

The following information resources have been selected by the National Health Library and Knowledge Service Evidence Virtual Team in response to your question. The resources are listed in our estimated order of relevance to practicing healthcare professionals confronted with this scenario in an Irish context. In respect of the evolving global situation and rapidly changing evidence base, it is advised to use hyperlinked sources in this document to ensure that the information you are disseminating to the public or applying in clinical practice is the most current, valid and accurate.

YOUR QUESTION

What guidance is available for healthcare workers on the provision of CPR for patients with suspected or confirmed Covid-19 in hospital settings, including community assessment hubs and intermediate care facilities?

What does the existing international guidance say?

[International Liaison Committee on Resuscitation: COVID-19 infection risk to rescuers from patients in cardiac arrest¹](#)

[Draft for Public Comment released on 30 March 2020]

TREATMENT RECOMMENDATIONS

- We suggest that chest compressions and cardiopulmonary resuscitation have the potential to generate aerosols. [weak recommendation, very low certainty evidence]
- We suggest that in the current COVID-19 pandemic lay rescuers consider compression-only resuscitation and public-access defibrillation. [good practice statement]
- We suggest that in the current COVID-19 pandemic, lay rescuers who are willing, trained and able to do so, may wish to deliver rescue breaths to children in addition to chest compressions. [good practice statement]
- We suggest that in the current COVID-19 pandemic, healthcare professionals should use personal protective equipment for aerosol generating procedures during resuscitation. [weak recommendation, very low certainty evidence]
- We suggest it may be reasonable for healthcare providers to consider defibrillation before donning aerosol generating personal protective equipment in situations where the provider assesses the benefits may exceed the risks. [good practice statement]



Resuscitation Council UK Statement on COVID-19 in relation to CPR and resuscitation in healthcare settings²

KEY POINTS

- Ensure “do not attempt cardiopulmonary resuscitation” (DNACPR) decisions are well documented and communicated.
- Do not listen or feel for breathing by placing your ear and cheek close to the patient’s mouth
- If a defibrillator is readily available defibrillate shockable rhythms rapidly prior to starting chest compressions.
- No chest compressions or airway procedures such as those detailed below should be undertaken without full AGP PPE. If the patient is already receiving supplemental oxygen therapy using a face mask, leave the mask on the patient’s face during chest compressions as this may limit aerosol spread. If not in situ, but one is readily available, put a simple oxygen mask on the patient’s face.
- Airway interventions – eg supraglottic airway (SGA) insertion or tracheal intubation – must be carried out by experienced individuals
- Identify and treat any reversible causes - eg severe hypoxaemia – before considering stopping CPR.
- Dispose of or clean all equipment used during CPR following the manufacturer’s recommendations and local guidelines.
- Remove PPE safely to avoid self-contamination and dispose of clinical waste bags as per local guidelines.
- Post resuscitation debrief is important and should be planned.

NICE COVID-19 rapid guideline: critical care in adults³

SECTION 2.4

“Sensitively discuss a possible “do not attempt cardiopulmonary resuscitation” decision with all adults with capacity and an assessment suggestive of increased frailty: eg a CFS score of 5 or more. Include in the discussion:

- the possible benefits of any critical care treatment options
- the possible risks of critical care treatment options
- the possible likely outcomes.”



The Faculty of Intensive Care Medicine, Intensive Care Society, Association of Anaesthetists and Royal College of Anaesthetists - Critical care preparation and management in the COVID-19 pandemic⁴

CARDIAC ARREST

- Appropriate PPE must be worn as with aerosol-generating procedures. Facemask ventilation should be avoided where possible.
- Compression-only CPR is advised until airway-experienced personnel are available.
- Use of an automated chest compression device may be used.
- Early intubation by an experienced operator is advised."

What does the Health Protection Surveillance Centre (Ireland) say?

Use of PPE to support Infection Prevention and Control Practice when performing aerosol generating procedures on confirmed or clinically suspected Covid-19 cases in a pandemic situation⁵

The guidance states that all staff working in an area where aerosol generating procedures are being performed must wear appropriate PPE. The minimum number of staff required must be present. The guidance includes a table entitled: "Aerosol generating procedures which have been associated with increased risk of transmission of respiratory infection." CPR [pre-intubation due to manual ventilation] has a consistently recognised, AGP-related increased risk of pathogen transmission, and PPE is recommended. Recommended PPE to include: hand hygiene, FFP2 respiratory mask, eye protection, gloves, and long sleeved gown.

What do WHO, ECDC and CDC say?

As CPR is an aerosol-generating procedure. The guidance from these organisations are:

- [WHO: Infection prevention and control during health care when novel coronavirus \(nCoV\) infection is suspected⁶ \[Section 3.2\]](#)
- [ECDC: Infection prevention and control and preparedness for COVID-19 in healthcare settings⁷ \[Aerosol Generating Procedures\]](#)
- [CDC: Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 \(COVID-19\) in Healthcare Settings⁸ \[Section 4\]](#)

Derived from CDC guidance, the American Heart Association has produced:

- [Interim Guidance for Healthcare Providers Caring for Pediatric Patients CPR Emergency and Vascular Care](#)
- [Interim guidance for healthcare providers CPR Emergency and Vascular Care](#)

What does the international literature say?

[Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus \(2019-nCoV\) patients⁹](#)

Intubation of critically ill patients with SARS-CoV was associated with episodes of healthcare worker transmission. The reasons for this are likely multifactorial, including high-level viral shedding due to severity of patient illness, procedures associated with resuscitation or intubation that may generate aerosols, and healthcare worker use of PPE: high-risk patient + high-risk procedure = higher level of precautions.

Patients infected with 2019-nCoV should be monitored for early signs of respiratory deterioration and intubated electively rather than emergently. If possible, patients isolated with 2019-nCoV should be monitored in a critical care area with airborne isolation and continuous physiologic monitoring.

During the SARS outbreak, the concept of “Protected Code Blue” was created to distinguish usual resuscitation from those requiring special procedures and precautions. More information about PCB

<http://sars.medtau.org/simulatedprotectedcodeblue.pps> and

<https://emergencymedicinescases.com/biohazard-preparedness-protected-code-blue/>.

Once designated as requiring 2019-nCoV isolation:

- Resuscitation should take place in an airborne isolation room if possible, as it is an AGP.
- The resuscitation team must be wearing appropriate airborne/droplet/contact PPE.
- Given the greater risk of infection during a dynamic resuscitation use of powered air purifying respirators (PAPRs) by specially trained resuscitation teams should be strongly considered. Although PAPRs have a higher protective factor compared with N95 respirators, there is no definitive evidence that PAPRs reduce the likelihood of viral transmission in the setting of potential airborne spread. Nonetheless PAPRs may be more comfortable to wear for prolonged resuscitations, eliminate concerns of unexpected poor N95 respirator fit, and are less likely to be dislodged when managing an agitated patient. PAPRs with hoods covering the entire head and neck may provide additional protection against contamination.
- Initial resuscitation efforts by first responders wearing usual airborne/droplet/contact PPE to an acute crisis should focus on measures that are most likely to help the patient and have low risk for viral transmission.
- A list of specific low and high risk resuscitation interventions is provided in the full text of the article.
- Once the PCB team has donned PPE and been checked by an infection control coach, they can enter the room. Team size should be minimal to avoid unnecessary viral exposure — typically four people with designated roles.
- Consider use of a specialized cart containing modular packs of equipment, with PCB team members bringing in the necessary defibrillator and packs rather than an entire resuscitation cart.
- Following resuscitation, team members can exit when appropriate and should remove PPE under careful supervision of an infection control coach using a checklist to avoid self-contamination.

COVID-19: A critical care perspective informed by lessons learnt from other viral epidemics¹⁰

CARDIOPULMONARY RESUSCITATION

The increased transmission of SARS-CoV to HCW previously reported during cardiopulmonary resuscitation (CPR) was likely due to virus aerosolisation during BVM ventilation. Preventive measures may include using apnoeic oxygenation during CPR, or careful two-person BVM ventilation to allow an effective face seal by two handed mask holding (with inline bacterial/viral filter), and early intubation when indicated. The use of mechanical CPR devices to replace HCW CPR may reduce the risk of facemask leakage for the HCW, and decreases their own minute ventilation, thus potentially reducing the risk of disease transmission. For patients already receiving mechanical ventilation in ICU, the ventilator may be set to volume control, with a large negative pressure trigger and high-pressure alarm setting to avoid a need for disconnection and change to manual BVM ventilation."

Considerations for Cardiac Catheterization Laboratory Procedures During the COVID-19 Pandemic Perspectives from the Society for Cardiovascular Angiography and Interventions Emerging Leader Mentorship (SCAI ELM) Members and Graduates¹¹

The authors recommend using appropriate PPE, disinfection and cleaning of all surfaces and if CPR is required in the Cardiac Catheterization Lab "consider using automated CPR devices for chest compression to minimize personnel exposure".

Cardiovascular Considerations for Patients, Health Care Workers, and Health Systems During the Coronavirus Disease 2019 (COVID-19) Pandemic¹²

"In the event of a cardiac arrest, efforts at cardiopulmonary resuscitation causing aerosolized pathogens could result in the wide dissemination of virus particles to clinicians, health care workers, and other patients. One measure which may help protect health care workers in the setting of cardiac arrest and chest compressions is the use of external mechanical compression devices to minimize direct contact with infected patients. Another important consideration for the catheterization laboratory is appropriate post-intervention cleaning of all equipment potentially contaminated with SARS-CoV2. The necessary downtime required for cleaning may seriously impact the availability of catheterization laboratory-based treatments for other patients. As such, many hospitals are minimizing

or cancelling elective procedures during the growth phase of the outbreak. Another consideration is the fact that catheterization laboratories and operating rooms are typically configured with positive pressure ventilation, and there have been reports of centers in China converting such facilities to negative pressure isolation in the setting of COVID-19. Guidance and recommendations in this space will be forthcoming from interventional communities, including the ACC and SCAI".

[NEWS ARTICLE: DEBATE] [Covid-19: Doctors are told not to perform CPR on patients in cardiac arrest](#)¹³

This article discusses the appropriateness of CPR guidance given to staff in University Hospitals Birmingham NHS Foundation Trust.

[Possible SARS coronavirus transmission during cardiopulmonary resuscitation](#)¹⁴

Based on experience from the SARS coronavirus a continuous quality improvement framework was developed providing interventions for preventing future episodes of transmission:

ADMINISTRATIVE CONTROLS

Policies and protocols for emergency resuscitation should include:

- description of the roles and responsibilities of healthcare workers responding to the emergency
- mechanisms to alert responders that the emergency involves a potentially contagious patient (e.g., announcing the code as an "isolation code blue")
- steps to limit the number of healthcare workers involved to minimize potential exposures
- plans for having auxiliary staff staged in a safe area where they can be easily called on if needed but otherwise preventing unnecessary exposure
- plans for safe disposal and cleaning of equipment used during the emergency response
- procedures for disposition of the patient after the emergency, either to the ICU if resuscitation is successful or the morgue if unsuccessful.

ENVIRONMENTAL ENGINEERING CONTROLS



- Physical engineering elements such as negative pressure rooms, dilution ventilation, high-efficiency particulate air filtration, ultraviolet lights, and scavenging devices.
- Aims to contain the infectious agent in a limited area and to minimize or rapidly decrease the viral load in the environment.

PPE

- Discuss the use of 4 personal protective system versus PAPR.
- Regardless of what PPE is used for AGPs, it is essential that they are distributed throughout the hospital in areas where they are most likely to be required by primary responders in an emergency situation as opposed to a central area where teams must wait for them to be brought to the emergency.
- Extra protection equipment should be included as part of any crash cart used by the responding code team.

QUALITY CONTROL

- It is important not to forget the basics of infection control procedures such as glove changing and hand hygiene.
- HCWs must remain vigilant about not only protecting themselves and protecting against patient-to-patient transmission.
- After developing good policies and training staff who are rehearsed for emergencies and provided with appropriate protection equipment, the last step is to ensure ongoing adherence to the standards set. This adherence is achieved through quality control.
- Without an effective quality control program in place, lapses in infection control procedures will occur, particularly as healthcare workers become fatigued during a prolonged outbreak.

UpToDate

Coronavirus Disease 2019 (COVID-19)¹⁵

INTERVENTIONS

In the event of a cardiac arrest, cardiopulmonary resuscitation should proceed with all members of the team wearing appropriate PPE. Practicing a test run of a COVID-19 patient cardiac arrest is prudent. Bag-mask ventilation should be avoided if feasible and the ventilator can be used instead to deliver a respiratory rate of 10bpm.

ARTICLES RELATING TO ADVANCE CARE PLANNING, PALLIATIVE CARE AND DO NOT RESUSCITATE ORDERS TO REDUCE FUTILE LIFE SUSTAINING TREATMENTS SUCH AS CPR AND ENSURE RATIONAL USAGE OF PPE RESOURCES

The Importance of Addressing Advance Care Planning and Decisions About Do-Not-Resuscitate Orders During Novel Coronavirus 2019 (COVID-19)¹⁶

Curtis et al. emphasise the importance of patients and clinicians working together on advance care planning, particularly regarding life-sustaining treatments such as cardiopulmonary resuscitation (CPR) or mechanical ventilation. The COVID-19 pandemic heightens the importance of implementing do-not-resuscitate (DNR) orders for appropriate hospitalized patients.

They suggest that the implementation of DNR orders can occur in 3 situations:

- Communicated by patients/surrogate decision makers
- Patients/surrogate decision makers may follow the recommendation of a clinician to forgo CPR; this may occur through informed consent/informed assent
- In extreme situations in which CPR cannot possibly be effective, clinicians in some health care settings may unilaterally decide to write a DNR order. This latter approach is not uniformly accepted and, prior to COVID-19, it rarely had a role. During this pandemic, however, in extreme situations such as a patient with severe underlying chronic illness and acute cardiopulmonary failure who is getting worse despite maximal therapy, there may be a role for a unilateral DNR to reduce the risk of medically futile CPR to patients, families, and health care workers.

Creating a Palliative Care Inpatient Response Plan for COVID19 – The UW Medicine Experience¹⁷

UW Medicine developed a strategy to implement a palliative care response for a multi-hospital healthcare system that incorporates conventional capacity, contingency capacity, and crisis capacity. This strategy included among other measures:

- Palliative care specialists provided guidance and tools for primary teams conducting goals-of-care and code status discussions in order



- to preserve resources by avoiding unwanted or non-beneficial cardiopulmonary resuscitation and mechanical ventilation.
- Digital health/telehealth was used where possible for palliative care consultations, to reduce PPE usage.

Goals of Care in a Pandemic: Our Experience and Recommendations¹⁸

Adams shares the experience of her institution in dealing with COVID-19 patients from a palliative care perspective. She recommends earlier goals of care conversations, multidisciplinary team work, and enhanced use of technology and telemedicine to address the care goals of patients, which reducing the need for rationing of resources.

Produced by the members of the National Health Library and Knowledge Service Evidence Team.[†] Current as at 2 April 2020. This evidence summary collates the best available evidence at the time of writing and **does not replace clinical judgement or guidance**. Emerging literature or subsequent developments in respect of COVID-19 may require amendment to the information or sources listed in the document. Although all reasonable care has been taken in the compilation of content, the National Health Library and Knowledge Service Evidence Team makes no representations or warranties expressed or implied as to the accuracy or suitability of the information or sources listed in the document. This evidence summary is the property of the National Health Library and Knowledge Service and subsequent re-use or distribution in whole or in part should include acknowledgement of the service.

<p>P Population</p> <ul style="list-style-type: none"> person location condition/patient characteristic 	HEALTHCARE WORKERS IN THE HOSPITAL SETTING WORKING WITH PATIENTS WITH CONFIRMED OR SUSPECTED COVID-19
<p>I Intervention</p> <ul style="list-style-type: none"> length location type 	PROVISION OF CPR TO PATIENTS
<p>C Comparison</p> <ul style="list-style-type: none"> another intervention no intervention location of the intervention 	NO CPR OR LIMITED CPR (E.G CHEST COMPRESSIONS AND AED USE ONLY)
<p>O Outcome</p>	TRANSMISSION OF COVID-19 TO HCWS THROUGH THE PROVISION OF CPR

The following search strategy was used (in tandem with COVID-19 search strings):

EMTREE: RESUSCITATION/

MESH: CARDIOPULMONARY RESUSCITATION

KEYWORD: CPR OR RESUSCITATION OR RESUS OR CARDIO-PULMONARY RESUSCITATION OR CARDIOPULMONARY RESUSCITATION OR CHEST COMPRESSIONS OR AUTOMATED EXTERNAL DEFIBRILLATOR OR CARDIAC ARREST OR ADVANCED CARDIAC LIFE SUPPORT OR CARDIO PULMONARY RESUSCITATION OR RESUSCITATE OR CARDIOVASCULAR

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