

Guidelines for Code Blue Resuscitation of Suspected, Probable or Confirmed COVID-19 Patients in Acute Care

November 6, 2020

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Provincial COVID-19 Acute Care Code Blue Working Group

November 6, 2020

This report has been prepared by Teresa Thurber and Dr. Richard Novick in partnership with the Provincial COVID-19 Acute Care Code Blue Working Group at the request of the Provincial Critical Care COVID-19 Working Group.

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Introduction

This leadership was consigned the task of developing a guidance document for the conduct of code blue resuscitation in patients with suspected, probable or confirmed COVID-19 infection in acute care facilities on March 27, 2020, to be submitted within one week. This assignment led to the rapid organization of a multidisciplinary working group of experienced members from the Edmonton, Central, Calgary and South Zones. This group included, in addition to the two lead authors, 25 adult and pediatric intensive care and emergency physicians, critical care nurses and nurse clinician educators, respiratory therapists, senior administrators and research analysts. The working group members and their practice locations are listed in the Appendix.

Purpose

The objective of this document is to provide guidance for the conduct of code blue resuscitation in patients with suspected, probable or confirmed COVID-19 infection within acute care facilities. The document focuses on pre-, intra-, and post-resuscitation stages, in acute care environments such as the critical care unit (adult and pediatric), inpatient units and ED. This document is applicable to all acute care facilities within the province. Resuscitation provided in non-acute care AHS facilities will be informed by other guidance.

Background

In preparation, working group members reviewed four key relevant documents from AHS, as well as four documents from other jurisdictions, to serve as background for our work (please see Resources & References section below). This material provided validation of established AHS principles of code blue resuscitation as well as effective response measures implemented in partner institutions. Subsequently, two teleconferences were organized, during which working group members provided substantive input on the conduct of code blue resuscitation in patients with confirmed or suspected COVID-19 infection. After each teleconference, members had additional opportunities to suggest revisions to the document. Final changes to the document were completed by Teresa Thurber in consultation with the Critical Care SCN.

Guiding principles

Guiding principle 1: This document provides guidance for healthcare workers (HCWs) on code blue resuscitation in acute care settings for patients with suspected, probable or confirmed COVID-19.

Guiding principle 2: The intention is to provide guiding principles to supplement current policies, procedures and protocols in place for resuscitation, with applicability to both urban and rural acute care areas (including adult and pediatric care, where applicable).

Guiding principle 3: Consideration that the location of resuscitation may influence response and team processes (i.e. Critical Care Unit vs. Inpatient Unit or Emergency Department (ED)).

Guiding principle 4: *Contact and droplet PPE shall be donned prior to initiating resuscitation by all response team members, even if there is a perceived delay in resuscitation efforts. A fit-tested N95 mask is required for all aerosol generating medical procedures (AGMP).*

- Point of Care Risk Assessment (PCRA) should be completed by all health care workers before initiating any resuscitation.
- Assume the patient is COVID-19 positive, unless otherwise identified/known.
- Routine practices, such as defibrillation and CPR, are otherwise unchanged from non-COVID-19 patients.
- The AHS Scientific Advisory Committee has determined that the provision of chest compressions alone is not considered to be an aerosol generating medical procedure (AGMP) and only requires contact and droplet PPE.
- Fit tested N95 and contact and droplet PPE are required for all AGMP. AGMP include manual ventilation and air way management. All individuals within 2 meters of the AGMP procedure require a fit tested N95.

Guiding principle 5: Minimize number of individuals in the patient room during resuscitation.

Guiding principle 6: Minimize equipment in the room wherever possible.

Guiding principle 7: Extracorporeal Cardiopulmonary Resuscitation (ECPR) – refer to *AHS ECPR reference document*.

Guiding principle 8: Family and visitors should be removed from the resuscitation area and a designated healthcare provider should provide ongoing support and information where available.

Pre-Arrest Planning

	Action
<p>Recommendations</p>	<ul style="list-style-type: none"> • GOC should be clearly documented on admission, identified on arrival of code blue team and reassessed frequently throughout the course of the patient’s illness and hospital admission. • Advanced planning for code blue resuscitation should refer to AHS’ critical care admission and triage, as per: Care of the Adult Critically Ill COVID-19 Patient • Patients with suspected, probable or confirmed COVID-19 infection, who are at risk of acute deterioration or cardiac arrest, should be identified early. Appropriate steps to prevent cardiac arrest and avoid unprotected CPR should be undertaken. • A daily and nightly Team Huddle (involving those team members responsible for providing code blue resuscitation services in the facility) is recommended to: <ul style="list-style-type: none"> ○ Familiarize team members at the start of each shift. ○ Review and discuss recommended procedures and deviations from standard code blue resuscitation. ○ Ensure team awareness of potential patients within the facility who have COVID-19 illness and are at risk of needing ICU transfer or advanced care. • Regular multidisciplinary simulation exercises of Code Blue in a COVID-19 presumptive or confirmed patient. <ul style="list-style-type: none"> ○ Ensure that simulation exercises align with AHS PPE preservation strategies.

Calling/Paging of the Arrest

	Action
Initial response to Arrest	<ul style="list-style-type: none"> Assume the patient is COVID-19 positive, unless otherwise identified/known. Initial health care providers responding must don contact and droplet PPE before entering patient space. If CPR is indicated, chest compressions alone can be initiated safely by a provider wearing contact/droplet PPE. Place loose clothing/sheet over the mouth and nose of the patient, as airway source control while awaiting individuals who are wearing PPE, including fit-tested N95 respirators. In patients with advanced airways (i.e.. intubated and/or tracheostomy), non-invasive ventilation (NIV) or heated humidified high flow oxygen (HHHF) a fit-tested N95 mask is required for all resuscitative measures in suspected, probable or confirmed COVID-19 patients as these are already AGMPs.
Calling/Paging Arrest	<ul style="list-style-type: none"> Current paging/notification processes should be followed. Clear identification of isolation requirements to the response team on arrival. Clear communication of GOC to responding resuscitation team members, where available/known. Upon arrival at the code, team members should quickly clarify roles and which members will be working inside versus outside of the patient's room.
PPE	<ul style="list-style-type: none"> Ensure that PPE is readily available for responding team members. Where possible, make available a "safety/logistics officer" to monitor donning/doffing. Since the availability of suitable PPE in sufficient quantities at the site of the arrest may not be guaranteed, the use of PPE pre-made kits should be considered, to travel with the response team or to be stored with code carts (where possible). CPR with manual ventilation and airway management procedures, are aerosol generating medical procedures. There is no settle time required after AGMP is complete. Since with most code blue events chest compressions and/or manual ventilation and airway management will be required, we recommend all members of resuscitation teams don full PPE, including fit-tested N95 masks, prior to entering the resuscitation area.

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	<ul style="list-style-type: none">• Donning should be carried out quickly but meticulously, even if there is a perceived delay to resuscitation.• If multiple individuals arrive at the same time, priority for donning and entering the room should be given to the Code Blue team leader and/or airway expert physician, and to the ICU/resuscitation team RN (assuming care providers providing chest compressions, if required, are already in place with appropriate PPE).
Equipment	<p>Inside the room</p> <ul style="list-style-type: none">• Code cart with defibrillator and arrest drugs may be brought into the room, if practical and if sufficient clean carts are available on site. In some units the code cart may be left just outside the patient's door and the defibrillator and medication drawer may be removed and passed into the patient's room upon the resuscitation team's arrival. Follow site-specific guidance.• Intubation equipment:<ul style="list-style-type: none">• Video laryngoscopy is highly recommended for the first attempt at intubation (where available); thus, resuscitation teams should have prompt access to a video laryngoscope at the site of the code.• Priority should be placed on intubation and obtaining a secure airway with closed ventilation, especially in an unresponsive patient.• If the patient has a Laryngeal Mask Airway (LMA) in situ, it should be swapped to a cuffed endotracheal tube as soon as possible.• If manual bagging of the patient is required because of unsuccessful initial intubation (see below), it should be provided via a bag valve mask with a HEPA filter.• When intubation is successful and manual bagging is required, it should be provided via a bag valve mask with a HEPA filter, capnograph (where available) and include placement of inline suction.

Conduct of Resuscitation/Response Team

	Action
Suggested response team members	<p>Inside the room</p> <ul style="list-style-type: none"> • Code Blue Team Leader • Airway expert physician (if available) • Registered Respiratory Therapist (RRT) to assist with/accomplish intubation and ventilation • RN to administer medications, cardioversion/defibrillation and update code blue team leader regarding changes in cardiac rhythm (ICU RN) • HCW to do CPR (1) - Usually first responder • HCW to do CPR (2) • RN for documentation and time-keeping. <p>Outside the room</p> <ul style="list-style-type: none"> • RN/HCW “runner”, to assist with supply of equipment stored on the unit and the activation of other HCWs, if required • “Logistic/Safety Officer”, who should be a senior HCW, to regulate access to the patient’s room, monitor proper PPE donning and doffing, ensure that protocols and the opening and closing of doors is followed and communicate with other units (e.g. ICU, ED) as appropriate prior to the initiation of patient transport.
Modifications to ACLS in COVID-19 patients	<ul style="list-style-type: none"> • Intubate patients early and hold chest compressions during intubation to minimize aerosolization of particles and optimize intubation success. • The best pharmacotherapy for induction and intubation will be determined by the MRHP on a case-by-case basis but in general should include strategies that minimize chances of cough or aerosol generation via use of agents inducing deep sedation and often use of neuromuscular blockade when clinically appropriate (e.g. no signs predicting difficult intubation). • Manual bagging of non-intubated patients using BVM should be avoided if possible. If necessary because of unsuccessful initial intubation, use two experienced practitioners to establish an intact seal and minimize the risk of aerosolization. • Avoid disconnections between the ETT and resuscitation bag. If required due to gas trapping, the plan to disconnect should be announced loudly in advance and the ETT should only be disconnected beyond the HEPA filter.

Post-Arrest

	Action
Recommended	<ul style="list-style-type: none"> • Post return of spontaneous circulation (ROSC) huddle – to discuss patient disposition, communication to the ICU/ED team as appropriate and specific transport details. • Debrief with team members the conduct of the code and identify opportunities for improvement.
PPE - Doffing	<ul style="list-style-type: none"> • This may occur partly in the room (gloves, gown) and outside the room (face shield, mask), or face shield and mask removal may occur in the anteroom, if there is one. • DO NOT RUSH. BE METHODICAL. Remove PPE slowly and carefully to avoid inadvertent contamination of yourself or others, performing hand hygiene in between each step while doffing. • Logistic/safety officer to monitor member PPE doffing, if possible.
Environment	<ul style="list-style-type: none"> • Decontaminate specialty equipment as per site-specific standard routines and IP&C guidelines. • Discard any opened supplies or any supplies that cannot be cleaned appropriately.
Post-ROSC Care	<ul style="list-style-type: none"> • Ensure adequate and appropriate required staff available before any transportation attempted. Follow site specific policies if family members are present. • Designate one runner 'clean' to pre-scout/secure transport route, open doors and touch elevator buttons. • If patient is intubated, use of transport ventilators (with filtering systems) is preferred to minimize the need for manual bagging. • Transportation to a critical care unit should follow guidelines from the: <ul style="list-style-type: none"> Care of the Critically Ill Adult COVID Patient Care of the Critically Ill Pediatric COVID-19 Patient • For patients being transported to an ICU or advanced care unit in a facility, consideration should be given to testing that can be safely completed en route so as to minimize the need for additional transports (e.g. CT scan) • Post-ROSC clinical care to follow usual process

Resources

- [Care of the Critically Ill Adult COVID Patient](#)
- [Care of the Critically Ill Pediatric COVID-19 Patient](#)
- [Cardiopulmonary Resuscitation \(CPR\) for Continuing Care Clients with Suspected or Confirmed Novel Coronavirus \(COVID-19\)](#)
- [AHS. Aerosol-Generating Medical Procedure Guidance Tool](#)

References

- [First 10em. Aerosol-generating-procedures](#)
- [Heart & Stroke. Modification to Public Hands-Only CPR during the COVID-19 pandemic](#)
- [British Columbia Minister of Health. Adult CPR Protocol for Suspect and Confirmed Cases of COVID-19](#)
- [Resuscitation Council U.K. Statements and resources on COVID-19 \(Coronavirus\), CPR and Resuscitation](#)
- [American Heart Association. BLS Healthcare Provider Adult Cardiac Arrest Algorithm](#)
- [Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 \(COVID-19\)](#)
- [Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 \(COVID-19\) Pandemic](#)
- http://www.bccdc.ca/Health-Info-Site/Documents/COVID_Adult_CPR_Protocol.pdf
- <https://www.saskhealthauthority.ca/news/service-alerts-emergency-events/covid-19/clinical-practice-resources/Documents/General%20-%20Code%20Blue/Clinical-Practice-Guidelines-Responding-to-Code-Blue-April-6-2020.pdf>
- <https://www.resus.org.uk/about-us/news-and-events/rcuk-statement-phe-ppe-guidance>
- https://onlinecpd.shpa.org.au/pluginfile.php/30032/mod_resource/content/1/ANZI_3367_Guidelines_V2.pdf
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3338532/>
- <https://costr.ilcor.org/document/covid-19-infection-risk-to-rescuers-from-patients-in-cardiac-arrest>
- <https://www.resuscitationjournal.com/article/S0300-9572%2820%2930191-X/pdf>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3322898/>

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- https://www.cadth.ca/sites/default/files/pdf/M0023_Aerosol_Generating_Procedures_e.pdf
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873403/>
- <https://www.resus.org.uk/covid-19-resources/statements-covid-19-hospital-settings/resuscitation-council-uk-statement-covid-0>
- <https://www.resus.org.uk/covid-19-resources/statements-covid-19-hospital-settings>

Appendix

Expanded Considerations to the Critical Care Code Blue Guidelines April 24, 2020

The Critical Care Code Blue team has developed guidance for hospital-based teams responding to cardio-pulmonary arrests for patients with **known or suspect COVID-19**.

Additional need has been expressed to understand how these guidelines might apply to first responders, before the Code Blue Team arrives, and to settings beyond those contemplated by these guidelines.

In an effort to consider the balance of the compelling healthcare worker desire to help and a patient's right to care while always prioritizing the need to protect healthcare workers from infection the following scenarios have been developed to guide refinement of the Critical Care Guidelines for applicability beyond the Acute Care Code Team for whom they were appropriately developed.

Note that these scenarios incorporate source control strategies as a means to further reduce risk to first responders.

Scenario 1 – Cardiac arrest on patients admitted to acute care who were not suspected of having COVID-19.

Any healthcare worker may start resuscitative efforts, including chest compressions, BVM and or defibrillation, while wearing a medical/surgical/procedure mask as per continuous masking policy unless a patient has a suspected or confirmed [acute viral respiratory infection](#) at which point contact and droplet PPE with a fit tested N95 respirator is required for all AGMP.

- All health care providers should always perform a PCRA before initiating any resuscitation.
- The Code Blue Team does not require additional PPE precautions to continue resuscitation efforts unless a patient has a suspected or confirmed [acute viral respiratory infection](#) at which point contact and droplet PPE with a fit tested N95 respirator is required for all AGMP.

Scenario 2 – For individuals where COVID-19 status is unknown (e.g. individual found in area of hospital outside of care unit) and COVID screening has not yet been completed.

- All health care providers should always perform a PCRA before initiating any resuscitation.
- Assume the individual is COVID-19 positive until proven otherwise.
- Any healthcare worker may start resuscitative efforts, including hands only CPR and defibrillation, while wearing contact and droplet PPE unless an AGMP (i.e. tracheostomy, HHHF, NIV, advanced airway) is in progress at which point a fit tested N95 is required.
- Place loose clothing/sheet over the mouth and nose of the patient, as airway source control while awaiting individuals who are wearing PPE, including fit-tested N95 respirators.

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- The Code Blue Team will don full contact/droplet PPE with a fit-tested N95 respirator to continue resuscitation with manual ventilation and airway management procedures.

Scenario 3 – For Out-of-Hospital Cardio-Respiratory Arrest where COVID-19 Status is Unknown

- Bystander chest compressions may be initiated
- **Source Control** strategies may be employed to reduce potential risk of exposure
- Defibrillation should be considered, as appropriate
- EMS will assume resuscitative efforts on arrival, with use of appropriate PPE.

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