Summary of adjustments to CPR algorithms in suspected or confirmed COVID-19 patients.

Reduce provider exposure

- Don PPE before entering the room/scene
- Limit personnel
- Consider using mechanical CPR devices for adults and adolescents who meet height and weight criteria
- Communicate COVID-19 status to any new providers

Prioritize oxygenation and ventilation strategies with lower aerosolization risk

- Use a HEPA filter, if available, for all ventilation
- Intubate early with a cuffed tube, if possible, and connect to mechanical ventilator, when able
- Engage the intubator with highest chance of first-pass success
- Pause chest compressions to intubate
- Consider use of video laryngoscopy, if available
- Before intubation, use a bag-mask device (or T-piece in neonates) with a HEPA filter and a tight seal
- For adults, consider passive oxygenation with nonrebreathing face mask as alternative to bag-mask device for short duration
- If intubation delayed, consider supraglottic airway
- Minimize closed circuit disconnections

Consider resuscitation appropriateness

- Address goals of care
- Adopt policies to guide determination, taking into account patient risk factors for survival
Victim is unresponsive. Shout for nearby help. Activate emergency response system via mobile device (if appropriate). Get AED and emergency equipment (or send someone to do so).

Monitor until emergency responders arrive.

CPR
- Begin cycles of 30 compressions and 2 breaths using bag-mask device with filter and tight seal
- OR continuous compressions with passive oxygenation using face mask.
  Use AED as soon as it is available.

AED arrives.

Check rhythm. Shockable rhythm?
- Yes, shockable
  - Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.
- No, nonshockable
  - Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

No breathing or only gasping, no pulse

No breathing or only gasping, has pulse

Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?

Normal breathing, has pulse

No normal breathing, has pulse

Verify scene safety
- Don PPE
- Limit personnel

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ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020

Don PPE
- Limit personnel
- Consider resuscitation appropriateness

Start CPR
- Give oxygen (limit aerosolization)
- Attach monitor/defibrillator
- Prepare to intubate

Rhythm shockable?

VF/pVT

Asystole/PEA

Shock

Prioritize Intubation / Resume CPR
- Pause chest compressions for intubation
- If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
- Connect to ventilator with filter when possible

CPR 2 min
- IV/IO access
- Epinephrine every 3-5 min
- Consider mechanical compression device

Rhythm shockable?

CPR 2 min
- Epinephrine every 3-5 min
- Consider mechanical compression device

CPR 2 min
- Amiodarone or lidocaine
- Treat reversible causes

CPR 2 min
- IV/IO access
- Epinephrine every 3-5 min
- Consider mechanical compression device

Rhythm shockable?

CPR 2 min
- Amiodarone or lidocaine
- Treat reversible causes

Rhythm shockable?

CPR 2 min
- IV/IO access
- Epinephrine every 3-5 min
- Consider mechanical compression device

Rhythm shockable?

CPR 2 min
- Amiodarone or lidocaine
- Treat reversible causes

If no signs of return of spontaneous circulation (ROSC), go to 10 or 11
- If ROSC, go to Post-Cardiac Arrest Care

Go to 5 or 7

CPR Quality
- Push hard (at least 5 cm [2 inches]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography – If P\textsubscript{ETCO}_2 < 10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure – If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.

Shock Energy for Defibrillation
- Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- Monophasic: 360 J

Advanced Airway
- Minimize closed-circuit disconnection
- Use intubator with highest likelihood of first pass success
- Consider video laryngoscopy
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Drug Therapy
- Epinephrine IV/IO dose: 1 mg every 3-5 minutes
- Amiodarone IV/IO dose: First dose: 300 mg bolus. Second dose: 150 mg.
- Lidocaine IV/IO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

Return of Spontaneous Circulation (ROSC)
- Pulse and blood pressure
- Abrupt sustained increase in P\textsubscript{ETCO}_2 (typically >40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

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BLS Healthcare Provider
Pediatric Cardiac Arrest Algorithm for the Single Rescuer for Suspected or Confirmed COVID-19 Patients

Updated April 2020

Verify scene safety
- Don PPE
- Limit personnel

Victim is unresponsive. Shout for nearby help. Activate emergency response system via mobile device (if appropriate).

Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?

No normal breathing, has pulse

Witnessed sudden collapse?

Yes

Activate emergency response system (if not already done), and retrieve AED/defibrillator.

No

Normal breathing, has pulse

No breathing or only gasping, no pulse

CPR
1 rescuer: Begin cycles of 30 compressions and 2 breaths using bag-mask device with filter and tight seal.
(Use 15:2 ratio if second rescuer arrives.) Use AED as soon as it is available.

After about 2 minutes, if still alone, activate emergency response system and retrieve AED (if not already done).

AED analyzes rhythm. Shockable rhythm?

Yes, shockable

Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

No, nonshockable

Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

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Verify scene safety
- Don PPE
- Limit personnel

Victim is unresponsive. Shout for nearby help. First rescuer remains with victim. Second rescuer activates emergency response system and retrieves AED and emergency equipment.

Monitor until emergency responders arrive.

Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?

- Normal breathing, has pulse
- No normal breathing, has pulse

No breathing or only gasping, no pulse

CPR
First rescuer begins CPR with 30:2 ratio (compressions to breaths) using bag-mask device with filter and tight seal. When second rescuer returns, use 15:2 ratio (compressions to breaths). Use AED as soon as it is available.

AED analyzes rhythm.
- Shockable rhythm?
- Nonshockable

Yes, shockable
Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

No, nonshockable
Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

• Provide rescue breathing using bag-mask device with filter and tight seal.
  - 1 breath every 3-5 seconds, or about 12-20 breaths/min.
  - Add compressions if pulse remains ≤60/min with signs of poor perfusion.
  - Activate emergency response system (if not already done) after 2 minutes.
  - Continue rescue breathing: check pulse about every 2 minutes. If no pulse, begin CPR (go to "CPR" box).

 Victim is unresponsive. Shout for nearby help. First rescuer remains with victim. Second rescuer activates emergency response system and retrieves AED and emergency equipment.

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Pediatric Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020

Don PPE
• Limit personnel

Start CPR
• Ventilate with oxygen using bag-mask device with filter and tight seal, if unavailable use nonbreathing face mask
• Attach monitor/defibrillator
• Prepare to intubate

Rhythm shockable?
Yes
VF/pVT
Shock
No
9
Asystole/PEA

Prioritize Intubation / Resume CPR
• Pause chest compressions for intubation
• If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
• Connect to ventilator with filter when possible

CPR 2 min
IO/IV access
Rhythm shockable?
Yes
5
Shock
No
6
CPR 2 min
Epinephrine every 3-5 min
Rhythm shockable?
Yes
7
Shock
No
8
CPR 2 min
• Amiodarone or lidocaine
• Treat reversible causes

CPR 2 min
IO/IV access
• IO/IV access
• Epinephrine every 3-5 min
Rhythm shockable?
Yes
11
CPR 2 min
Treat reversible causes
No
Go to 5 or 7

12
If no signs of return of spontaneous circulation (ROSC), go to 10 or 11
If ROSC, go to Post-Cardiac Arrest Care

CPR Quality
• Push hard (≥⅓ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
• Minimize interruptions in compressions.
• Avoid excessive ventilation.
• Change compressor every 2 minutes, or sooner if fatigued.
• If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation
First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose

Advanced Airway
• Minimize closed-circuit disconnection
• Use intubator with highest likelihood of first pass success
• Consider video laryngoscopy
• Prefer cuffed endotracheal tube if available
• Endotracheal intubation or supraglottic advanced airway
• Waveform capnography or capnometry to confirm and monitor ET tube placement
• Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Drug Therapy
• Epinephrine IO/IV dose: 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Repeat every 3-5 minutes.
• Amiodarone IO/IV dose: 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.
• Lidocaine IO/IV dose: Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated >15 minutes after initial bolus therapy).

Return of Spontaneous Circulation (ROSC)
• Pulse and blood pressure
• Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes
• Hypovolemia
• Hypoxia
• Hydrogen ion (acidosis)
• Hypoglycemia
• Hypo-/hyperkalemia
• Hypothermia
• Tension pneumothorax
• Tamponade, cardiac
• Toxins
• Thrombosis, pulmonary
• Thrombosis, coronary

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