



Perspective

CPR in the Covid-19 Era — An Ethical Framework

Daniel B. Kramer, M.D., M.P.H., Bernard Lo, M.D., and Neal W. Dickert, M.D., Ph.D.

The coronavirus pandemic is forcing clinicians, health care institutions, and public officials to develop crisis standards of care that differ radically from ordinary care for services

such as diagnostic testing and mechanical ventilation. Under normal conditions, cardiopulmonary resuscitation (CPR) is provided unless a patient has a do-not-resuscitate (DNR) order that is based on the wishes of the patient or a surrogate. Health care workers are trained to start resuscitation immediately and not wait for more experienced personnel to arrive. It is assumed that intensive care will be available subsequently and that resuscitation attempts pose no substantial risks to clinicians or other patients. Crisis standards during a major surge in Covid-19 patients challenge typical assumptions regarding resuscitation and default provision of CPR.

Clear policies for crisis and contingency standards for CPR are essential. Without such policies,

response teams are left in the untenable position of having to balance their obligations to individual patients, colleagues, future patients, institutions, and themselves. Ad hoc decision making may cause disparities among patient populations in initiation or discontinuation of resuscitation, worsen existing health and structural inequalities, and engender conflicts with and lingering trauma for patients' loved ones. Unlike allocation of ventilators, provision of CPR to individual patients cannot be practically adjudicated by a hospital-level triage team. How does the surge of patients with Covid-19 complicate standard CPR practices, and how can we best design CPR standards for crisis conditions? We examine these issues below, propose an ethical frame-

work, and make specific recommendations for crisis standards for inpatient CPR.

CPR is resource-intensive and may pose risks to clinicians. In cases of cardiopulmonary arrest occurring outside intensive care units (ICUs), successful resuscitation typically requires transfer to an ICU and mechanical ventilation. Under crisis conditions, however, the hospital may have no available ICU beds or ventilators. If these resources are not available, there may be little role for resuscitation.

CPR for in-hospital arrest has limited effectiveness. Excluding patients in specific settings such as cardiac catheterization labs, where arrhythmic arrests are rapidly reversible, only about 25% of patients who have an in-hospital cardiac arrest survive to hospital discharge.¹ Involvement of less experienced code-team members during times of staffing shortages and delays associated with donning personal protective equip-

ment (PPE) may further reduce the likelihood of success. Although data on patients with Covid-19 remain limited, initiating CPR in these patients may appear problematic to some clinicians if the best-case outcome is returning the patient to active clinical deterioration.

Code-team members also face risks related to aerosolized transmission of coronavirus,² particularly during intubation. Covid-19 infections among health care workers reduce a hospital's capacity to care for current and future patients. Especially in a context of limited Covid-19 testing, patients undergoing resuscitation should be considered Covid-19-positive, and code-team members must wear PPE, which may be in limited supply.

The National Academies of Science, Engineering, and Medicine state that crisis standards of care aim to “save the most lives possible” under severe resource constraints.³ Core ethical principles must be maintained: “fairness, the duty to care, the duty to steward resources, transparency in decision-making, consistency, proportionality, and accountability.”³ In the context of CPR, we believe that these principles have a few key implications for health care workers.

Clinicians should respect the preferences of patients and their surrogates to the extent possible, while recognizing the need to allocate available resources so as to save the most lives. Transparent policies may help families accept that substantial changes from usual care are necessary and fair. Transparency can also discourage discrimination according to religion, race, national origin, gender, sexual orientation, disability, age, insurance, or economic status.

Health care professionals should provide interventions that may benefit the patient, in keeping with the best available evidence and within resource constraints. Some measures that might benefit or rescue a patient — or that might help the family to feel that “everything was done” — may not be feasible, and forgoing them in certain patients may allow severely understaffed hospitals to save the lives of more patients. Finally, harm to hospital personnel should be minimized, particularly in situations where there is a substantial risk of transmission.

These general principles can be translated into three specific recommendations for crisis standards for CPR. First, acknowledge resource constraints when discussing goals of care and DNR status. If patients or surrogates decide to forgo CPR, respecting their preferences also reduces resource constraints and risks to health care workers.⁴ These discussions are important in the care of all severely ill patients but have heightened significance during the pandemic. Discussions about goals of care and CPR preferences should take place on admission and be updated during a patient's hospitalization. If crisis standards of care are in effect, doctors should explain that severe resource constraints mean that some ordinary care may not be possible for some patients. Some patients may choose to forgo resuscitation in this context, but clinicians should carefully avoid real or perceived coercion to accept DNR status or making prognostic predictions that are not supported by strong evidence.

Second, forgo CPR in certain circumstances. Available evidence does not support categorical withholding of resuscitation from pa-

tients with particular medical conditions. Factors such as age and underlying illness have been linked to outcomes after inpatient cardiopulmonary arrest,¹ but exclusion of patients with specific disease states, including Covid-19, is not recommended on the basis of current evidence.⁵

However, resource scarcity and the need to maximize lives saved when crisis standards of care are in force mean that resuscitation should not be performed, even in the absence of DNR status, under certain conditions: if ventilators or critical care beds are not available or the patient has been determined, through a fair hospital triage process, to be ineligible for them (an exception may be made when a patient is found to have a shockable rhythm such as ventricular fibrillation, since defibrillation alone probably poses a lower risk of exposure than other components of resuscitation and has greater potential for success); if the patient's condition is deteriorating significantly despite provision of critical care (e.g., in patients with progressive refractory hypoxemia or shock despite optimal support, resuscitation would not address the underlying deterioration, and risks to health care workers in crisis situations may not be justified by the very low chance of benefit to the patient⁵); or if the institution determines that staffing shortages are so severe that the use of typical code teams would divert resources from and jeopardize outcomes for other patients.

Third, ensuring the safety of personnel justifies selective constraints on resuscitation. Under crisis standards of care, substantial risks to health care workers may outweigh very small chances of providing benefit to a particu-

lar patient.⁵ Professional society guidelines recommend protective measures that may alter resuscitation practices and the potential for success. These include consistent use of PPE by the code team, performance of intubation by experienced personnel, and use of mechanical CPR where available.⁵

To protect health care workers in a manner consistent with the ethical framework we've outlined, we believe that resuscitation should commence only after the code team has donned appropriate PPE, including a face shield for the person performing intubation. Institutions should not require resuscitation if appropriate PPE is not available. If no member of the code team is sufficiently experienced at emergency intubation, the team should perform only interventions that can be delivered safely (e.g., defibrillation and compression-only CPR with supplemental oxygen) until an appropriate clinician arrives. At the same time, we believe that adequately trained responders who have appropriate PPE should not

be allowed to refuse to perform CPR out of concern for personal safety, except in patients with refractory deterioration. (Our recommendations assume that clinicians with contraindications to caring for patients with Covid-19 have been deployed elsewhere.)

To date, U.S. hospitals have not had to implement crisis standards of care, unlike hospitals in some other countries. However, as part of preparedness planning, states and hospitals need to develop such standards for CPR and solicit public feedback on them. Explicit crisis standards, grounded in ethical principles, will help clinicians define and understand when strict adherence to established resuscitation protocols may no longer be appropriate.

Disclosure forms provided by the authors are available at NEJM.org.

From the Richard A. and Susan F. Smith Center for Outcomes Research in Cardiology, Beth Israel Deaconess Medical Center and Harvard Medical School — both in Boston (D.B.K.); the Greenwall Foundation, New York (B.L.); the University of California, San Francisco, San Francisco (B.L.); and Emory University School of Medicine, Atlanta (N.W.D.).

This article was published on May 6, 2020, at NEJM.org.

1. Andersen LW, Holmberg MJ, Berg KM, Donnino MW, Granfeldt A. In-hospital cardiac arrest: a review. *JAMA* 2019;321:1200-10.
2. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 2020;382:1564-7.
3. National Academies of Sciences, Engineering, and Medicine. Rapid expert consultation on crisis standards of care for the COVID-19 pandemic (March 28, 2020). Washington, DC: National Academies Press, 2020 (<https://www.nap.edu/catalog/25765/rapid-expert-consultation-on-crisis-standards-of-care-for-the-covid-19-pandemic-march-28-2020>).
4. Fritz Z, Perkins GD. Cardiopulmonary resuscitation after hospital admission with covid-19. *BMJ* 2020;369:m1387.
5. 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 April 9 (Epub ahead of print).

DOI: 10.1056/NEJMp2010758

Copyright © 2020 Massachusetts Medical Society.