

# Pulmonary Edema Protocol

revised October 2008



---

---

## Preamble

Acute pulmonary edema is characterized by severe shortness of breath, an elevated jugular venous pressure, and crackles in both lungs. Common etiologies include ischemic heart disease, valvular heart disease, hypertension, and fluid overload.

## Requirements

1. Fully licensed Technician-Paramedic.
2. Certification in pulmonary edema protocol by the Medical Director.
3. Certification in intravenous cannulation protocol by the Medical Director.

## Indications

1. Patient with shortness of breath **and** crackles in both lungs
  - appendix 1 lists the signs suggesting pulmonary edema

## Contraindications

1. Systolic blood pressure less than 100 mm Hg.(for NTG and furosemide)
2. Known hypersensitivity to drug(s) being used
  - in this situation, the drug to which the patient is sensitive should be omitted
3. Use of sildenafil (Viagra<sup>™</sup>) in the past 24 hours, or tadalafil (Cialis<sup>™</sup>) in the past 72 hours. (for NTG)

## **Drug Doses and Frequencies**

1. nitroglycerine  
as nitrospray  
0.4 mg sublingually  
repeat q5minutes prn  
maximum of 3 doses  
hold if systolic blood pressure less than 100 mm Hg  
  
OR  
as nitroglycerine tablets  
0.3 mg sublingually  
repeat q5minutes prn  
maximum of 3 doses  
hold if systolic blood pressure less than 100 mm Hg
2. nitroglycerine patch (0.4 mg/hr)(if available)  
apply 5 minutes after 1<sup>st</sup> dose of NTG spray/tablets  
hold or remove if systolic blood pressure less than 100 mm Hg
3. furosemide  
40 mg IV bolus, repeat q15 minutes prn, maximum 160 mg  
If patient is taking a total daily dose greater than 40 mg:  
- dose equivalent to patient's total daily dose (maximum 160 mg)
4. salbutamol (Ventolin<sup>™</sup>)  
2.5mg (2.5ml premixed respiratory solution)

**Procedure**

1. Perform patient assessment and record vital signs, level of consciousness, and oxygen saturation.
2. Assess that patient meets criteria for this protocol.
3. Ensure there are no contraindications to use of this protocol.
4. Patient placed in semi-fowler's position, if no contraindication.
5. Administer supplemental oxygen by mask.
6. Establish an intravenous line.
7. Administer nitroglycerine.
8. Administer furosemide.
9. Administer salbutamol if severe bronchospasm.
10. Assess the patient, including vital signs, level of consciousness, oxygen saturation, and effect of treatment.
11. Initiate transport.
12. Repeat doses of medications if indicated.
13. Repeat assessment, including vital signs, level of consciousness, oxygen saturation, and effect of treatment after each drug dose.
14. If hypotension occurs, it should be managed based on the appropriate protocol. Do not administer any further medications if the patient is hypotensive.

Note: in the event of prolonged transport times, additional doses of nitroglycerine may be administered with orders via physician on-line medical control or by prior expressed written instructions from the Medical Director.

## **Documentation Requirements**

The following information must be documented on the patient care report form:

1. Patient's presenting signs and symptoms, including vital signs, level of consciousness and oxygen saturation.
2. History of cardiorespiratory symptoms, their severity, character, and other associated symptoms.
3. Indications for protocol use.
4. Dose, formulation, route, and time for each medication dose administered, and resulting clinical effects.
5. Repeat assessment, including vital signs, level of consciousness and oxygen saturation, as indicated.
6. Changes from baseline, if any, that occur during treatment or transport.
7. Signature and license number of Technician-Paramedic performing any transfer of function skills.

## **Certification Requirements**

1. Attend in-depth classes and lectures on pulmonary edema, including anatomy, physiology, and pathophysiology of the cardiorespiratory system.
2. Demonstrate an understanding of the pharmacology, mechanism of action, and potential side effects of furosemide and nitroglycerine.
3. Pass a written examination.
4. Certification is by the Medical Director.

### **Recertification Requirements**

1. Review class and recertification is done every 12 months.
2. A record will be kept to document all cases where this protocol is used.

### **Decertification**

1. Decertification is at the discretion of the Medical Director or the Provincial Medical Director, Emergency Medical Services, Manitoba Health & Healthy Living

### **Quality Assurance Requirements**

1. Appropriate quality assurance policies must be in place. The Medical Director or designate must review all instances where this protocol is used. As a minimum, the following must be assessed:
  - i) appropriateness of implementation
  - ii) adherence to protocol
  - iii) any deviation from the protocol
  - iv) corrective measures taken, if indicated
2. Yearly statistics for protocol use compiled and forwarded to Emergency Medical Services, Manitoba Health & Healthy Living.

**Appendix 1**

Possible signs and symptoms of pulmonary edema.

1. Shortness of breath
2. Crackles in lung bases
3. Apprehension
4. Hypertension (hypotension may be present)
5. Tachycardia
6. Elevated jugular venous pressure
7. Pink frothy sputum
8. Cyanosis