Heart Failure Readmissions: The Challenge

Ravi Ramani, MD
Assistant Professor of Medicine
Director, UPMC Integrated Heart Failure Program
So How Come Ms. Smith Is Back, Again???

She's Back!

Patient Factors

Physician Factors

Disease Specific

BAC Factors

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• Pt discharged after having CV surgery. Lasix dose was decreased and ACE withheld due to increased creatinine. Presented 8 days later with 13lb weight gain, SOB. Dx: CHF.

• Pt treated for CHF and PNA. Remote monitoring reports 11 lbs weight gain in 4 days. PCP contacted, says to ask cardiologist. Cardiologist out of country. PCP contacted again, but it’s the weekend. Patient admitted Sunday night.

• Pt w/ hx of ETOH/drug abuse treated for CHF & ARF. Dietician documented pt refusing diet education. To followup with PCP in 7 days. Returned 5 days later in resp distress, chest pain, and lactic acidosis.

• Pt discharge after treatment for CHF, hyposmolality, & UTI. Returned 4 days later with hospital-acquired PNA.

• Pt discharged after treatment for CHF. Presented 7 days later with AMS and dehydration associated with over diuresis.
Disease Factors

• Heart Failure “brittleness”
• Stage of Heart Failure
• Comorbid conditions
  – Renal function
  – Anemia
  – Ischemia
  – COPD
  – BP, both high and low
Patient Factors

• Medication and diet compliance
• Social situation
• Economic situation
• Patient understanding and engagement
BAC Factors

- Seasonal variation
- Regional variation
Physician Factors

- Inadequate diuresis while in house
- Incorrect post discharge diuretics
- Poor handoff
- Inappropriate or duplicate medications
- Inability to handle exacerbation in a timely manner
- Lack of consultation
Why Do HF Patients Get Admitted?

- **Volume Overload:**
  - Any dyspnea: 89%
  - Pulmonary vascular congestion: 74%
  - Rales: 67%
  - Edema: 65%

- **Other causes:**
  - Pneumonia: 5%
  - Renal Failure: 5%
  - Other septicemia: 4%
So: How Do We Treat Acute HF?
How Do We Really Treat Acute HF?

• At the time of discharge:
  – 50% of patients lose less than 5 lbs
  – 20% lose no weight at all
  – 5% gain weight

• UPMC Data (smaller cohort) is very similar

• 50% of discharged patients wait > 10 days to see a provider
  – Rates higher in minorities

• UPMC Discharge Instructions for HF is >90%
  – Does this really mean that the patient gets it?
Principles of Management: Live long and, err, breathe well...
Living Long

- Reducing Progression: Neurohormonal interventions
- Prevention of Complications: Stroke and arrhythmias
Breathing Better

• Hemodynamic interventions
  – Diuretics
  – Positive inotropic agents
Breathing Better

Fix the pump
Make ‘em pee
A condition in which the heart either cannot maintain adequate systemic perfusion, or can do so only at the expense of increased filling pressures.
Breathing Better

• With hemodynamic interventions
  – Diuretics
  – Digoxin
  – Positive inotropic agents
  – Mechanical interventions that improve hemodynamics (e.g., CRT, MCS, Transplant)
Compensatory Mechanisms: Frank-Starling Law

Forrester Hemodynamic Subsets

- Normal LV
- Mild LVD
- Severe LVD

Cardiac Index

Maximal

Normal Resting

Resting Symptoms

Low-Output Symptoms

Normal Resting 2.2

18 Pulmonary Edema Congestive Symptoms

Left Ventricular End-Diastolic Pressure

Adapted from Alan T. Kono, DHMC Update 2005
Forrester Hemodynamic Subsets

Cardiac Index

2.2

I
WARM DRY

II
WARM WET

III
COLD DRY

IV
COLD WET

Left Ventricular End-Diastolic Pressure

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<table>
<thead>
<tr>
<th>WARM DRY</th>
<th>WARM WET</th>
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<tbody>
<tr>
<td>BP: WNL</td>
<td>BP: WNL/↑</td>
</tr>
<tr>
<td>JVP: &lt; 5cm</td>
<td>JVP: &gt; 5cm</td>
</tr>
<tr>
<td>Lungs: Clear</td>
<td>Lungs: Crackles</td>
</tr>
<tr>
<td>Extremities: No/trace edema</td>
<td>Extremities: ++ edema</td>
</tr>
<tr>
<td>Creatinine: Near normal</td>
<td>Creatinine: Near normal</td>
</tr>
<tr>
<td>CO: Normal</td>
<td>CO: Normal</td>
</tr>
<tr>
<td>Filling pressures: Normal</td>
<td>Filling Pressures: High</td>
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</tbody>
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<table>
<thead>
<tr>
<th>COLD DRY</th>
<th>COLD WET</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP: Low</td>
<td>BP: Low</td>
</tr>
<tr>
<td>JVP: &lt; &gt; 5cm</td>
<td>JVP: &gt;&gt; 5cm</td>
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<tr>
<td>Lungs: Minimal crackles</td>
<td>Lungs: ++ Crackles</td>
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<tr>
<td>Extremities: No/trace edema</td>
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<td>Creatinine: Increased</td>
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<tr>
<td>CO: Low</td>
<td>CO: Low</td>
</tr>
<tr>
<td>Filling Pressures: ←→</td>
<td>Filling Pressures: High</td>
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</tbody>
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Breathing Better: Diuretics

- Distal convoluted tubule
  - Thiazides (HCTZ)

- Proximal convoluted tubule
  - Acetazolamide

- Ascending (thick) loop of Henle
  - Furosemide

- Collecting duct
  - K+-sparing

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Patients with HF admitted with evidence of significant fluid overload should be promptly treated with intravenous loop diuretics to reduce morbidity.

If patients are already receiving loop diuretic therapy, the initial intravenous dose should equal or exceed their chronic oral daily dose and should be given as either intermittent boluses or continuous infusion.

When diuresis is inadequate to relieve symptoms, it is reasonable to intensify the diuretic regimen using either:

a. higher doses of intravenous loop diuretics.

b. addition of a second (e.g., thiazide) diuretic.
Breathing Better: Inotropes

![Graph showing the relationship between filling pressure and cardiac output with inotropes](image-url)
Inotropic Agents: Palliation or Bridge

- Signs of severely decreased cardiac output
  - Hypotension
  - Increasing renal insufficiency
  - Mental status changes/ severe fatigue

- Signs of refractory volume overload
  - Lung congestion
  - Peripheral edema
  - JVP
Inotropes: Classes

• Direct beta-agonists:
  – Dobutamine
  – Epinephrine

• Phosphodiesterase Inhibitors:
  – Milrinone
Complications of Inotropes

- Hypotension
- Sinus tachycardia
- Atrial Fibrillation
- Ventricular ectopy/ tachycardia
- Worsening ischemia
- Death: All agents increase mortality
Inpatient Therapy: Principles

- Treat the hemodynamic issue first
- Treat to completeness
- Increase in creatinine (50%) is OK in most circumstances
- SBP of 90 mmHg is acceptable unless the patient is symptomatic or the decrease in BP is drastic
Discharge Criteria

- Exacerbating factors addressed
- Optimal volume status achieved
- Stability on discharge medications
- Patient education complete
- Post discharge plan in place