Protocol
2-3

SECTION: Adult Cardiovascular Emergencies

PROTOCOL TITLE: Medical – Pulmonary Edema/CHF

REVISED: 06/2017

HEART FAILURE

OVERVIEW:
Heart failure is generally divided into left ventricular failure and right ventricular failure. Left ventricular heart failure is the inability of the left ventricle to adequately move blood into the systemic circulation. In left ventricular failure, an imbalance in the output of the two sides of the heart occurs. The left ventricle is unable to move all the blood delivered to it from the right side of the heart. Left ventricular followed by left atrial pressure rises and is transmitted back to the pulmonary circulation. When the pressure in the pulmonary vessels becomes too high, blood serum is forced into the alveoli, resulting in pulmonary edema. In right ventricular heart failure the right side of the heart fails to function as an adequate pump, which leads to back pressure which leads to back pressure into the venous circulation. This is most commonly caused by left heart failure, which subsequently progresses to right heart failure. The patient's symptoms should assist in determining left versus right heart failure, or both. Signs of left sided heart failure include rales / crackles, tachypnea while right-sided failure will create JVD, ascites, and peripheral edema. The management goal of patients with HF involves decreasing cardiac workload by reducing both preload and afterload.

HPI	Signs and Symptoms	Considerations
• Congestive heart failure • Past medical history • Medications (digoxin, lasix, Bumex) ▪ Erectile dysfunction meds: Cialis® (Tadalafil), Viagra® ▪ (Sildenafil), Levitra® (Vardenafil HCl) • Cardiac history • Myocardial infarction	• Respiratory distress, rales • Apprehension, orthopnea • Jugular vein distention • Pink, frothy sputum • Peripheral pitting edema • Diaphoresis • Tripod positioning • Inability to speak in full sentences • Accessory muscle usage with respiration • Hypotension, shock • Chest pain	• Myocardial Infarction • Asthma • Anaphylaxis • Aspiration • COPD • Pleural effusion • Pneumonia • Pulmonary Embolus • Pericardial Tamponade

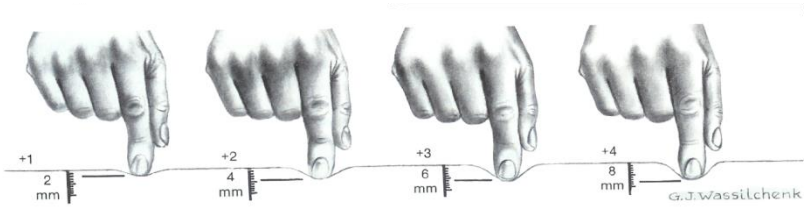
Pulmonary edema with SBP greater than or equal to100 mmHg
If SBP less than 100 mmHg, see *Cardiogenic **SHOCK** protocol*.

Protocol 2-3 Continued

HEART FAILURE

	EMR	EMT	A	I	P
1. Perform general patient management.	•	•	•	•	•
2. Support life-threatening problems.	•	•	•	•	•
3. Administer oxygen to maintain *SPO$_2$* 94 - 99%	•	•	•	•	•
4. *CPAP* is the preferred airway management over endotracheal intubation. Consider intubation for severe respiratory distress / pending respiratory failure.				•	•
5. Transport the patient immediately positioned in an upright position.		•	•	•	•
6. Monitor *pulse oximetry*.	•	•	•	•	•
7. Place patient on cardiac monitor and obtain/interpret *12 lead ECG.*				•	•
8. Establish an IV / lock of normal saline at KVO.				•	•
9. Give *NITROGLYCERIN.*					
a. SBP greater than 180: Give *NITROGLYCERIN,* 2 tablets, 0.4 mg SL and 2 inches of Nitropaste 2%. If respiratory distress persists *and* SPB greater than 180 *and* HR greater than or equal to 60 bpm, repeat nitroglycerin, 1 tablets SL every 5 minutes.				•	•
b. SBP 100 – 180: Give NITROGLYCERIN, 1 tablet, 0.4 mg SL and 1 inch of Nitropaste 2%. If respiratory distress persists *and* SPB greater than or equal to 100 mmHg *and* HR greater than or equal to 60 bpm, repeat nitroglycerin, 1 tablet SL every 5 minutes.				•	•
10. If available, administer CPAP with 5 - 10 cmH_20 PEEP. If no CPAP available, continue with next step.		•	•	•	•
11. If obvious pulmonary edema noted on exam, consider *LASIX* 0.5 – 1.0 mg / kg slow IVP, if systolic BP > 90 mmHg.				•	•
12. If wheez*ing is present, consider bronchodilator therapy, ALBUTEROL* 5.0 mg and *ATROVENT* 0.5 mg via nebulizer with 6 - 8 liters of Oxygen. Treatment should only be administered ONCE.				•	•
13. Consider *FENTANYL* titrated to pain relief at 1 mcg / kg IV/IM, not to exceed 50 mcg per single dose. May repeat every 10 minutes.				•	•
14. Transport and perform ongoing assessment as indicated.		•	•	•	•

Assessment of Edema			
+1	Slight pitting, disappears rapidly (2 mm)	+2	Deeper pit, disappears in 10 - 15 seconds (4 mm)
+3	Pit is noticeably deep and may last more than a minute. The extremity is fuller and swollen (6 mm)	+4	The pit is very deep, lasts 2 - 5 minutes, and the extremity is grossly distorted (8 mm)



PEARLS:

1. The possibility of myocardial infarction should be assessed in all patients presenting with HF.
2. If the patient is currently taking daily diuretics, double the patient's normal prescribed dose.
3. In left ventricular failure, the apical pulse is usually displaced laterally and downward. There may additionally be a paradoxically split S_2 / S_3 gallop.
4. In right ventricular failure, S_3 is often heard with a holosystolic murmur of tricuspid regurgitation.
5. Advise the receiving facility of CPAP initiation early so they can have CPAP ready on arrival.
6. Upon arrival at hospital, advocate for patient to remain on CPAP and do not remove CPAP until hospital equivalent respiratory therapy is ready to be placed on patient.

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