Current Dilemmas in Heart Failure: 
Closing the Gap between Clinical Care and Coding

Juan M. Aranda, Jr. MD FACC FHFS
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation
Interim Vice Chair for Clinical Affairs
Department of Medicine, University of Florida

Case (Coding Nightmare)

- 69-year-old man with history of heart failure and recent diagnosis of COPD codes to ER with one week history of cough, SOB, and leg edema. Took extra dose of COPD inhalers and extra Lasix with no result.
- In ER, BP 90/60, HR 100, evidence of fluid overload, crackles and wheezes.
- Labs: WBC 11,000, Creatinine 1.7, Na 135
- Diagnosis: HF decompensation secondary to COPD, R/O pneumonia
- Treatment: IV Lasix, IV antibiotic, IV steroid for COPD
  What do you code?
In 1785, Sir William Withering believed that *digitalis purpurea* had a diuretic effect in patients with a weak and irregular pulse who had edema.

“...When edema is gross and fails to respond...Southey’s tubes constitute a cleaner way of removing fluid...”

Paul Wood. Heart failure. In Diseases of the heart and circulation. 1957;311

**Definition of Heart Failure (HF)**

- “Heart Failure is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood.” ACCF/AHA Guidelines
- The cardinal manifestations are
  - Dyspnea and fatigue
  - Fluid retention
- “Congestive” Heart Failure
  - Acute or chronic HF with evidence of sodium and water retention
  - No longer a preferred term
Heart Failure Syndrome

- Symptoms are non-discriminating
- Signs result from retention of sodium and water, which then may be absent in patients on treatment (diuretics, etc.)
  - Or caused by non-cardiac conditions (renal failure, volume overload, pulmonary disease)
  - Or may have multiple etiologies

>> Identifying the underlying cardiac cause is central to the diagnosis

Why Is Heart Failure Important in the US?

6.0 million Americans with HF (2.8% of adult US population) – NHANES 2008
- After normal baby delivery, it is the most common cause of hospitalization
- 670,000 new cases/year
- 1.1 million ADHF hospitalizations each year
- 30 day readmission rate 25%
- 15 million ambulatory visits
- Mortality 50% at 5 years
- #1 reason for hospitalization of people > 65 yr. old
- More costly than all forms of cancer combined
  - Largest federal Medicare ($71 billion) and VA $ expenditure
- Cost $39.2 billion
- $21B annual hospitalization costs

Clinical Course of Heart Failure

1.1 million HF hospitalization, 6.5 million hospital days, LOS 6 days, cost $50 billion

Coding Fiesta 2018
Juan M. Aranda, Jr. MD FACC, FHFA
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation

Current Dilemmas in Heart Failure:
Closing the Gap between Clinical Care and Coding
October 13, 2018
Characteristics of Patients with Diastolic Heart Failure and Patients with Systolic Heart Failure

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Diastolic Heart Failure</th>
<th>Systolic Heart Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Often elevated</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>Left atrial pressure</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>Left ventricle hypertrophy</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Left ventricle hypertrophy in echocardiography</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Diabetes</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Major structural heart disease</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>N-terminal proBNP</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Anemia</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Acute coronary ischemia</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Prior myocardial infarction</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Night sweats</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>NYHA class IV</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Deconditioning/Intolerance to Exercise ≠ HFpEF

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

<table>
<thead>
<tr>
<th>Type of HF</th>
<th>HFpEF</th>
<th>HFmrEF</th>
<th>HFdEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Symptoms ± Signs</td>
<td>Symptoms ± Signs</td>
<td>Symptoms ± Signs</td>
</tr>
<tr>
<td>2</td>
<td>LVEF &lt; 40%</td>
<td>LVEF 40-49%</td>
<td>LVEF ≥ 50%</td>
</tr>
<tr>
<td>3</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
</tr>
</tbody>
</table>

• BNP ↑
• At least one additional criterion:
  1. Relevant structural heart disease (LVH/LAE)
  2. Diastolic dysfunction

Ponikowski P. Eur Heart J. 2016;37:2129-200
B-Type Natriuretic Peptide - A Window to the Heart


Confounders of BNP measurements

- “False positive”
  - Pulmonary embolus
  - Pulmonary HTN
  - Renal dysfunction
  - Rapid lowering of PCWP
  - Age/Gender
  - ACS

- “False negative”
  - Obesity
  - Acute MR
  - Flash Pulmonary edema

Very Testable

If you had to have heart failure, would you rather have:
Systolic Heart Failure? OR Heart Failure with Preserved EF
Recommendations for Stage C HFpEF


Conclusions: 1. Beware of exercise physiology, 2. understand pressure volume interactions.

Heart Failure With Preserved Ejection Fraction
Treat Now by Treating Comorbidities


Current Dilemmas in Heart Failure:
Closing the Gap between Clinical Care and Coding

October 13, 2018

Juan M. Aranda, Jr. MD FACC, FHFSA
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation
### HF Hospitalizations: Baseline Characteristics of Patients in ADHERE and OPTIMIZE-HF

<table>
<thead>
<tr>
<th></th>
<th>ADHERE</th>
<th>OPTIMIZE-HF</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>159,168</td>
<td>48,418</td>
</tr>
<tr>
<td>Age (years)</td>
<td>72.4</td>
<td>73</td>
</tr>
<tr>
<td>Male (%)</td>
<td>48.4 (48)</td>
<td>46</td>
</tr>
<tr>
<td>AF (%)</td>
<td>30.9</td>
<td>31</td>
</tr>
<tr>
<td>CAD (%)</td>
<td>57.5</td>
<td>46</td>
</tr>
<tr>
<td>Hx HF (%)</td>
<td>75.6</td>
<td>-</td>
</tr>
<tr>
<td>EF &gt; 40 (%)</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Congestion (x-ray) (%)</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>EF (%)</td>
<td>37.8</td>
<td>39</td>
</tr>
<tr>
<td>SBP (mm Hg)</td>
<td>143.9</td>
<td>142</td>
</tr>
<tr>
<td>Crea</td>
<td>1.0</td>
<td>1.8</td>
</tr>
<tr>
<td>BUN</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>Na mmol/L</td>
<td>138</td>
<td>136</td>
</tr>
</tbody>
</table>

Inpatient mortality from ADHERE Registry

Based on admission BUN, creatinine and BP

Analysis of patients in the National Acute Decompensated Heart Failure National Registry (ADHERE).

Fonarow GC et al. J Cardiac Fail 2003;9(suppl 1):S79.
Anemia Recommendations

<table>
<thead>
<tr>
<th>DO</th>
<th>LOE</th>
<th>Recommendations</th>
<th>Comment/Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td></td>
<td>In patients with NYHA class II and III HF and iron deficiency (serum iron &lt;80 ng/dl or ferritin &lt;100 ng/ml), intravenous iron replacement might be reasonable to improve functional status and QoL. (Walters, 2017)</td>
<td>Consistent with therapeutic benefits.</td>
</tr>
</tbody>
</table>


Juan M. Aranda, Jr. MD FACC, FHFSA
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation
Current Estimate of Advanced HF Patients

- 300 Million Population
  - 45-50% Preserved Systolic Function 1.0-3.5 M
  - HF = 2.5% Population* or 6.5-7 Million Total
  - 50-55% Systolic HF 3.0-3.5 Million
  - Class III: 300-350,000
  - Class IV: 150-200,000
  - Theoretical Candidates for MCS
  - 35% Class I
  - 35% Class II
  - 25% Class III (10% III B)
  - 5% Class IV
  - Class III + IV <75 years 250-300,000 Pts

*Current Estimate of Advanced HF Patients

Clinical Course of Heart Failure

Circulation 2012, 125:1928-1952

Sleep Disordered Breathing

Clinical Scenario of the Class IV Heart Failure Patient (end stage)

- Low systolic blood pressure
- High heart rate
- Elevated filling pressures
- Renal Dysfunction
- Hyponatremia
- Cardiac Cachexia

Patient Selection
The Late Stage Heart Failure Patient

- Severe exercise intolerance
- Heart failure wasting syndrome
- Cardiorenal syndrome
- Right heart failure
- Inotrope dependence

Current Dilemmas in Heart Failure: Closing the Gap between Clinical Care and Coding

October 13, 2018

Juan M. Aranda, Jr. MD FACC, FHFA
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation
Survival of Stage D Patients Treated with Optimal Medical Therapy

Hershberger, R; J Cardiac Failure 2003;9:180-7

Rose, E; N Engl J Med 2001;345:1435-43

Rogers, J; AHA 2005

2017 ACC Expert Consensus Decision Pathway
Referral to Advanced Heart Failure Specialist

I NEED HELP

I IV inotropes
N NYHA III/IV or ↑BNP
E End organ dysfunction
E EF <35%
D Defibrillator shocks
H Hospitalization >1
E Edema despite escalating diuretic
L Low BP, high HR
P Prognostic medication – downtitration of GDMT


Left Ventricular Assist Devices: Bridges to Transplantation, Recovery, and Destination for Whom?

Potential Populations for Support
- Acute unstable shock
- Chronic CHF in refractory heart failure state with organ dysfunction
- CHF Class IV inotropic-dependent
- CHF IV-IVC intolerant due to symptomatic hypotension or progressive renal insufficiency
- CHF IV on IABP therapy
- Failing biventricular support, i.e., CIBS
- Cardiac arrest
- Cardiac transplantation
- Progressive renal dysfunction
- CHF IV on oral therapy including AICI
- CHF III, ambulatory Class IV

Potential Pathways

Current Pathway

Estimated 90% Mortality
- 1 month, salt-wasting factors
- 0.4-1 months
- 1-2 months
- 2.5-3 months
- 3.5 months
- 36 months

Options for Management of Advanced/End Stage Heart Failure

- Optimized Oral HF Drug Rx
- High-Risk CV Surgery
- Investigational Drugs
- CRT
- BIV Pacer
- Hospice
- Inotropes
- DT
- VADs
- Tx

BiV Pacer: CRT trials mostly class III, out of hospital >1 month, no inotrope exposure >1 month

Double Trouble Girls

“Dr. A., I don’t want any heart device. I am doing just fine on my medicines.”
LM

“Dr. A., this is the best I have felt in years. I just put my husband in a nursing home and went dancing all night with my sister.”
AB

Current Dilemmas in Heart Failure: Closing the Gap between Clinical Care and Coding

October 13, 2018

Juan M. Aranda, Jr. MD FACC, FHFS
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation
Median survival (years):
Adult = 10.7; Conditional = 13.2;
Pediatric = 16.1; Conditional = 20.9

p < 0.0001
(Transplants: January 1982 – June 2015)
**Cumulative Morbidity Rates in Survivors Within 1, 5, and 10 Years After Adult Heart Transplant**  
(Transplants: January 1994–June 2014)


**Options for Management of Advanced/End Stage Heart Failure**

- Optimized Oral HF Drug Rx
- High-Risk CV Surgery
- Investigational Drugs
- BiV Pacer
- Hospice
- Inotropes
- DT
- VADs
- Tx

**Use of a Continuous-Flow Device in Patients Awaiting Heart Transplantation**

Issues Affecting Cardiac Transplantation That May Not Affect LVAD Outcomes

- Age limit >70 years old
Issues Affecting Cardiac Transplantation That May Not Affect LVAD Outcomes

- Age limit >70 years old
- Pulmonary hypertension
  - PVR >5 wood units
  - TPG >15 mmHg
- Diabetes with end organ damage
- Obesity BMI >35
- Creatinine Clearance <40-50 ml/min
- Recent history of cancer
Post- REMATCH Study
Risk Factors for Mortality

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition</td>
<td>Infection</td>
</tr>
<tr>
<td>Renal Dysfunction</td>
<td>Renal Failure</td>
</tr>
<tr>
<td>Coagulopathy</td>
<td>Bleeding</td>
</tr>
<tr>
<td>RV Failure</td>
<td>RV/MO Failure</td>
</tr>
</tbody>
</table>

Complications of LVAD Therapy

- GI Bleeding
- Stroke
- Infection
- Pump Clot Hemolysis
- Anemia
- Renal Failure
Current Dilemmas in Heart Failure: Closing the Gap between Clinical Care and Coding

October 13, 2018

Drive Line Exit Site Care

In order to improve the specificity and completeness of the data used to assign diagnostic and procedure codes, and to assure documentation of severity of stress and risk of mortality, we need your assistance with further clarification of the diagnoses of Sepsis, bacterial pneumonia and respiratory status.

Question: If Septic is noted in, can you please further clarify if this was present on admission or not present on admission?

- Yes, the Septic was present on admission
- No, the Septic was not present on admission
- Unable to clinically determine if the Septic was present on admission or not present on admission

Please document your responses here:
Post Heartmate 2, Post Bariatric Surgery, 12 Weeks Post Transplant

Clinical Course of Heart Failure
1.1 million HF hospitalization, 6.5 million hospital days, LOS 6 days, cost $50 million

Juan M. Aranda, Jr. MD FACC, FHFSA
Professor of Medicine
Director of Heart Failure and Cardiac Transplantation