reduce the number of infected people gathered in this environment (the symptomatic ones).

Many of the procedures in aquatic emergencies have a direct risk from the inability to maintain social distance or carry certain PPE (e.g., water rescue equipments). There is still a low certainty of immunity after SARS-CoV-2 infection. However, to date no human reinfections with SARS-CoV-2 have been confirmed<sup>(25)</sup>. In other coronaviruses such as SARS-CoV-1 and MERS-CoV, immunoglobulin G (IgG) concentrations remained high for several months up to two or three years<sup>(26,27)</sup>. Therefore, those rescuers who have passed the Covid-19 will possibly have immunity, at least for a time, which could be a protective benefit in rescues with greater exposure. Furthermore, unlike other emergency professionals<sup>(28)</sup>, the group of lifeguards is relatively young, with an average age of between 20 and 30 years<sup>(29,30,31,32,33,34,35)</sup>. The severity of harm in the reported case series shows a low symptomatic incidence in young people. In Spain, the 20-30 year-old age group

accounted for 0.1% of total deaths by Covid-19, and the lethality for this range was 0.2% in relation to reported cases. Under 40 years, the case fatality rate did not exceed 0.3%<sup>(36)</sup>.

### PERSONAL PROTECTIVE EQUIPMENT (PPE). POSSIBILITIES AND LIMITATIONS

Until there is a definitive solution to Covid-19, and in the absence of information to the contrary, any victim requiring water rescue or resuscitation should be considered as a potential SARS-CoV-2 carrier. This presents a new challenge in the field of lifeguarding, as there is no previous experience of the use of anti-bacterial/viral protection equipment by these professionals, mainly in the aquatic environment.

PPE in lifeguarding, as in all other emergency-related professions, is essential to ensure safety. PPE shall be combined, where appropriate, with personal protection, rescue or first aid materials. PPE does not eliminate the source of the risk, but its function is to control it and protect the professional. The use of PPE needs training, both for placement and for use and removal. Lack of training and experience can give a false sense of security<sup>(37)</sup>. In aquatic emergencies, the use of PPE will be limited by the type, location and method of rescue.

Below is a description of the situations in which the use of PPE is possible and those in which it is not, as well as elements specific to the lifeguard that could offer added protection (table 1).

### REACTION TO DROWNING. WATER RESCUE

Rescue is defined as actions directed at a person or group in a situation of stress or distress in an aquatic space. The purpose of the rescue

is to interrupt the drowning process<sup>(38)</sup>. The casuistry of the rescues is very variable depending on the characteristics of the aquatic environment, the atmospheric conditions, the profile of the victim, the density of bathers or the characteristics of the rescue service. A Brazilian study identified that for every drowning victim who needed urgent medical attention, six others had to be rescued<sup>(39)</sup>.

Rescue is key to the survival of drowning victims, and the time spent underwater is the most important factor in their prognosis<sup>(40)</sup>. It is commonly accepted that the use of the material provides the lifeguard with protection as well as saving valuable time<sup>(29)</sup>. The criteria for the selection of the material are related to its availability, technical knowledge, incident characteristics and specific protocols of each service<sup>(29)</sup>.

With the appearance of Covid-19, the procedures and materials traditionally used by lifeguards must be re-evaluated, taking into account the conditioning factors of water rescue:

- Little or no chance of keeping a safe distance.
- Water rescues without respiratory compromise but with aerosolization.
- Usual, recurring coughs and secretions in drowning victims. The grades of drowning shown in table 2 indicate the appearance of coughing from an early stage of the drowning process and secretions in later stages. This process (from grade 1 to grade 6) can take from a few seconds to minutes<sup>(15)</sup>.
- In unconscious victims it is also possible to generate aerosols and potential contagion with the use of some rescue techniques that embrace or surround the victim, in combination with the propulsive movement of swimming. This assumption is based on the same mechanics of aerosol generation in chest compressions<sup>(41)</sup>.

**Table 1**  
**Feasibility of the use of PPE and other protective equipment in the different interventions of the lifeguards.**

PROTECTION	PROTECTION EQUIPMENT	WATER RESCUE		GROUND ATTENTION	
		From ship	From inside the water	Assessment and reanimation	Non-emergency care at the first aid station
<b>Mucosa of the eyes</b>	<b>Full glasses</b>	XX	-	XX	XX
	<b>Lifeguard / Diving Glasses</b>	X	X	X	X
	<b>Screen</b>	-	-	XX	XX
	<b>Full-screen helmet / or full-face helmet</b>	XX	-	X	X
<b>Airways</b>	<b>FFP2 and FFP3 mask</b>	XX (FFP2) XX (FFP3 if resuscitation on board)	-	XX (FFP3)	XX (FFP2)
<b>Skin</b>	<b>Nitrile gloves</b> (can be combined with neoprene gloves)	XX	-	XX	XX
	<b>Double latex or vinyl gloves</b> (can be combined with neoprene gloves)	X	-	XX	XX
	<b>Complete suit: Long-sleeved waterproof gown or disposable coverall against infectious agents</b>	-	-	XX	XX
	<b>Complete suit: Common long-sleeved gown or complete work uniform</b> (long sleeves, long pants)	-	-	-	X

XX: protection (described as PPE in Covid-19); X: some protection (usual material in lifesaving or means of fortune); -: not feasible or not recommended in the technique/environment.

All rescues must be carried out with two fundamental premises in mind: safety for the rescuer and better conditions for the victim.

**Security for the rescuer.** The acceptable conditions for safer rescue are reduced life risk (sea and weather conditions) and reduced rescue time (less exposure, less risk). The combination of rescue equipment with PPE should be designed for safety and efficiency.

In a risk vs. efficiency grading, the safest intervention would be the one performed from outside the water. In the scientific literature, the use of drones that provide flotation material and the launching of objects such as rescue bags have already been analyzed in simulation studies<sup>(42,43)</sup>. The use of these materials avoids direct contact with the victim, allows rescue or self rescue or at least could avoid submersion.

If the intervention of the lifeguard is required in the water, motorised vehicles (rescue boats or jet skis) should be the preferred option, as they can allow the rescuer some protection, reduce the intervention time and even start the assessment before arriving on land. Hand-to-

hand rescue is strongly discouraged and should always be avoided. It is the one that involves more contact, takes longer, offers less protection to the lifeguard and generates more physical fatigue<sup>(29,30,33,35,44,45,46)</sup>.

**Better conditions for the victim.** Interrupting the drowning process, decreasing the time submerged, and providing rapid rescue are critical factors for survival<sup>(15,40)</sup>. Rescue boats are a fast and common material on beaches all over the world<sup>(32)</sup>. Rescuers usually do not need to enter the water to perform the rescue and, depending on the characteristics of the boat, resuscitation attempts may be initiated on board<sup>(47)</sup>. During this period it is recommended that the victim be moved to the mainland to be assessed properly and safely.

Ventilation in water is associated with a higher probability of survival<sup>(48)</sup>. This practice is not safe at present and should be avoided. However, attempts at on-board resuscitation will be considered if the transfer of the victim is not delayed, safety conditions allow it, if there is sufficient space and if the rescue team has specific training and PPE. Moisture, water or

**Table 2**  
**Drowning Grades adapted from Szpilman et al (2012)<sup>(15)</sup>.**

Rescue without respiratory compromise	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Conscious Victim				Unconscious Victim		
Contact Aerolization	Cough	Cough	Discharge (Foam in the mouth)	Discharge (Lots of foam in the mouth)	Respiratory arrest Secretion (Much foaming at the mouth)	Cardio-respiratory arrest Secretion (Much foaming at the mouth)

secretions can quickly limit the effectiveness of the HEPA filter. The use of a defibrillator on a rescue boat is feasible<sup>(47)</sup> and has no contraindications for aerosol emission<sup>(41)</sup>.

Completely eliminating risk in a water rescue environment is not possible. The preference for rescue will be from out of the water or using boats. These options will allow the responder to use PPE and minimize contact exposure. **Table 3** shows a hypothetical gradation of risk in relation to the type of rescue documented in the literature, the possibility of PPE use and the victim's level of awareness.

### MITIGATION: PRE-HOSPITAL CARE AND BASIC LIFE SUPPORT IN DROWNING

The high incidence of contagion in health personnel<sup>(4,5)</sup> should be considered as a warning to increase safety measures in pre-hospital care in the first-aid modules. Employment-exposure matrices are systems that gather information on agents or occupational exposures<sup>(49)</sup>, and should be implemented, including SARS-CoV-2 exposure, to improve safety during care.

Movement in and out of the first aid station shall be restricted to essential personnel only<sup>(21)</sup>. The common area for lifeguards and assistance must be differentiated and occupy different rooms.

The patient will be triaged at a safe distance, preferably outside the module, with the lifeguard at the windward side. After the initial assessment, it will be determined whether on-site care is essential or whether transfer to a useful health centre is recommended. For on-site care, without technical complexity or risk (e.g. washing of small wounds and application of dressings), material and instructions for self-care can be provided.

When the patient needs to be attended by a lifeguard or health personnel at the first aid station, the use of a surgical mask will be required<sup>(20)</sup>.

A brief history of the user will be required before intervention:

- It will be asked if it is suspected that the patient has Covid-19, such as altered smell or taste, as well as dyspnea, cough and/or fever.
- If the patient suspects having had contact in the last few days with someone positive, or if Covid -19 positives are common in the area where the patient resides/feeds.

Most incidents on the beach are minor, and almost half occur on the lower limbs<sup>(50)</sup> (e.g. spiderfish bites, cuts, etc.). Without suspicion of Covid-19, for daily care it is recommended: to put mask on the patient and use gloves, FFP2 mask and integral eyeglasses or splash screen. If Covid-19 is suspected, the competent health authority shall be alerted and its instructions followed.

If the patient's condition is critical and emergency care is needed, the use of gloves, FFP3 mask, full-face splash goggles or face shield, and waterproof gown is recommended<sup>(51)</sup>.

The use of PPE requires training and expertise. If a rescuer is wet, hypothermic or physically limited by the effort after rescue, he or she will not be part of the team initiating assessment and resuscitation. A specific team trained in the use of PPE will be waiting at the shore, ready to intervene. If the use of the first aid module is necessary, it should be disinfected immediately after use. The removal of the PPE will be directed by another colleague or in front of a mirror. Materials that are fungible should be disposed of properly in a sanitary waste bag (**figure 1**).

**Table 3**  
**Risk matrix for water rescues during the Covid-19 Era.**  
**Suggestion of risk of contagion in case of rescue of infected victim.**

Rescue type	Risk	Rescue	PPE	Conscious victim	Unconscious victim
<b>OUT OF WATER RESCUE</b>	<b>LOW</b> Possibility to rescue without wearing PPE, or to put it on completely if necessary	Drone	Not applicable	An unmanned aerial vehicle that may have the ability to carry floating material for self-rescue or to facilitate rescue by the rescue team.	Not applicable
		Rescue bag, poles and other approach materials	Recommended: FFP2 or FFP3 mask, gloves and goggles	A device or material attached to the lifeguard from one end that can be used when the victim is conscious and able to hold on, and is relatively close to shore or from a boat.	Not applicable
<b>UNDERWATER RESCUE</b>	<b>MEDIUM</b> Possibility of wearing total or partial PPE. Relatively short duration of exposure.	Rescue ship	Helmet with screen, FFP2 or FFP3 mask, nitrile gloves or double latex or vinyl gloves (neoprene gloves can be worn on top), goggles.	Rescue from boat and, whenever possible, without having to make contact with the rescued person. The lifeguard tells the rescuer how to board the boat using handles and ropes. If necessary, you can facilitate the rescue tube manoeuvre. If the rescuer cannot climb up alone, the lifeguard will help by asking the rescuer to raise one leg and pull it up to full lift, or by pulling the armpits with the rescuer's back to the bulb. The lifeguard gives the rescuer a disposable surgical mask that must be put on immediately.	Rescue from boat, without entering the water, the lifeguard grabs the rescued by his wrists and pulls him to place him on top of the bulb avoiding frontal exposure. Then he knocks the rescued man down in the bathtub. If the lifeguard cannot cope with the weight of the rescued person alone, he gives one arm to the skipper and between the two arms he is lifted up to the bulb and from this moment on the lifeguard is responsible for laying him down in the cockpit avoiding frontal exposure.  Some urgent action may be considered; if the patient is unconscious and breathing, oxygen will be applied with a reservoir mask. If the victim is not breathing, CPR can be started using a HEPA-filtered resuscitation balloon. If this is impossible due to the movement of the boat, the victim's mouth can be covered using a mask with a reservoir bag and oxygen connection. These procedures shall be carried out provided that they do not delay the transfer and have sufficient space and equipment.

**Tabla 3 (continuation)**  
**Risk matrix for water rescues during the Covid-19 Era.**  
**Suggestion of risk of contagion in case of rescue of infected victim.**

Rescue type	Risk	Rescue	PPE	Conscious victim	Unconscious victim
<b>UNDERWATER RESCUE</b>	<b>MEDIUM</b> Possibility of wearing total or partial PPE. Relatively short duration of exposure.	Jet ski	Helmet with screen, FFP2 or FFP3 mask, nitrile gloves or double latex or vinyl gloves (it is possible to wear neoprene gloves on top), goggles.	Rescue from the jet ski, without entering the water and, whenever possible, without having to make contact with the rescued. The lifeguard informs the rescued person to climb onto the rescue platform and stand prone (face down) holding the handles from above. If necessary you can facilitate the manoeuvre with a rescue tube. The lifeguard gives the rescuer a disposable surgical mask that must be put on immediately.	The rescue is always done with a skipper and a lifeguard. The lifeguard positions himself on the rescue platform, without entering the water, grabs the rescued person by one of his wrists, takes him to the back of the rescue platform and pulls to place the rescued person in a prone position (face down), always avoiding frontal exposure. The lifeguard puts the rescuer on a disposable surgical mask immediately. The lifeguard secures the victim by standing on top and holding handles from above. It is not advisable to begin assessment or CPR until a place with full safety possibilities is reached, both for the rescuer and for the rescued.
	<b>HIGH</b> Little or no possibility of using PPE. A relative distance can be maintained from the victim.	Rescue paddle surfboards and other paddle-powered boats (kayaks, canoes)	Swimming goggles, FFP2 mask, nitrile gloves or double latex or vinyl gloves (neoprene gloves can be worn on top), goggles.	Rescue from a board, help in lifting the victim by his feet. Transfer of the victim lying prone (face down) and the lifeguard rowing on his feet or knees for greater stability.	Board rescue, arm-and-leg lift of victim. Transfer of the victim lying prone (face down) and the lifeguard rowing on his feet or knees for greater stability.
	<b>VERY HIGH</b> No possibility of wearing PPE. No protection in close contact.	Water rescue techniques (with or without material)	Lifeguard glasses, nitrile gloves or double latex or vinyl gloves (neoprene gloves can be worn on top)	Rescue by providing floating material from the maximum distance (taking into account waves and with a lifeguard on the windward side). Maintain as much distance as possible during the transfer (with collaborative victim and floating material will be swimming while the victim holds on to the material).	Rescue using flotation material, preferably rescue tube. Depending on the conditions of the sea, the lifeguard may carry out the transfer of an unconscious victim at a distance, taking hold of the rescue material and without the need for a body grip. Although an unconscious victim does not generate aerosols, rescue techniques may generate some type of aerosol by accidental chest compression during rescue. Proximity to the victim could be a potential risk.

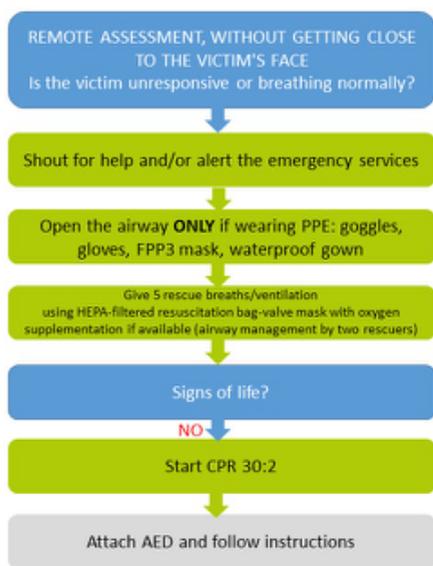


– Airway management with bag valve mask, with antiviral filter and oxygen connection. This maneuver must be performed by two lifeguards, one in the fixation of the mask and another in the handling of the bag of resuscitator ball. It is vitally important that the mask is properly secured to prevent aerosolization leakage (the greatest risk of contagion during

CPR maneuvers), and the HEPA filter on the expiratory valve.

– The defibrillator will not be a priority in drowning, so the start of resuscitation manoeuvres will not be delayed. The defibrillator should be fitted when available, as recommended by the ERC2015 drowning protocol<sup>(52)</sup> (figure 2).

**Figure 2**  
**Adaptation of the drowning basic life support algorithm according to ERC2015<sup>(52)</sup> recommendations to the Covid-19 era according to ERC2020<sup>(51)</sup> recommendations.**



## CONCLUSIONS

The special circumstances of aquatic environments have become even more complex for pre-hospital care with the appearance of SARS-CoV-2. This guide has sought to establish a series of practical recommendations for lifeguards, based on the scientific evidence currently available. Safety is the fundamental pillar of professional practice during emergencies. Rescuers should adapt their protocols to

include the required PPE and prioritize those interventions that offer the greatest safety with the least exposure. The procedures described must be supplemented by health and legal regulations, as well as the occupational risk prevention plans and emergency plans specific to each service.

Rescuers are professionals with high exposure to Covid-19 during the pandemic due to the almost complete absence of PPE during

water rescue, water damage to antiviral filters, working in places that are sometimes difficult to access or under extreme environmental conditions. It is necessary to rethink the use of aquatic spaces that satisfy safety standards for lifeguards and users. Strategies such as restricting entry to the aquatic area or delimiting safe aquatic spaces should be considered, in order to reduce incidents and, if they occur, to be able to provide an adequate and safe response.

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