Objectives

- Discuss the epidemiology of congestive heart failure within the US
- Identify several reasons why patients with heart failure may not be admitted to hospice
- Describe the symptomatic management of heart failure, and how the underlying cardiac pathophysiology influences such treatment

Question 1

Which of the following statements is true regarding hospice eligibility and heart failure?

A. Ejection fraction is needed to enroll into hospice
B. Sxs are the key determinant of eligibility
C. Hospice programs must incorporate a validated prognostic model as part of admission process
D. A cardiologist must attest the pt is terminally ill

Question 2

Deactivation/ discontinuation of which of the following devices/ interventions near the EOL improves patient QOL?

A. ICD
B. ACE Inhibitors
C. Pacemaker
D. Inotrope

HFSA 2010 Definition of HF

- Syndrome caused by cardiac dysfunction, due to myocardial dysfunction or loss
  - neurohormonal and circulatory abnormalities
  - pulmonary and systemic venous congestion and/or inadequate peripheral delivery
- Characteristic symptoms
- Usually progressive
  - can be stabilized and dysfunction and remodeling may improve

A Poorly Functioning Heart:

- Delivers insufficient blood flow and therefore oxygen to vital organs
- Reduces the capacity for the body to do work due to lack of fuel (exercise intolerance)
- Results in shortness of breath
Symptoms of Worsening Heart Failure

- Volume Overload
  - Shortness of breath
  - Orthopnea, PND, insomnia
- Swelling and abdominal bloating
- Lightheadedness
- Palpitation
- Depression
- Pain

Low Cardiac Output

- Fatigue, often attributed to “aging” or “deconditioning”
- Anxiety/agitation
- Drowsiness, Confusion
- GI discomfort
- Lightheadedness
- General discomfort
- Depression
- Pain

Bekelman DB et al JGIM 2009, Heart Failure Guidelines, J Card Fail, 2010

Heart Failure Practice Guideline - J Cardiac Failure, 2010

- “HF has a worse px than many common CAs and premature death from decompensated HF or sudden cardiac death (SCD) is frequent”
- “Advance directives and EOL Care are important issues for pts with this condition”. “A discussion of HF course and Px should be conducted w/ all pts to the extent they are willing to participate.”

Heart Failure Practice Guideline - J Cardiac Failure, 2010

- Discussions should begin early, be readdressed over the years; makes EOL discussions much easier, “should acknowledge HF will ultimately lead to death”; discuss CPR outcomes
- Common predictors of death: Na <134, Cr >1.6, Anemia, low BP, increased age (multiple morbidities, frailty, cognitive impairment), depression

Elements Important To Goals of Care Conversations

- Shared Decision-Making

Survival
- Costs/Burden
  - Direct Medical Costs
  - Indirect Costs
  - Lost Opportunities
  - Caregiver Burden
- Outcomes Relevant to an Individual Patient
  - Quality of Life
    - Symptoms
    - Physical Function
    - Mental
    - Emotional
    - Social


Clinical Course of CHF, Proposed Timing of PC & Hospice

- 6 M people in US have HF
- 550K new cases/yr; 5-10% are Class D, 300-600K
- 2 M hospitals, 350K deaths/yr; 28% inhosp in d/c dx in 20y-most common D/C dx
- 80% of Class D HF are > 75 yo Risk of HF 1 in 5, doubles with poorly controlled htn
- About 50% of pts with HF die w/in 5 years of dx
- 1 in 3 deaths in US are caused by heart disease
  - 1 death every 40 seconds, 2,150 each day
- 18% of decedents with HF enroll in hospice

4 Types of Cardiac Disorders

• Diseases which affect the heart as a "pump" or muscle (Cardiomyopathies)
• Diseases which are a consequence of structural abnormalities of the heart (congenital heart disease, valvular d/o)
• Diseases which are a consequence of lack of oxygen to the heart (CAD)
• Problems which involve the electrical conduction system (dysrhythmias)

Anatomy and Physiology

The Electrical Conduction System

Cardiac Conduction System

Types of Heart Failure

• Systolic heart failure
• Diastolic heart failure
• Right sided heart failure
• Left sided heart failure

What is HFpEF?

• Heart Failure with Preserved Ejection Fraction
• AHA/ACC 2013 Guideline
  • Clinical signs or symptoms of heart failure
  • Evidence of preserved or normal LVEF
  • Evidence of abnormal LV diastolic dysfunction per Doppler echocardiography or cardiac catheterization
Prevalence of HFpEF

- ADHERE – 105,000 admissions for ADHF with LVEF documented in 52,000 patients (274 centers)
  - 50% admitted with heart failure had HFpEF
  - Presentation characteristics, LOS similar between HFpEF & HFrEF
  - In hospital mortality & ICU care < in HFpEF
- OPTIMIZE-HF – 41,000
  - 50% admitted with heart failure had HFpEF
  - LOS, all-cause mortality (60 & 90 days) & rehospitalization rates similar
  - Characteristics of ADHERE & OPTIMIZE-HF
    - Age: 73.9 and 75.1
    - Percentage of females
    - HTN > in HFpEF
    - Std HF medications used significantly less often for HFpEF than HFrEF
  - Fonarow et al 2007; Yancy et al 2006

Epidemiology of HFpEF

- Older
- Women > Men
- Comorbidities
  - Diabetes (2-5 times more likely to develop HFpEF)
  - HTN – 55-86% epidemiology trials; 60-88% clinical trials (3 fold increase in developing HFpEF)
  - RHF, pulm htn
  - Valvular disease
  - Atrial fibrillation
  - Obesity
  - High output state (thyrotoxicosis, pregnancy, thiamine deficiency, anemia)
  - Restrictive cardiomyopathy

Mode of Death in HFpEF

- 60% cardiovascular
- 26% sudden death
- 14% heart failure
- 5% MI
- 9% stroke
- 30% non-cardiovascular
- 10% unknown/not classified
  

CHF Outcomes by Type

Why Does this Matter to Hospice?

- EF is NOT the parameter to “rule in” or “rule out” patients as being terminally ill with HF
- Look for:
  - Loss of ADLs
  - Decreased appetite & weight loss (NOT BMI! Many were obese to start!!)
  - Low BP
  - High HR
  - Low Na, High Cr. Low energy, dyspnea

Case of AF

- 104 y/o woman, 2 year history of CHF. Relatively stable until today - developed acute worsening of sx
  - Recent EF 48% with diastolic dysfunction, LA enlargement
  - Long-standing ACEI, not able to tolerate β-blocker
  - EKG in office displays rapid AFb
  - Room air saturation 87%, 2L 96%
  - BP 130/70, pulse 148, RR 32, afebrile
  - Doppler negative DVT
  - PMH: s/p CVA, HTN, DJD, presbycusis
  - SHF: Former Exec secy, widowed x 30 yrs, lives alone
- Goals of Care conversation
Case AF Cont...

- Started cardiazem and increased furosemide
- Felt much improved by the next day, HR in low 100's
- Still dyspneic at rest with oxygen
- Able to walk a little further than day before
- What goals should be discussed?

Case of AF Cont...

- One week later, improved overall
  - Atrial fibrillation with better rate control
  - Less dyspneic @ rest, but present w/ minimal exertion
  - Oxygen helps with symptoms
- Prefers to remain at home, no invasive treatments; supported by family, church members; open to aides; at peace with a life well-lived
- Agreed to hospice information visit
- Elected hospice benefit a week later

Case of AF Cont...

- One month later, AF became more dyspneic at night
  - Daughter called hospice, but afraid, so brought to ED
  - HR back to 140's
  - Very uncomfortable
- Goals in ED reviewed and focus remains comfort
- Hospice met family in emergency room

Case of AF Cont...

- Daughter agreed to continuous care
- Diuresis w/ subcutaneous furosemide and titration of cardiazem at home
- Improved within a couple days
- Transitioned back to routine care

AF Visit Summary

- Patient Profile
  - 104 y/o woman w/ Heart Disease Unspecified (ICD-9 429.9)
  - Home hospice elected
  - LOS 92 days

- Services Received
  - 7 Physician Visits
  - 42 RN Visits
  - 2 Social Worker Visits
  - 35 CNA Visits
  - Continuous Care: 5 days
  - HME-Elect bed/O2, W/C, etc.

Which HF Patients Qualify for Hospice Care?

- NYHA Class III-V CHF: hx of cardiac arrest and resuscitation
- EF <20% AND Normal EF too!!!
- ADL impairment
- Frequent ED visits or any admissions for decompensated HF in the face of optimal treatment
- Surplus question
- Renal failure, Cr >1.4, Na< 136, SBP< 104
- Symptomatic dysrhythmias, syncope, ascites, massive rapid weight changes
Which Patient Qualifies for Hospice?

- 82 y/o with ongoing dyspnea @ minimal exertion
- Echo EF 45%, diastolic dysfunction
- On optimal medications - ACEI, β-blocker, and diuretic
- Co-morbidity - COPD, DJD, CRI (CrCl=23), DM
- 70 y/o with shortness of breath at rest on oxygen
- Echo EF 21%, global HK
- On optimal medications - ACEI, β-blocker, aldosterone antagonist, diuretic
- Co-morbidity - Mild dementia, DM, anemia

NYHA Class and 1-year Mortality

<table>
<thead>
<tr>
<th>NYHA Class</th>
<th>Description (fatigue, palpitations, or dyspnea)</th>
<th>Mortality 1-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Symptoms only with more than ordinary activity</td>
<td>---</td>
</tr>
<tr>
<td>II</td>
<td>Symptoms with more than ordinary activity</td>
<td>7%</td>
</tr>
<tr>
<td>III</td>
<td>Symptoms with ordinary activity</td>
<td>13%</td>
</tr>
<tr>
<td>IV</td>
<td>Symptoms at rest</td>
<td>20-52%</td>
</tr>
</tbody>
</table>


Brief Take Home Points

- Qualifying for hospice is about ADLs and Sx, not EF
- The criteria for HFpEF and HFrEF differ but the mortality and morbidity is similar.
- Approximately 50% of heart failure is HFpEF; EF alone is NOT a good predictor of mortality for all HF patients
- Limited treatment options for HFpEF; treat the underlying issue to improve HFpEF.

Burden Heart Failure - Family

- In 2009, 31% households had unpaid caregiver in last 12 months
- Family caregivers report poorer outcomes with increased disease severity and functional dependency of pt
  - Physical (pain, exhaustion, no health maintenance)
  - Psychological (depression, anxiety, stress)
  - Social (isolation, loneliness)
  - Financial (loss of income and savings; 13% Family Members had to quit work, 25% lost most of their savings)
- Caregivers who provide care and report strain had mortality risk 63% higher than those who were not strained


Needs of Seriously Ill Cardiac Patients and Their Families

- Most prefer advance care planning; need more information in an outpatient setting to make informed choices over the trajectory of illness
- 50% prefer to die at home
- 25% of patients >65 do so

Strachan PH 2009; Gott M 2008; MacIver J, 2008; Fried TR, 2002; Swetz KM, 2010; Stevenson LW 2008; Fried T 2007; Dev 2012; CDC 2012

Needs of Seriously Ill Cardiac Patients and Their Families

- To be accompanied by family, friends in final stages of illness, but don’t want to be a burden; fear dying “alone” (Strachan PH 2009)
- Improved sx management, esp for dyspnea, depression, pain, edema and fatigue (Blinderman CD 2008; LeMond 2011)
- Improved coordination of care (LeMond 2011)
The Cost of Dying from HF

- Mean total costs for last 2 years $156,168
- Last 6 months $78,880 (Curtis LH, 2008)
- Inpatient costs 78.7% of total care
- Pts spend 25% of last 6 mos in hospital (Russo MJ, 2008)
- 25% of survivors lost all savings due to CHF Rx

Cause of Death Based on NYHA Class (CHARM, CHARM-Added, MERIT-HF)

- NYHA II preserved LVEF:
  - 20% died from progressive HF, 29% SCD, 21% other CV cause, 30% non-CV cause
- NYHA II - III: low LVEF
  - 28% died of progressive HF, 20% SCD

SCD= Sudden Cardiac Death (dysrhythmia)

Pharmacologic of Treatment HF

<table>
<thead>
<tr>
<th>Class</th>
<th>Examples</th>
<th>Indication</th>
<th>Adverse Effect</th>
<th>Other Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE inhibitor</td>
<td>Enalapril, Lisinopril, Ramipril</td>
<td>HF stage B-D</td>
<td>K, renal dysfn, BP, cough, angioedema</td>
<td>First-line for systolic HF</td>
</tr>
<tr>
<td>ARBs</td>
<td>Candesartan, losartan, valsartan</td>
<td>HF stage B-D</td>
<td>Hyperkalemia, renal dysfunction, hypotension</td>
<td>Use when ACEI no tolerated</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>Carvedilol, metoprolol</td>
<td>HF stage B-D</td>
<td>Fatigue, hypotn, depressed mood</td>
<td>First-line for systolic HF</td>
</tr>
<tr>
<td>Aldosterone blocker</td>
<td>Spironolactone</td>
<td>NYHA III or IV</td>
<td>K, renal dysfunction</td>
<td>Monitor K</td>
</tr>
<tr>
<td>Loop diuretics</td>
<td>Furosemide, torsemide, bumetanide</td>
<td>Volume overload</td>
<td>Renal dysf, freq urination, thirst</td>
<td>IV or SubQ admin</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>Digoxin</td>
<td>Symptomatic HF after 1st line</td>
<td>Dysrhythmias, nausea, VH, delirium</td>
<td>Monitor toxicity closely</td>
</tr>
</tbody>
</table>

Why is Referral so Difficult for Cardiologists?

- Continued difficulty in acceptance of hospice even among cardiac professional societies, despite demonstrated survival benefit in CHF (81 day on average, Connor 2007)
- Palliative Care just entering the CHF lexicon (AHA 2009)
- Difficulty due to “uncertain” prognosis
- Patients not aware of poor px, lack of ACP (LeMond 2011)
- Not aware that hospice can QOL while incurring cost of care

Systolic HF - fluid excess
- Loop Diuretics
- ACE inhibitors/ARBs
- Beta blockers
- Aldosterone blockers
- Nitrates/Hydralazine AA
- Digoxin
- Device therapy in some
- Isotopes for rescue

Diastolic HF - fluid redistributed due to high afterload or stiff ventricle
- Control blood pressure
- Control heart rate (Afib)
- Relieve Ischemia
- Less diuretics frequently
- ARB, spironolactone

Barriers to Referral to Hospice for HF Patients
Hospice Prolongs CHF Survival

What makes the Conversations Difficult for Cardiologists?
- Prognostication is not an exact science
- Fear of taking away hope and the perception that they are “giving up” on the patient
- Time consuming
- Poor training for these types of discussions
- Personal values, beliefs and attitudes
- Concerns about d/c’g meds
- Fear of that death = failure or inadequacy

Barriers to Effective Palliative Care/Supportive Care in Heart Failure
- Providers not sure who is responsible for the discussion
- Poor community awareness of HF and sequelae
- Lack of integrated care systems
- Difficulties in timing and having the resources to address death and dying issues
- Limited evidence for HF symptom management at end of life
- Struggle to reconcile the goals of palliative care w/in the dynamic, highly technological therapeutic context of HF

Sx Management of ES HF Dyspnea: Etiology
- Multifactorial
- Related to respiratory changes
  - Changes in lung stiffness, dead space, VQ mismatch, increased work of breathing, and impaired ventilation with diaphragmatic splinting (HF, ascites)
  - Central chemoreceptors responding to changes in CO2 and pH
  - Muscular weakness due to skeletal muscle wasting
  - Myocardial (ischemia)
  - Psychological and social
    - Anxiety and fear
    - Compliance and adherence issues

Sx Management of ES HF Dyspnea: Treatment
- Intravenous loop diuretics or PO + Metolazone
- Opioids – reduce hypoxic ventilatory drive – may unload volume by acting on opioid receptors in the lung
- Oxygen supplementation in the absence of hypoxemia is not effective, although some patients do report symptomatic (PLACEBO) benefit. Consider room air (fan, compressed air)
- Antidepressants if indicated for depression

Sx Management in End Stage HF: Fatigue
- Common due to worsening HF, deconditioning, depression/anxiety, elevated neurohormones
- Management
  - Energy conserving strategies (planning your day to maximize rest and periods of activity/exertion)
  - Screen for and treat underlying depression, anxiety
  - Treat anemia
  - Use of CPAP for those with sleep apnea
Depression

1: 5 pts w/ HF meets criteria for major depressive disorder; a greater # report depressive sxs.

Depressive symptoms are highly correlated with ↓ QOL, ↑ pain and worsened clinical outcomes

Only clinical trial is SADHART-CHF (sertraline v. placebo for 12 weeks): too short and lower dosing than usual

SSRIs = std of care for depression in HF

LeMond, L et al. Progress in Cardiovascular Diseases, 2011.

Candidates for Home Inotrope Infusion

- Inotropes provide some symptomatic relief for some patients
- Shortness of breath, alertness, concentration
- Cardiologist generally involved
- Maintenance dose established in hospital, no active titration
- No previous hypersensitivity to the agent
- Central venous access
- Agreeable to hospice plan of care
- No monitors, not a bridge to transplant or LVAD
- Typically admitted on continuous care for transition

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Dobutamine</th>
<th>Milrinone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of Action</td>
<td>Stimulates Beta-1 and Beta-2 receptors</td>
<td>Phosphodiesterase III inhibitor</td>
</tr>
<tr>
<td>Primary effects</td>
<td>Inotropic and chronotropic</td>
<td>Inotropy, arterial and venous dilation</td>
</tr>
<tr>
<td>Maintenance dose</td>
<td>2-20mcg/kg/min</td>
<td>0.375-0.75 mcg/kg/min</td>
</tr>
<tr>
<td>Significant Adverse Reaction</td>
<td>PVC’s, palpitations, headache, nausea</td>
<td>Dysrhythmias, hypotension, angina, hypokalemia</td>
</tr>
<tr>
<td>Cost Per Day</td>
<td>5 mcg/kg/min = $7.76 plus $40 per diem</td>
<td>0.375 mcg/kg/min = $338.38 plus $40 per diem</td>
</tr>
</tbody>
</table>


Left-Ventricular Assist Device

Case of RJ, 73 yo M, HF

- Mechanical circulatory support with LVAD
- Developed infection, on suppressive antibiotics for several weeks
- Clot started to form, despite anticoagulation
- Fxnl status ↓, can only walk a few steps
- Hospitalized, PC consult re: goals of care


Starling RC, et al. Unexpected Abrupt Increase in Left Ventricular Assist Device Thrombosis. NEJM 2013

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Goals of Care Conversations, Shared Decision-Making

**Advanced Therapies in CHF Devices**

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Indication</th>
<th>Benefits</th>
<th>Burdens</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICD</td>
<td>Detects fatal arrhythmia, restores sinus</td>
<td>Survival, No QOL/fxn improvements</td>
<td>Pain, Trauma, PTSD, Anxiety, device issues</td>
<td>Life expectancy &gt; 1 yr, good fn</td>
</tr>
<tr>
<td>CRT Pacemaker/RV+lateral LV so heat synchrony</td>
<td>NYHA III/IV Ambulatory EF&lt;35% and QRS&gt;120</td>
<td>Improved survival w/ ICD, arr, exercise, QOL, Fewer hospzns</td>
<td>Surgery and device related complications</td>
<td>20-30% no benefit, mortality benefit by 3 months</td>
</tr>
<tr>
<td>LVAD</td>
<td>Channel ejects blood LV to circulation</td>
<td>Bridge to transplant Destination therapy systolic dys</td>
<td>Improved survival, exercise, QOL</td>
<td>2-year survival 58%</td>
</tr>
</tbody>
</table>

**LVAD Discontinuation**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>Deactivation can occur at home</td>
</tr>
<tr>
<td>Stroke</td>
<td>Device trained individual or hospice nurse</td>
</tr>
<tr>
<td>Cancer</td>
<td>Average time to death after device deactivation = 20'</td>
</tr>
<tr>
<td>Renal failure</td>
<td></td>
</tr>
<tr>
<td>Impending pump failure</td>
<td>Rapidly acting sx mgmt meds immed available</td>
</tr>
</tbody>
</table>

**Case RJ Cont...**

- Recognizes only has a couple days left to live
- Concerned about family well-being
- Would prefer to be at home w/ wife & dogs
- Develop shortness of breath and confusion
- Hospice nurse trained in device deactivation

**Case RJ Cont...**

- Goes home on continuous care
- Did well x 3 d, then more confused, then unconscious
- Per goals of care conversation, LVAD to be stopped when unconscious
  - Symptoms controlled beforehand; meds available
  - IDT team present
  - Nurse discontinued LVAD
- Patient died 5 minutes later

**Caring for CHF Pt: New Paradigm - Embrace Technology and High Acuity**

- LVAD
- TPN
- Inotropes - dobutamine and milrinone
- Need for lab monitoring
- Know about ICDs and how to turn them off (have P&P)
- Vents / Bipap / High 02 flow
- Dialysis patients

**Provide Evidence-Based Treatments**

- CHF medications ARE continued and monitored
  - ACE/ARB, β-blocker, aldosterone blockers, digoxin, diuretics, hydralazine/ISDN
- Parenteral therapies CAN be continued
  - Inotropes (dobutamine, milrinone), nitrates, diuretics
- Do not stop “pacers”
- Discuss goals of care surrounding defibrillators
- Medications related to symptoms and quality of life
Question 1

Which of the following statements is true regarding hospice eligibility and heart failure?

A. Ejection fraction is needed to enroll into hospice
B. Sxs are the key determinant of eligibility
C. Hospice programs must incorporate a validated prognostic model as part of admission process
D. A cardiologist must attest the pt is terminally ill

Question 2

Deactivation/ discontinuation of which of the following devices/ interventions near the EOL improves patient QOL?

A. ICD
B. Antiarrhythmics
C. Pacemaker
D. Inotropes

Summary

- HF is an increasing cause of death in the US
- HFpEF represents about 50% of HF, so look beyond EF to admit patients for heart failure
- Signs of eligibility are ED visits, hospzns for HF, weight loss, loss of ADLs, dyspnea and lab abnormalities, low BP, high HR
- Patients feel best on cardiac medications- be judicious in your evaluation of medication management
- Embrace technology