



CHF / Pulmonary Edema



History

- Congestive heart failure
- Past medical history
- Medications (digoxin, Lasix, Viagra / sildenafil, Levitra / vardenafil, Cialis / tadalafil)
- Cardiac history --past myocardial infarction

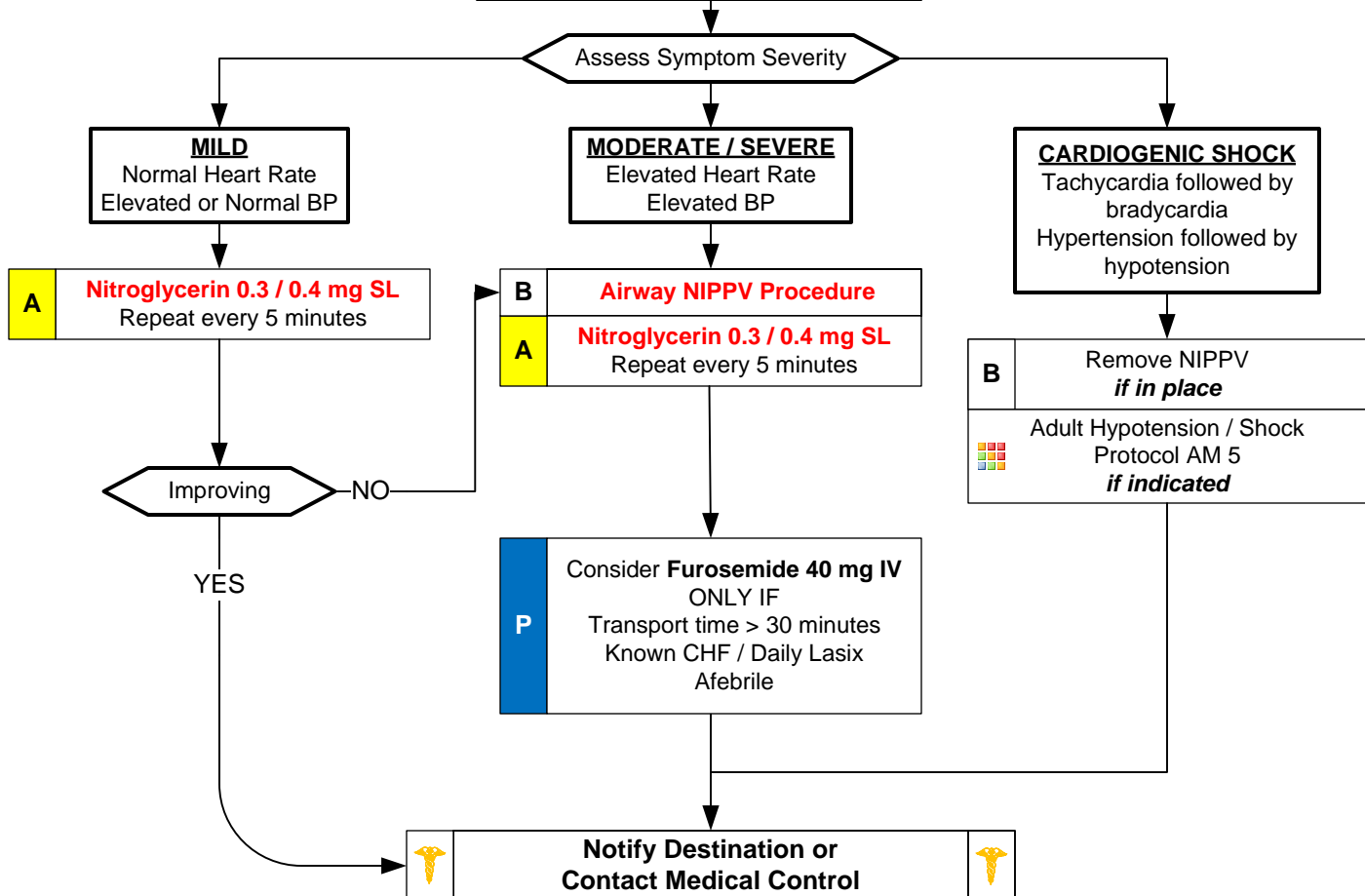
Signs and Symptoms

- Respiratory distress, bilateral rales
- Apprehension, orthopnea
- Jugular vein distention
- Pink, frothy sputum
- Peripheral edema, diaphoresis
- Hypotension, shock
- Chest pain

Differential

- Myocardial infarction
- Congestive heart failure
- Asthma
- Anaphylaxis
- Aspiration
- COPD
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pericardial tamponade
- Toxic Exposure

| | |
|--|--|
| Airway Protocol(s) AR 1, 2, 3 as indicated | |
| Chest Pain and STEMI Protocol AC 4 if indicated | |
| B | 12 Lead ECG Procedure |
| | Nitroglycerin 0.3 / 0.4 mg Sublingual Repeat every 5 minutes x 3 if prescribed to patient and (BP >100) |
| P | Cardiac Monitor |
| IV / IO Protocol UP 6 | |





CHF / Pulmonary Edema



Acute decompensated heart failure:

- Patients either have heart failure with preserved ejection fraction or heart failure with reduced ejection fraction.
- Normal ejection fraction, or the amount of blood the heart squeezes forward with each beat, is about 55%.

Ejection Fraction:

- Patients who are known to have heart failure may know their ejection fraction – ask the patient if they know.
- Heart failure with preserved ejection fraction typically have an ejection fraction of $\geq 41\%$.
- Heart failure with reduced ejection fraction have an ejection fraction of $\leq 40\%$.

Systolic compared to diastolic dysfunction:

- Another way to think about heart failure is systolic or diastolic dysfunction.
- Systolic dysfunction is due to a weak and thin ventricular myocardium where diastolic dysfunction is due to thickened and stiff myocardium.
- The heart is unable to squeeze blood effectively with systolic dysfunction. In diastolic dysfunction the heart is not able to fill effectively because the myocardium does not relax and the myocardium is enlarged or thickened and decreases the volume of the heart. It will be difficult to know the patient's underlying pathophysiology because both circumstances produce similar sign and symptoms.

Main therapy considerations:

- Airway, oxygenation, and ventilation are most important. NIPPV therapy should be initiated early.
- 12 Lead ECG is important to acquire early. If patient is experiencing a STEMI, follow the Triage and Destination Protocol for STEMI care.

Therapy related to Systolic Blood Pressure:

Normotensive to Hypertensive:

- Oxygen
- NIPPV
- NTG SL every 5 minutes as needed. ALS may continue NTG with no limit with SBP ≥ 100 mmHg. This effectively provides a NTG drip.

Hypotensive:

- The patient with CHF / Pulmonary edema and hypotension is difficult to treat.
- When the SBP is ≤ 90 mmHg give 1 – 2 doses of Normal Saline at 250 mL each. If the patient responds they are likely volume depleted from an intravascular perspective, even though they may have peripheral edema and pulmonary edema.
- If responsive to fluid, continue to give 250 mL boluses to maintain SBP ≥ 90 mmHg. Frequent reassessments of lung sounds are important to ensure you are not worsening the respiratory status.
- If the SBP ≤ 90 mmHg after fluid boluses, or initially responsive, and now unresponsive to fluid boluses, add **Norepinephrine (Levophed)** at **0.5 mcg/kg/min** and titrate to a SBP of ≥ 90 mmHg or MAP of 65 mmHg.

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care**
- **Diuretics (furosemide) and opioids have NOT been shown to improve the outcomes of EMS patients with pulmonary edema. Even though this historically has been a mainstay of EMS treatment, it is no longer routinely recommended.**
- **Nitroglycerin:**
 - **Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 36 hours due to potential severe hypotension.**
 - **Nitroglycerin may cause hypotension during any type myocardial infarction. It is NOT more likely to cause hypotension in an inferior MI and should NOT be avoided unless already hypotensive.**
- **Document the time of the 12-Lead ECG in the PCR as a Procedure along with the interpretation (Paramedic).**
- **Consider myocardial infarction in all these patients. Diabetics, geriatric and female patients often have atypical pain, or only generalized complaints.**
- **Cardiac related symptoms in men and women:**
 - **Pressure, squeezing, fullness, or pain in the chest.**
 - **Pain or discomfort in one or both arms, the back, neck, jaw, or stomach.**
 - **Shortness of breath with or without chest pain.**
 - **Sweating, nausea, weakness, and/or lightheadedness.**
 - **Women, diabetic patients, and the elderly often experience only weakness, shortness of breath, nausea/vomiting, and back or jaw pain.**
- **If patient has taken nitroglycerin without relief, consider potency of the medication.**
- **Contraindications to opioids include severe COPD and respiratory distress. Monitor the patient closely.**
- **Monitor for hypotension after administration of nitroglycerin and opioids.**
- **Allow the patient to be in their position of comfort to maximize their breathing effort.**
- **EMT may administer Nitroglycerin to patients already prescribed medication. May give from EMS supply.**
- **Agency medical director may require Contact of Medical Control.**