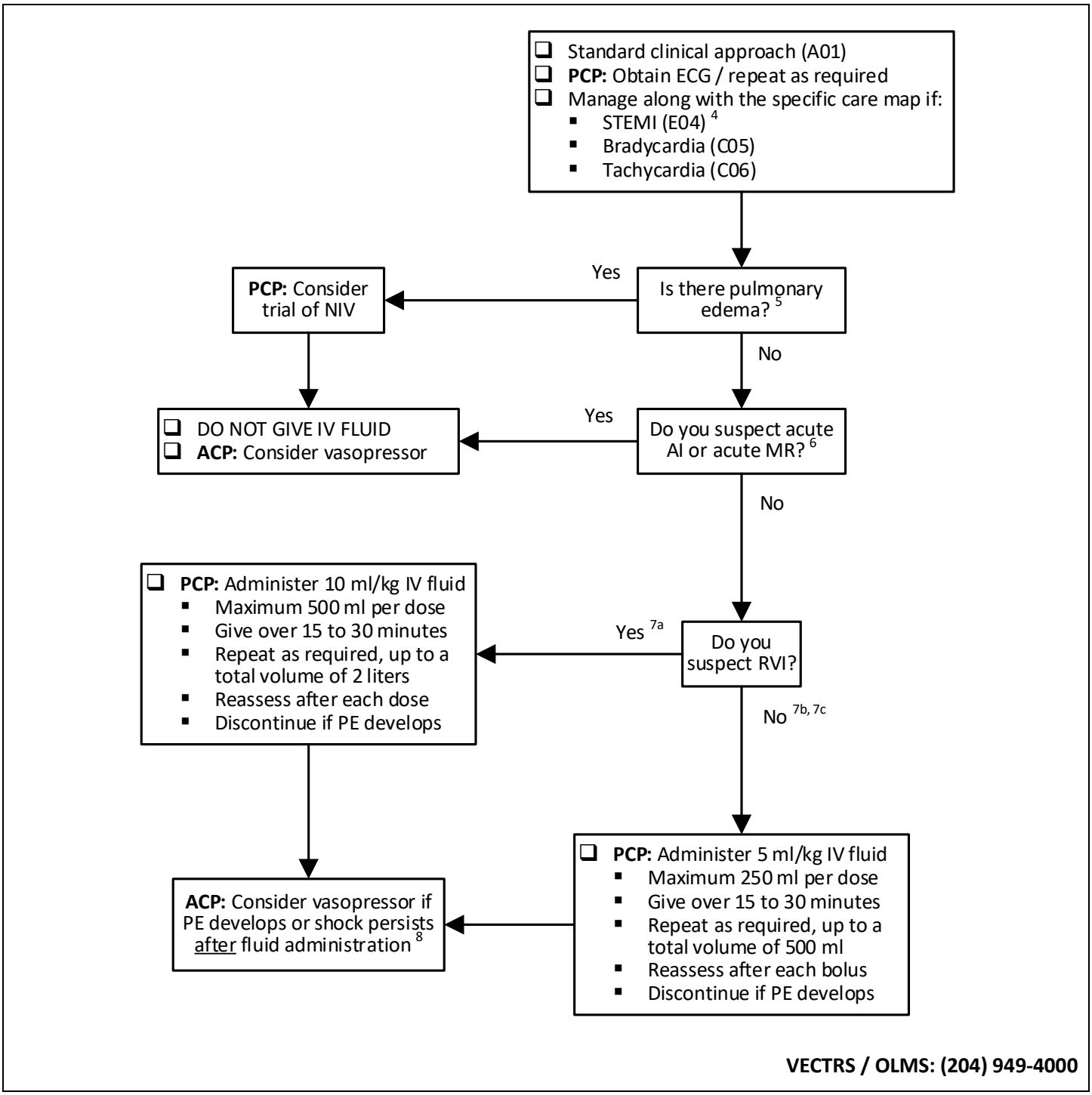
Shared health Soins communs Manitoba	C07.3 - CARDIOGENIC SHOCK (ADULT)	
	Version date: 2025-03-06	Effective Date: 2025-04-30 (07:00)
PCP = PCP - ACP	ICP = ICP & ACP	ACP = ACP only	None = EMR - ACP



INDICATIONS
• Hypotension, hypoperfusion, or shock due to a cardiac cause in an adult (18 years & older)

WARNINGS
• For cardiogenic shock in an infant, child, or adolescent refer to C07.4

NOTES

1. Cardiogenic shock is a life-threatening emergency with a mortality rate of more than 40 percent even with treatment. It is one of the most difficult conditions to manage in medicine. Treatment can be complex and prehospital options are limited. Establishing the specific cause is usually difficult without access to the advanced investigations available in hospital.

   Paramedics at all levels should have a very low threshold to call the Virtual Emergency Care & Transport Resource Service (VECTRS) early. On line medical support (OLMS) can provide advice and help expedite transport to the specialized cardiology services available at St. Boniface Hospital (SBH).

2. For paramedics, the goals include:
   a. maintaining a high index of suspicion for the diagnosis.
   b. improving coronary artery perfusion by the use of vasopressor support and, where possible, intravenous (IV) fluid administration.
   c. early recognition of ST-elevation myocardial infarction (STEMI) and prompt transport to SBH for emergent percutaneous coronary intervention (PCI).
3. The common causes of cardiogenic shock can be grouped into four categories: left ventricular systolic failure (LVSF), right ventricular ischemic dysfunction (RVID), valvular lesions, or unstable dysrhythmias (appendix A). The management of each is unique.
4. Cardiogenic shock develops in approximately 5 to 10 percent of cases of acute myocardial infarction (AMI) primarily due to pump failure. Potential mechanical complications such as ventricular rupture or acute mitral regurgitation (MR) from papillary muscle ischemia can also arise.
5. The addition of pulmonary edema (PE) adds another layer of complexity to management of cardiogenic shock. Preload reduction with diuretics and afterload reduction with nitrates, mainstays in the management of acute cardiogenic pulmonary edema (ACPE), are contraindicated by the presence of hypotension.

   Non-invasive ventilation (NIV) can be effective. A trial of bilevel positive airway pressure (BiPAP) or continuous positive airway pressure (CPAP) is indicated for the patient with respiratory failure. However, it should be used with caution in shock. The increase in intrathoracic pressure with the higher airway pressures may decrease venous return, reduce coronary perfusion pressure, depress cardiac output, and lead to hemodynamic collapse.
6. Acute valvular lesions like aortic insufficiency (AI) or mitral regurgitation (MR) usually present with ACPE in addition to cardiogenic shock. Preload and afterload reduction should not be used, and intravenous (IV) fluids will be poorly tolerated. CPAP and vasopressor support may be the only available options, prior to hospital. [8a]

7. Some causes of cardiogenic shock are preload dependent and the judicious administration of IV fluid may be helpful. However, this should not be done in the patient with ACPE, and should be immediately discontinued if the patient develops it.
    a. RVID accompanies up to 50 percent of inferior wall infarcts. It impairs the delivery of blood from the right to the left side of the heart. If the lungs are clear, boluses of IV fluid may be trialed to optimize right ventricular volume (preload) and improve left ventricular (LV) filling.
    b. Severe aortic stenosis (AS) is another such condition. If the lungs are clear, small boluses of IV fluid can be carefully attempted. Because AS can be complicated by AI and MR, any increase in LV volume may cause the fluid "backup" into the lungs.
    c. In AMI, LVSF may also be improved by augmenting preload with small boluses. However, as in AS, increased LV volume may put the patient into PE.
8. If IV fluid fails to improve cardiac output or is contraindicated, paramedics with the advanced (ACP) work scope should consider vasopressor support.
    a. In regurgitant conditions, such as aortic insufficiency, norepinephrine is the preferred agent as the beta-adrenergic mediated tachycardia results in shorter diastole which decreases the time for regurgitation to occur. Keep in mind that the tachycardia will increase cardiac oxygen demand, potentially exacerbating myocardial ischemia.
    b. Alternatively, in AS phenylephrine may be a better choice. It is less likely to increase the heart rate, so the resulting longer diastole may enhance LV filling.
9. The safest way to administer a vasopressor is by continuous infusion and this method should be used whenever and wherever possible. Vasopressor therapy should be titrated to ensure adequate organ perfusion and improvement in the patient's overall condition, not just the numerical value of the blood pressure (BP). Pay attention to clinical indicators such as level of consciousness, skin temperature, and capillary refill. Frequent reassessment is essential.
10. A mean arterial pressure (MAP) of less than 45 mmHg is insufficient to maintain adequate coronary artery perfusion. Emergent intervention is required to prevent hemodynamic collapse and cardiac arrest. But, setting up an infusion takes time.

    Push-dose vasopressors have been shown to be an effective *temporizing* measure for immediate BP control and, in the short term, can be safely administered through peripheral IV or intraosseous lines. Both epinephrine and phenylephrine have an onset of action of less than one minute.

LINKS

- A01 - Standard Clinical Approach
- C05 - Unstable Bradycardia
- C06 - Unstable Tachycardia
- E04 - Acute Coronary Syndrome & STEMI & NSTE-ACS
- M05 - Epinephrine
- M31 - Norepinephrine
- M32 - Phenylephrine

APPROVED BY	
	
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VERSION CHANGES (refer to X03 for change tracking)
• Inclusion of advanced work scope • Revised notes & flow chart for greater clarity & ease of use • Refined approach to fluid administration based on potential underlying cause

APPENDIX A: COMMON CAUSES OF CARDIOGENIC SHOCK

- Left ventricular systolic failure (LVSF)
  - Myocardial infarction
  - Cardiomyopathy
  - Myocarditis
  - Acute decompensated heart failure (ADHF)
  - Overdose (e.g. beta blocker, calcium channel blocker)
- Right ventricular ischemic dysfunction (RVID)
  - Inferior wall acute ST-elevation myocardial infarction (STEMI)
- Valvular lesions
  - Critical aortic stenosis
  - Acute aortic regurgitation
  - Acute mitral regurgitation
  - Congenital heart disease [1]
- Dysrhythmias
  - Tachycardia
  - Bradycardia