

EDITORIAL

First aid during the COVID-19 pandemic

Workers spend more than a third of their lifetime in the workplace [1]. Customers and other visitors also spend a significant amount of time in workplaces. Health events requiring urgent intervention may therefore occur in the workplace. Between 0.3 and 4.7% of out-of-hospital cardiac arrests [2] (a leading cause of death globally with an incidence of 55 per 100 000 adults per annum [3]) occur in the workplace. Other traumatic events involving workers, customers and the general public may require cardiopulmonary resuscitation (CPR). Drowning, which is responsible for 7% of all traumatic deaths and is the third leading global cause of death from accidents, is a significant risk in swimming pools and spas. Globally, the annual estimate of deaths due to drowning is 372 000, but this may be an underestimate [4]. Effective first aid is a moral duty for every worker. In compliance with Article 16 (1) of Directive 89/391/EEC, employers must appoint trained first aiders to deliver first aid, firefighting and the evacuation of workers. The resumption of activities after lockdown calls for a review of workplace first aid.

Although workplace first aid is generally well organized throughout Europe, it has become more challenging due to the COVID-19 pandemic, as the virus poses a serious risk of infection to both the casualty and the rescuer. During first aid, rescuer and casualty come into close contact, especially during CPR. Mouth-to-mouth resuscitation poses the greatest risk of infection. However, performing chest compressions also generates aerosols by passive ventilation [5]. The protection provided by facial shields/visors and Laerdal-type pocket masks with one-way filtered valve does not guarantee the safety of both the rescuer and the casualty.

Following the COVID-19 pandemic, risk assessments should be reviewed and occupational first-aid services should be reconfigured. As there may be a shortage of protective equipment and trained operators, staff must be properly trained and ready to deal with the challenges posed by the pandemic. During teaching sessions, social distancing must be maintained and the number of participants must be limited. Students must have appropriate personal protective equipment (PPE). Hand-sanitizers and sanitizing products should be provided for the cleansing and disinfection of surfaces as well as low-cost dedicated manikins that can be sanitized before and after use by each student. Automated External Defibrillator (AED) training devices must also be sanitized. Careful

resource management can overcome these problems, but it is more difficult to implement effective safety procedures designed to eliminate the biological risk for the casualty and the rescuer.

The risk posed by mouth-to-mouth resuscitation and uncertainty over effective control could lead some workers to refuse to perform CPR or, should they be infected, to blame their employers for failing to adequately control the risk. The guidelines for first aid and CPR should therefore be modified to include additional risk control measures and recommendations.

Avoiding transmission of infectious diseases during mouth-to-mouth resuscitation is a problem that was addressed prior to the current pandemic. If the casualty was infected by HIV, tuberculosis, hepatitis B or SARS, the 2015 European Resuscitation Council (ERC) guidelines recommended rescuers to use a Laerdal-type disposable face shield with a low-resistance filter one-way filtered valve. However, the COVID-19 pandemic has prompted international and national organizations to update their guidelines.

If casualties are suspected of having COVID-19, the updated American Heart Association (AHA) guidelines recommend lay rescuers should perform only chest compression and defibrillation in adults, and to carry out full CPR only in children who are at high risk of respiratory failure. The AHA recommends both the rescuer and the casualty should wear a surgical mask or face covering [6]. Visor eye protection is not recommended.

The Australian and New Zealand Committee on Resuscitation (ANZCOR) recommendations released on 3 April 2020 suggest that lay rescuers should only do chest compressions and public-access defibrillation. However, lay rescuers who are willing and highly skilled can provide rescue breathing to infants and children while adhering to standard precautions and safety procedures for handwashing, cleansing and decontamination [7]. The guidelines of the International Liaison Committee on Resuscitation (ILCOR), updated on 10 April 2020, recommend mouth-to-nose-and-mouth ventilation for children (<8 years) if the rescuer is sufficiently skilled and willing to accept the risk [5].

On 24 April 2020, the ERC published specific recommendations [8], which were then followed by national guidelines released by the UK and Italian Resuscitation Councils. The ERC guidelines set out a detailed CPR procedure for

lay rescuers in the case of suspected or confirmed COVID-19 adults. Resuscitation is to be carried out by rescuers wearing filtering face masks (FFP2 or FFP3) and disposable gloves via chest compressions only and without performing breathing manoeuvres. The rescuer is to cover the nose and mouth of the victim with a surgical mask (or a strip of cloth), before performing chest compressions.

The ERC suggests treating every victim as if he/she were potentially infected by COVID-19. Therefore, if the casualty is responsive and able to provide self-care, the ERC suggests providing first-aid advice from a safe social distance (2 m). Appropriate PPE (i.e. gloves, FFP2 or FFP3 mask and visor eye protection) should be worn and the casualty should wear a surgical mask. The rescuer should call for specialist healthcare assistance and wear his/her own PPE. Direct assistance should be provided only if absolutely necessary (e.g. in case of haemorrhage, applying a dressing, use of an adrenaline auto-injector, assessing for responsiveness and positioning of a victim) in order to limit exposure.

In Italy, the Italian Resuscitation Council (IRC) has adopted the ERC pandemic protocol and has suggested that in some workplaces, such as swimming pools, professional rescuers (life guards) should wear PPE (e.g. facial masks, goggles, gloves), remove all unprotected bystanders and use the mask-ball with high-efficiency filter placed between the mask and the ball [9].

Employers must provide biosafety training for rescuers and supply the necessary PPE, i.e. a first-aid kit that includes disposable gloves (in compliance with EN ISO 374-5 standard), hydroalcoholic hand cleaning gel and filter masks. FFP masks must be made of filter material, cover the nose and mouth, and possibly also the chin (semi-mask). The European FFP2 approved masks are able to filter at least 94% of the particles suspended in the air, whereas FFP3 masks have a filtering capacity of at least 99%. They roughly correspond to the US-approved N95 and N99 masks. However, in the USA, as in Europe, the approval criteria for these masks do not refer specifically to protection against biological agents. Since the 'minimal infective dose' of the virus responsible for COVID-19 is unknown, in cases of SARS-CoV-2 infection we suggest adopting a 'precautionary principle' approach and using FFP2 or FFP3 masks.

The choice of type of mask, and therefore level of protection, might nevertheless be less important than the ability to use the masks correctly. The protection offered by FFPs is greater when the subject has passed fit testing. To be effective, masks must be worn and removed correctly, but the risk of infection can never be eliminated. Experience with SARS has shown that for biological diseases in which a highly limited number of particles may be sufficient for infection, all types of mask may be inadequate and some workers may therefore become infected even if they use the masks properly [10]. The best strategy to limit infection is to give

clear instructions and guidance and ensure their enforcement. Educational efforts should focus on proper training, reinforcing hand hygiene, implementing fit testing and seal checking of masks, and the safe removal of PPE.

In conclusion, since SARS-CoV-2 is a highly transmissible virus, and adherence to the international and European recommendations reduces the risk for rescuer and casualty but does not eliminate it completely, prevention must reduce this risk to the lowest level reasonably achievable. The first aider must be informed of all potential hazards, must be aware of the risk of virus transmission and must be provided with PPE. The first aider must however accept the residual risk.

Nicola Magnavita^{1,2}

Angelo Sacco^{1,3}

Gabriella Nucera⁴

Francesco Chirico^{1,5,*}

e-mail: medlavchirico@gmail.com

¹Department of Life Sciences and Public Health, Post-graduate School of Occupational Health, Università Cattolica del Sacro Cuore, Roma, Italy; ²Department of Woman/Child and Public Health, Fondazione Policlinico A. Gemelli IRCCS, Roma, Italy; ³Local Healthcare Unit Roma 2, Roma, Italy; ⁴Department of Medicine, ASST Fatebenefratelli and Sacco. Fatebenefratelli Hospital, Emergency Unit, Milan, Italy; ⁵Health Service Department, State Police, Ministry of Interior, Italy

References

- Warner DF, Hayward MD, Hardy MA. The retirement life course in America at the dawn of the twenty-first century. *Popul Res Policy Rev* 2010;**29**:893–919.
- Descatha A, Dagnat C, Cassan P, Jost D, Loeb T, Baer M. Cardiac arrest in the workplace and its outcome: a systematic review and meta-analysis. *Resuscitation* 2015;**96**:30–36.
- Berdowski J, Berg RA, Tijssen JG, Koster RW. Global incidences of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. *Resuscitation* 2010;**81**:1479–1487.
- OMS. Drowning. 3 February 2020. <https://www.who.int/news-room/fact-sheets/detail/drowning> (21 June 2020, date last accessed).
- Couper K, Taylor-Phillips S, Grove A *et al.* COVID-19 Infection Risk to Rescuers from Patients in Cardiac Arrest. Consensus on science with treatment recommendations: International Liaison Committee on Resuscitation (ILCOR). 2020. <https://costr.ilcor.org/document/covid-19-infection-risk-to-rescuers-from-patients-in-cardiac-arrest> (21 June 2020, date last accessed).
- Edelson DP, Sasson C, Chan PS *et al.* Interim guidance for basic and advanced life support in adults, children, and neonates with suspected or confirmed COVID-19: from the Emergency Cardiovascular Care Committee and Get With the Guidelines®-Resuscitation Adult and Pediatric Task Forces of the American Heart

- Association in Collaboration with the American Academy of Pediatrics, American Association for Respiratory Care, American College of Emergency Physicians, The Society of Critical Care Anesthesiologists, and American Society of Anesthesiologists: Supporting Organizations: American Association of Critical Care Nurses and National EMS Physicians. *Circulation* 2020;**141**:e933–e943.
7. Australian and New Zealand Committee on Resuscitation (ANZCOR). Resuscitation During the COVID-19 Pandemic. 3 April 2020. <https://resus.org.au/> (21 June 2020, date last accessed).
 8. European Resuscitation Council (ERC). European Resuscitation Council COVID-19 Guidelines. 24 April 2020. https://erc.edu/sites/5714e77d5e615861f00f7d18/content_entry5ea884fa4c84867335e4d1ff/5ea885f34c84867335e4d20e/files/ERC_covid19_pages.pdf?1588257310 (26 May 2020, date last accessed).
 9. Italian Resuscitation Council (IRC). Raccomandazioni per la Rianimazione Cardiopolmonare (RCP) durante l'epidemia da Sars-Cov-2 e in caso di sospetta o confermata infezione Covid-19 2020. Italian Resuscitation Council. marzo 2020. https://www.ircouncil.it/wp-content/uploads/2020/03/001.ISTRUZIONI_CORONAVIRUS.pdf (26 May 2020, date last accessed).
 10. Ofner M, Lem M, Sarwal S, Verneacombe M, Simor A. Cluster of severe acute respiratory syndrome cases among protected health care workers—Toronto. *MMWR Morb Mortal Wkly Rep* 2003;**52**:433–436.