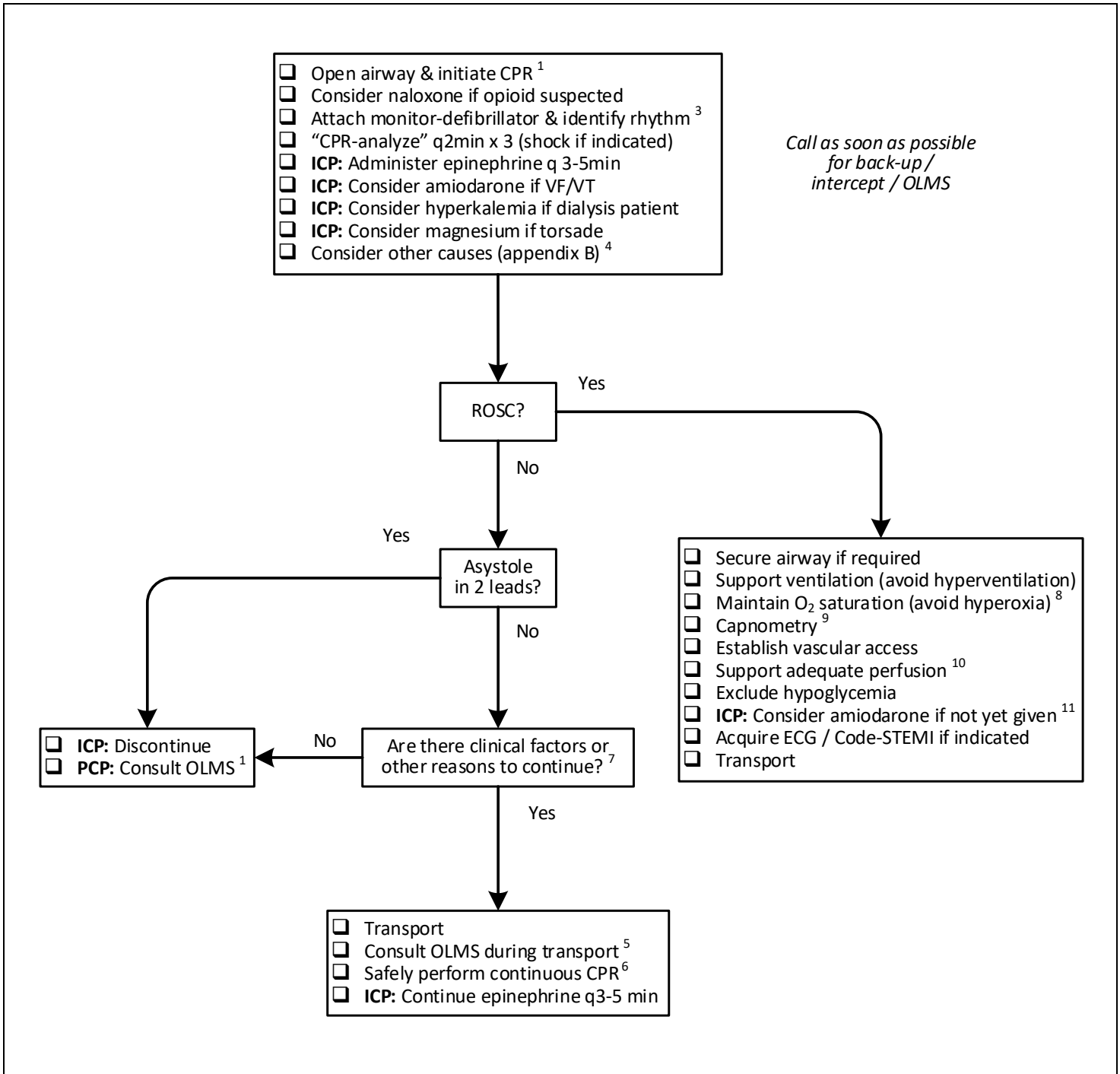
Shared health Soins communs Manitoba	C02 - ADVANCED CARDIAC ARREST (PCP & ABOVE)	
	All ages	RESUSCITATION
Version date: 2024-01-22		Effective Date: 2024-02-13 (0700)



IDENTIFIER:	PCP: PCP & ICP	ICP: ICP only	None - all providers

INDICATIONS
• Cardiac arrest due to nontraumatic causes (for traumatic cardiac arrest refer to F02.2)

CONTRAINDICATIONS
• Health care directive prohibiting resuscitation from cardiac arrest • Obvious signs of death [12]

NOTES

1. During the COVID pandemic extended personal protective equipment (PPE) is required for all resuscitations. Airway manipulation during resuscitation is an aerosol generation medical procedure (AGMP). Compressions and defibrillation are not.
   - If the patient is known or suspected to be COVID positive, do not perform positive pressure ventilation (PPV). Provide passive oxygenation only with the two-hand or CPAP mask seal (figure 1).
   - If the patient's known to be COVID negative (or COVID is not reasonably suspected) PPV can be initially provided without a sealed airway. The airway should be sealed as soon as possible.
2. If the patient's age is unknown, use visible signs of puberty as the differentiating feature for adolescent and child dosing. For patients less than 8 years of age or 25 kilograms weight use pediatric pads. If pediatric pads are not available, use adult pads but ensure separation by at least 2.5 cm (consider antero-posterior placement).
3. When defibrillating a patient with an implanted cardioverter-defibrillator (ICD) or pacemaker, place the electrodes at least 8 centimeters (3 inches) away from the pulse generator.
4. Reversible causes of cardiac arrest (appendix B) will often present initially with pulseless electrical activity (PEA) or a shockable rhythm, but will rapidly progress to asystole if uncorrected. Prompt identification and correction of the "H's & T's" (while maintaining high-quality CPR) is the priority.

   For certain causes, such as tension pneumothorax, treatment may be available by a provider with the appropriate practice scope at an emergency department (ED) and scene time should be minimized.

   Ventricular tachycardia (VT) or ventricular fibrillation (VF), due to a reversible cause such as hyperkalemia or a tricyclic antidepressant (TCA) overdose may not respond to defibrillation until the underlying cause is addressed.
5. The decision to transport without return of spontaneous circulation (ROSC) can be complex and depends on the cause of the arrest, whether it was witnessed or bystander CPR was performed, the downtime prior to EMS arrival, the ability to sustain high-quality CPR during transport, and the transport duration to the next level of care. However, emergency transport without hope of survival exposes paramedics and the public to unnecessary risk. Consider early contact to on-line medical support (OLMS).

   Clinical factors such as younger age, hypothermia, persisting electrical activity, or persistent EtCO2 above 10 mmHg indicate an increased chance of survival, and may support extended efforts.

   In certain non-clinical circumstances and even with little probability of survival, transporting to a health care facility and deferring the decision about discontinuation to a health care provider with additional training and experience may be in the best interest of the patient's family and providers (e.g. pediatric victim, family distress).

6. Always maintain personal safety when performing CPR during transport. Continue until fatigue ensues or if safety concerns arise. Do not interrupt to reassess unless signs of return of spontaneous circulation (ROSC) occur (e.g. spontaneous movement).
7. Transport time to the closest emergency department (ED) must be based on safe transport speed and should consider time for egress and loading.
8. Provide supplemental oxygen to achieve an oxyhemoglobin saturation (SaO_2) of 92% to 98% in adults, and 94% to 99% in children under age 10 years.
9. Over-ventilation may compromise cerebral blood flow. Target an end-tidal carbon dioxide ($EtCO_2$) level of 35 to 45 mmHg.
10. In adults aim for a mean arterial pressure (MAP) of greater than 65 mmHg (or a systolic blood pressure of approximately 90 mmHg).
11. When administering amiodarone to a patient with ROSC, note that the dose is lower and the administration rate is slower than when administering during cardiac arrest (refer to M14).
12. Prior death can be reliably concluded by finding evidence of a significant time lapse from the cessation of circulation, or the recognition of injuries incompatible with survival. Evidence of significant time lapse includes dependent lividity, rigor mortis, generalized tissue decomposition, putrefaction, and torso freezing (such that the chest cannot be compressed). Injuries incompatible with life include decapitation, incineration, transection of the thorax or abdomen, substantial destruction of vital organs (heart, lungs, brain), or separation of vital organs from the body.

FIGURE 1: PASSIVE OXYGENATION WITH BVM & MOUTH / NOSE SEALED

TWO-HAND MASK SEAL	CPAP MASK SEAL
	

LINKS	
• C07.1 - HYPOVOLEMIA & SEPSIS • E04 - ACUTE CORONARY SYNDROME & STEMI • E11 - HYPERKALEMIA • F02.2 - ADVANCED TRAUMA ARREST • M05.2 - EPINEPHRINE FOR CARDIAC ARREST • M11 - NALOXONE	• M14 - AMIODARONE • M15 - SALBUTAMOL • M18 - SODIUM BICARBONATE • M24 - MAGNESIUM SULFATE • M26 - CALCIUM CHLORIDE

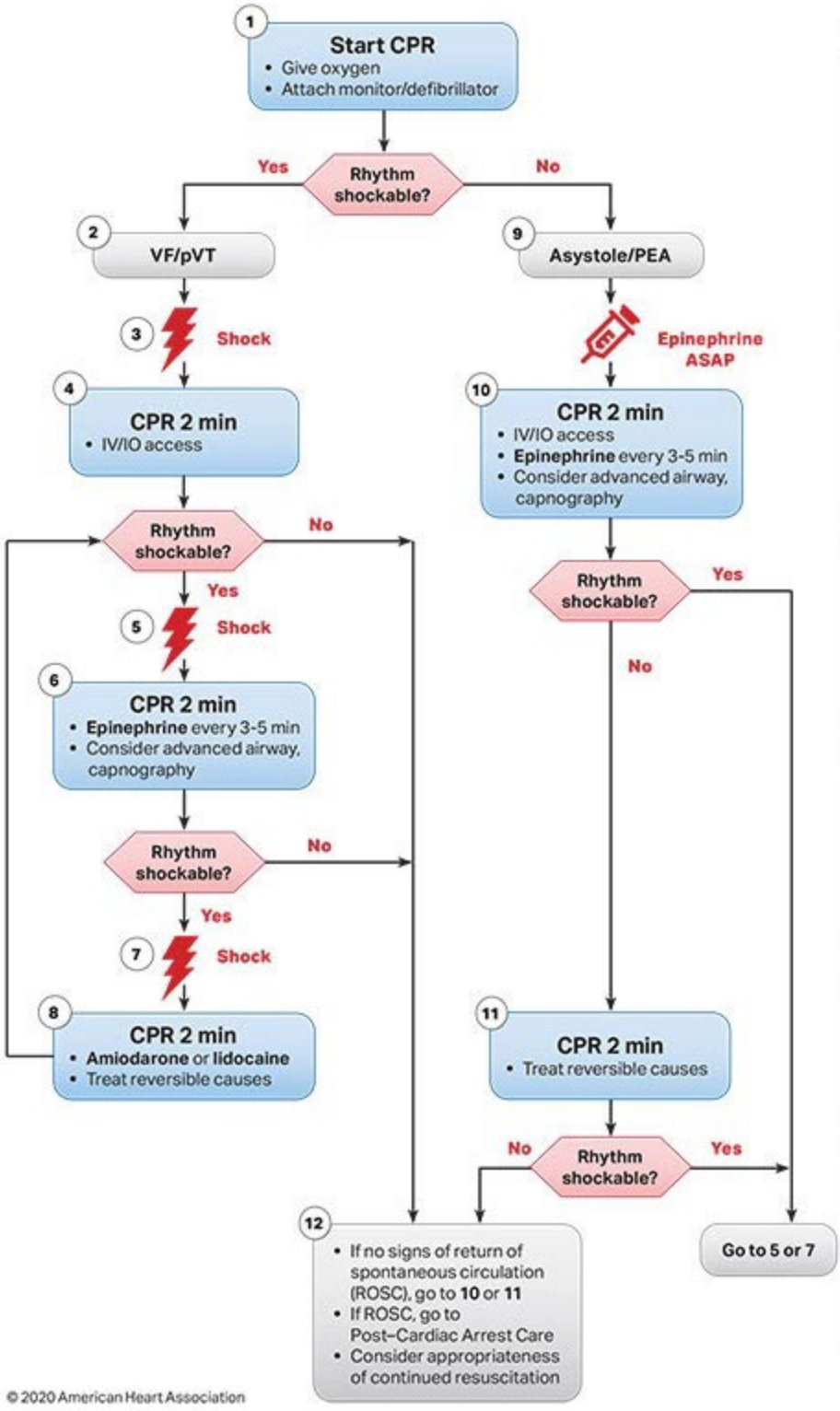
APPROVED BY	
	
EMS Medical Director	EMS Associate Medical Director

VERSION CHANGES (refer to X03 for change tracking)
• Renamed • Simplified algorithms & revised notes • Trauma arrest removed to new care map F02.2 • ROSC management incorporated into each algorithm • PCP must contact OLMS to discontinue • Simplified directions for airway management during COVID • Medication quick reference guide moved to appendix A • “H’s & T’s” moved to appendix B & include care map identifiers where available • Identifier legend at bottom of flow chart replaces work scope statement in header

APPENDIX A: CARDIAC ARREST QRG *This guide is for dosing only. Refer to the medication documents for additional information required for safe administration.*	
TEN YEARS & OLDER	**LESS THAN TEN YEARS** [2]
DEFIBRILLATION	
• Initial shock @ 120 to 200 J • Use maximum energy if uncertain • Increase the dose with each additional shock	• First shock @ 2 J/kg • Second shock @ 4 J/kg • Administer each additional shock @ 4 to 10 J/kg
EPINEPHRINE (M05.2)	
• 1 mg • Repeat every 3 to 5 minutes as required (q3-5min)	• 0.01 mg/kg (single max dose = 0.5 mg) • Repeat every 3 to 5 minutes as required (q3-5min)
AMIODARONE (M14) [11]	
• 300 mg • Repeat 150 mg once in 5 minutes	• 5 mg/kg (single max dose = 150 mg) • Repeat every 5 minutes up to 2 more times as required

APPENDIX B: POTENTIAL CAUSES OF CARDIAC ARREST *("H's & T's")*	
CAUSE	**MANAGEMENT**
Hypovolemia / hemorrhage	C07.1 - HYPOVOLEMIC & SEPTIC SHOCK
Hypoxia	Ensure patent airway & optimize oxygenation
Acidosis	Optimize oxygenation and high-quality compressions
Hyperkalemia	E11 - HYPERKALEMIA
Hypothermia	Prolonged efforts *may* be justified until warmed [10]
Tension pneumothorax	Decompression [4]
Cardiac tamponade	Possible *transient* benefit from fluid bolus
Overdose	M11 - NALXONE, M18 - SODIUM BICARBONATE
Myocardial infarction	E04 - ACUTE CORONARY SYNDROME & STEMI
Pulmonary embolism	Possible *transient* benefit from fluid bolus
Trauma	F02.2 - ADVANCED TRAUMA ARREST

APPENDIX C: HEART & STROKE ADULT CARDIAC ARREST ALGORITHM (ACLS)



CPR Quality

- Push hard (at least 2 inches [5 cm]) 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_{ETCO_2} is low or decreasing, reassess 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

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.
  or
  Lidocaine IV/IO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

Advanced Airway

- 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

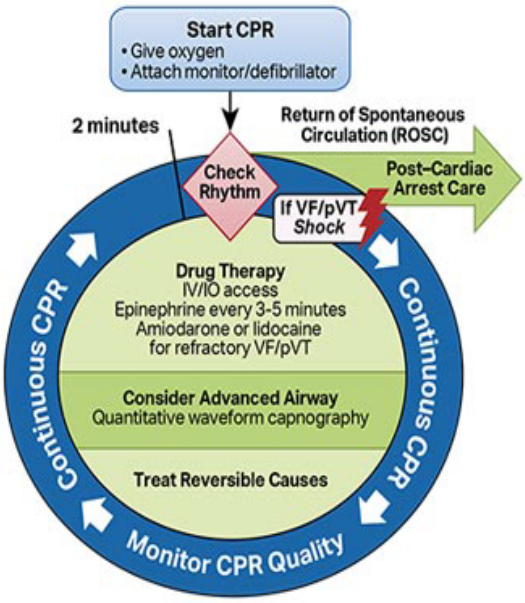
Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

APPENDIX D: HEART & STROKE ADULT CARDIAC ARREST CIRCULAR ALGORITHM (ACLS)



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APPENDIX E: HEART & STROKE PEDIATRIC CARDIAC ARREST ALGORITHM (PALS)