Acute Decompensated Heart Failure: An Emergency Department Pathway

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ADHF: An ED Pathway

Why Develop This Pathway?
- No HF pathway was available
- Assessment was not standardized
- Provide education for the House Staff
ADHF: An ED Pathway

Assessment of a HF patient

Does the patient have signs/symptoms of volume overload?:
- DOE/SOB
- Orthopnea/PND
- Elevated JVP
- Gallop (S3)
- Rales
- Pulmonary Congestion
- Hepatomegaly
- Ascites
- Weight Gain
- Edema

Does the patient have signs/symptoms of decreased cardiac output/perfusion?:
- Perioral Cyanosis
- Nail Bed Cyanosis
- Cool Extremities
- Altered Mental Status
- Fatigue
- Pre Renal Azotemia
- Decreased Urine Output
- Narrow Pulse Pressure
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Based upon the Stevenson Classification, patients are:

1. Warm and Dry (adequate perfusion and euvolemic)
2. Dry and Cool (volume depleted and inadequate perfusion)
3. Wet and Cool (volume overloaded and inadequate perfusion)
4. Wet and Warm (volume overloaded and adequate perfusion)
**ADHF: Dry and Cool**

### ADHF Pathway Cardiac Assessment

**Does the patient have signs/symptoms of volume overload?:**
- DOE/SOB
- Orthopnea/PND
- Elevated JVP
- Gallop ($S3$)
- Rales
- Pulmonary Congestion
- Hepatomegaly
- Ascites
- Weight Gain
- Edema

**Does the patient have signs/symptoms of decreased cardiac output/perfusion?:**
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- Cool Extremities
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- Fatigue
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- Narrow Pulse Pressure

**Laboratory Orders**
- ADHF Panel
- ABG
- TSH

**Imaging Orders**
- CXR (2 View) PA and Lateral
- CXR Portable Stat

**Continue home medication as clinically indicated**
**otherwise follow pathway**
**Medications**

**Based upon your assessment what is the fluid and cardiac status?:**
- **Dry and Cool**
  - (Volume depleted and signs/symptoms of inadequate perfusion)
- **Wet and Cool**
  - (volume overloaded and signs/symptoms of inadequate perfusion)
- **Wet and Warm**
  - (volume overloaded and signs/symptoms of adequate perfusion)
Dry and Cool: Volume Depleted and Signs/Symptoms of Inadequate Perfusion

Assumed by careful history and examination to be secondary to volume depletion/dehydration
Click here to continue

Assumed to be secondary to progression of heart failure
Click here to continue
Dry and Cool: Assumed By Careful History and Examination To Be Secondary To Volume Depletion/Dehydration

- NS 500cc Bolus order (Remember to immediately sign orders)

  - Is there improvement?
    - YES
    - NO

  YES

  **Discharge**
  - Review/Adjust meds
  - Encourage fluids
  - Click here for discharge questions

  NO

  **Pump Failure**
  - ICU Admission (order)
  - Consider positive inotropes/vasopressor therapy
  - Dobutamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
  - Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
  - Consider hemodynamic measurements

**Does the patient have follow up in 1 to 2 weeks?**
- Click to place Congestive Heart Failure Evaluation

**Are the meds optimized?**
- Medications Menu

**Assessment of function**
- NYHA Class I: Symptoms of HF only at activity levels that would limit normal individuals
- NYHA Class II: Symptoms of HF with ordinary exertion
- NYHA Class III: Symptoms of HF with less than ordinary exertion
- NYHA Class IV: Symptoms of HF at rest
Dry and Cool:
Assumed By Careful History and Examination To Be Secondary To Progression of Heart Failure

Pump Failure

ICU Admission (order)
Consider positive inotropes/vasopressor therapy
Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
Consider hemodynamic measurements
ADHF: Warm and Cool

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- Edema

Does the patient have signs/symptoms of decreased cardiac output/perfusion?:
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Continue home medication as clinically indicated
otherwise follow pathway

Based upon your assessment what is the fluid and cardiac status?:
- Dry and Cool
  (Volume depleted and signs/symptoms of inadequate perfusion)
- Wet and Cool
  (Volume overloaded and signs/symptoms of inadequate perfusion)
- Wet and Warm
  (Volume overloaded and signs/symptoms of adequate perfusion)
Wet and Cool: Volume Overloaded and Signs/Symptoms of Inadequate Perfusion

Is the patient’s SBP > 90mmHg

- YES
- NO

NO

YES

ICU Admission (order)
Consider positive inotropes/vasopressor therapy
Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
Consider hemodynamic measurements

How do you characterize the patient’s volume status?

- Mild/Moderate Overload
- Severe Overload
Wet and Cool: Severely Overloaded

[Remember to immediately sign orders]
CPAP Respiratory Consult
High Flow Oxygen (be careful with COPD patients)
Morphine 2MG IVP
Furosemide 40MG IVP ONCE
Furosemide DRIP 0.05MG/KG/HR IV

30 Minute Response:
- Oxygen sats improve?
- Diuresis > 250cc?
  - Yes
  - No

[Remember to immediately sign orders]
Furosemide DRIP 0.1MG/KG/HR IV
Nitroglycerin DRIP 10MCG/MIN IV

Is the SBP >150mmHg?
- YES
- NO

[Remember to immediately sign orders]
Nitroglycerin DRIP 20MCG/MIN IV

Is the patient’s SBP>150mmHg?
- YES
- NO

[Remember to immediately sign orders]
Enalaprilat 0.625MG IVP 8 ONCE
Or
Hydralazine 10MG IVP Q6H
Hydralazine 20MG IVP Q6H
Tritate to SBP<150mmHg

30 Minute Response:
- Oxygen sats improve?
- Diuresis > 250cc?
  - YES
  - NO

MEDICATION ORDER
(Remember to immediately sign orders)
D/C NTG gt
Furosemide DRIP 0.2MG/KG/HR IV
Sodium Nitroprusside 0.1MCG/KG/MIN IV
Or
Nesiritide 2MCG/KG BOLUS IV

ICU Admision (order)
Consider positive inotropes/vasopressor therapy
Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
Consider hemodynamic measurements
Wet and Cool: Mildly/Moderately Overloaded

30 Minute Response:
- Oxygen Sats Improve?
- Diuresis > 250cc?
  - YES
  - NO

30 Minute Response:
- Oxygen Sats Improve?
- Diuresis > 250cc?
  - YES
  - NO

30 Minute Response:
- Oxygen Sats Improve?
- Diuresis > 250cc?
  - YES
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Does the patient have follow up in 1 to 2 weeks?
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Are the meds optimized?
- Medications Menu

Assessment of function
- NYHA Class I: Symptoms of HF only at activity levels that would limit normal individuals
- NYHA Class II: Symptoms of HF with ordinary exertion
- NYHA Class III: Symptoms of HF with less than ordinary exertion
- NYHA Class IV: Symptoms of HF at rest

Admit to ICU vs Tele
- Address underlying causes

(Remember to immediately sign orders)
Furosemide 40MG IVP ONCE
Furosemide DRIP 0.05MG/KG/HR IV
Nitroglycerin DRIP 10MCG/MIN IV

ICU Admission (order)
- Consider positive inotropes/vasopressor therapy
- Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
- Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
- Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
- Consider hemodynamic measurements

Medication Orders
- D/C NTG gtt
- Furosemide DRIP 0.2MG/KG/HR IV
- Sodium Nitroprusside 0.1MCG/KG/MIN IV
- Or
- Nesiritide 2MCG/KG BOLUS IV

(Tritrate to SBP<150mmHg)

30 Minute Response:
- Oxygen sats improve?
- Diuresis > 250cc?
  - YES
  - NO

30 Minute Response:
- Oxygen sats improve?
- Diuresis > 250cc?
  - YES
  - NO
**ADHF: Wet and Warm**

### Does the patient have signs/symptoms of volume overload?
- DOE/SOB
- Orthopnea/PND
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- Rales
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### Laboratory Orders
- ADHF Panel
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### Imaging Orders
- CXR (2 View) PA and Lateral
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Continue home medication as clinically indicated otherwise follow pathway

**Medications**

### Based upon your assessment what is the fluid and cardiac status?
- **Dry and Cool**
  - (Volume depleted and signs/symptoms of inadequate perfusion)

- **Wet and Cool**
  - (Volume overloaded and signs/symptoms of inadequate perfusion)

- **Wet and Warm**
  - (Volume overloaded and signs/symptoms of adequate perfusion)
Wet and Warm: Severely Overloaded

[Remember to immediately sign orders]
CPAP Respiratory Consult
High Flow Oxygen (be careful with COPD patients)
Morphine 2MG IVP
Furosemide 40MG IVP ONCE
Furosemide DRIP 0.05MG/KG/HR IV

30 Minute Response:
Oxygen sats improve?
Diuresis > 250cc?

[Remember to immediately sign orders]
Furosemide DRIP 0.1MG/KG/HR IV
Nitroglycerin DRIP 10MG/MIN IV

Medication Order
Is the SBP >150mmHg?
YES
NO

Tritrate to SBP<150mmHg
Enalaprilat 0.625MG IVP8 ONCE
Or
Hydralazine 10MG IVP Q6H
Hydralazine 20MG IVP Q6H

[Remember to immediately sign orders]
Nitroglycerin DRIP 20MG/MIN IV

Is the patient’s SBP>150mmHg?
YES
NO

[Remember to immediately sign orders]
ICU Addmission (order)
Consider positive inotropes/vasopressor therapy
Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
Consider hemodynamic measurements

30 Minute Response:
Oxygen sats improve?
Diuresis > 250cc?

YES
NO

30 Minute Response:
Oxygen sats improve?
Diuresis > 250cc

YES
NO

NO

NO

YES

NO
Wet and Warm: Mildly/Moderately Overloaded

30 Minute Response:
- Oxygen Sats Improve?
  - YES
  - NO
- Diuresis > 250cc?
  - YES
  - NO

Does the patient have follow up in 1 to 2 weeks?
- YES
- NO

Assessment of function
- NYHA Class I: Symptoms of HF only at activity levels that would limit normal individuals
- NYHA Class II: Symptoms of HF with ordinary exertion
- NYHA Class III: Symptoms of HF with less than ordinary exertion
- NYHA Class IV: Symptoms of HF at rest

Admit to ICU vs Tele
Address underlying causes
- YES
- NO

ICU Admission (order)
- Consider positive inotropes/vasopressor therapy
- Dopamine premix 400MG in D5W 250ML 5MCG/KG/MIN IV
- Dobutamine premix 500MG in D5W 250ML 2MCG/KG/MIN IV
- Milrinone premix 20MG in D5W 100ML 0.1MCG/KG/MIN IV
- Consider hemodynamic measurements

30 Minute Response:
- Oxygen Sats Improve?
  - YES
  - NO
- Diuresis > 250cc?
  - YES
  - NO

(Remember to immediately sign orders)
- Furosemide 40MG IVP ONCE
- Furosemide DRIP 0.05MG/KG/HR IV

(Remember to immediately sign orders)
- Furosemide DRIP 0.1MG/KG/HR IV
- Nitroglycerin DRIP 10MCG/MIN IV

(Remember to immediately sign orders)
- Nitroglycerin DRIP 20MCG/MIN IV

Is the patient’s SBP > 150mmHg?
- YES
- NO

(Remember to immediately sign orders)
- Enalaprilat 0.625MG IVPB ONCE
  - Or
  - Hydralazine 10MG IVP Q6H
  - Hydralazine 20MG IVP Q6H

- Titrate to SBP < 150mmHg

(Remember to immediately sign orders)
- D/C NTG gtt
- Furosemide DRIP 0.2MG/KG/HR IV
- Sodium Nitroprusside 0.1MCG/KG/MIN IV
  - Or
  - Nesiritide 2MCG/KG BOLUS IV

Medication Orders

30 Minute Response:
- Oxygen sats improve?
  - YES
  - NO
- Diuresis > 250cc?
  - YES
  - NO

(NO)
ADHF: An ED Pathway

Hospital to Home:
1. Discharge follow up
2. Medication review
3. Do patients know when to call?
4. Assessment of function
Hospital to Home

1. Discharge Follow Up
   - A formal HF consult will be placed in CPRS, to schedule the patient in a Fast Track HF clinic within 1-2 weeks
Hospital to Home

2. Medication Review
- This is performed when the pathway is first initiated and, if the patient is stable to go home, at the time of discharge
3. Do patient’s know when to call?
- At the time of discharge, patients will be given a HF handbook, providing them with instructions on what foods to avoid, the importance of daily weights, and to call their PCP or cardiologist if their weight increases by more than 3-5lbs.

- The ED Discharge Instructions also instruct contacting a physician if they develop SOB, lower extremity swelling, weight gain or chest pain
4. Assessment of function:
   - In the assessment section of the 1010M template, there is an assessment of function based upon the NYHA Class I to IV
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References:


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