MATTERS OF THE HEART
Caring for Patients with Heart Failure

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Objectives

- Describe trajectory & prognostication of heart failure (HF)
- Review pharmacological and non-pharmacological treatment
- Discuss palliative care role & hospice eligibility criteria
- Management of common symptoms in advanced HF

What is Heart Failure?

Complex Clinical Syndrome
- Structural or functional cardiac disorder
- Impairs ability of ventricle to fill with or eject blood

Characterized By
- Dyspnea
- Exercise intolerance
- Fatigue
- Fluid retention

Epidemiology

Incidence:
- 550K new cases/yr

Prevalence:
- 5.8 million Americans with symptomatic HF

Morbidity:
- 1 million hospitalizations annually
- Most common discharge diagnosis among Medicare beneficiaries
- 60% hospitalized in last 6 months of life

Economics:
- Health care $ = 40 billion/year

Mortality:
- 250,000 deaths/yr
- 1 yr mortality comparable to certain cancers

Diagnosis

- Clinical history and exam

- 2D Echocardiogram = Gold standard
  - Ejection Fraction (EF)
  - Structural abnormalities

- Brain Natriuretic Peptide (BNP) = Good "rule-out" test

Making sense of the terminology!

- Acute?
- Chronic?
- Left?
- Right?
- Systolic?
- Diastolic?
- High output?
- Low output?
- Forward?
- Backward?
**Classification**

Heart Failure with Reduced Ejection Fraction (HFREF) …aka Systolic HF  
vs.  
Heart Failure with Normal Ejection Fraction (HFNEF) …aka Diastolic HF

**HFNEF**

- EF > 50%
- Diastolic dysfunction
  - Impaired LV relaxation
  - Elevated diastolic filling pressures
  - Diastolic wall stiffness
- HTN : LV hypertrophy
  - DM, Obesity, sleep apnea
- Valvular disease
- Hypertrophic cardiomyopathy
- Restrictive cardiomyopathy

**Disease Severity**

- New York Heart Association (NYHA) classification
- American College of Cardiology/American Heart Association (ACC/AHA) classification

**NYHA classification**

<table>
<thead>
<tr>
<th>Class</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitations, or dyspnea.</td>
</tr>
<tr>
<td>II</td>
<td>Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitations, or dyspnea.</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitations, or dyspnea.</td>
</tr>
<tr>
<td>IV</td>
<td>Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.</td>
</tr>
</tbody>
</table>

**American College of Cardiology/American Heart Association Stages of Heart Failure**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
<th>Patient Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High-risk for developing HF</td>
<td>HTN, CAD, DM, Prior MI, History of Cardiomyopathy</td>
</tr>
<tr>
<td>B</td>
<td>Asymptomatic HF</td>
<td>Stroke, HTN, LV hypertrophy or systolic dysfunction, Atrial fibrillation</td>
</tr>
<tr>
<td>C</td>
<td>Symptomatic HF</td>
<td>Known structural heart disease, NYHA class II, III, or IV</td>
</tr>
<tr>
<td>D</td>
<td>Refractory, End-Stage HF</td>
<td>Marked symptoms at rest despite maximal medical therapy</td>
</tr>
</tbody>
</table>
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Disease Trajectory

- Challenging
  - High incidence of sudden cardiac death (SCD)
  - Differences in application of treatment guidelines
  - Inter-observer differences in assessing NYHA class
- Several models proposed
  - EFFECT Model
  - Heart Failure Survival Score (HFSS)
  - Seattle Heart Failure Model (SHFM)

Seattle Heart Failure Model (SHFM)

- Tested primarily in patients with SHF
- Both outpatient and advanced HF patients
- Accurate (?) estimate of 1-, 2- and 3-year mortality
- Predictive of mode of death in ambulatory patients with NYHA class II-IV

Seattle Heart Failure Model (SHFM)

- Age
- Gender
- Ischemic disease
- NYHA class
- Ejection Fraction
- Systolic BP
- Use of a K sparing diuretic
- Diuretic dose/kg
- Statin use
- Allopurinol
- Hemoglobin
- Lymphocyte count
- Uric Acid
- Sodium
- Cholesterol

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Mainstays of Treatment

- Drugs
- Devices
- Cardiac transplant

HF with Normal EF

- Control BP – systolic and diastolic
- Treat hyperlipidemia
- Rate control if in atrial fibrillation
- Caution when using diuretics, ACE-I, CCB and nitrates
- Coronary revascularization in patients with CAD

HF with Reduced EF

- Start with a diuretic if volume overloaded
  - Mortality benefit
  - Reduced hospitalization rates

- Add drugs with mortality benefit, titrate to target doses
  - ACE-I: all patients
  - ARBs: if unable to tolerate ACE-I
  - BB: NYHA class II, III
  - Aldosterone antagonist + diuretic+ ACE-I: NYHA Class III, IV
  - + Hydralazine+Nitrate (Bidil) – especially in AA

Target doses

<table>
<thead>
<tr>
<th>Drug</th>
<th>Starting dose</th>
<th>Target dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE-I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>6.25 mg TID</td>
<td>50 mg TID</td>
</tr>
<tr>
<td>Enalapril</td>
<td>2.5 mg BID</td>
<td>10-20 mg BID</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>2.5-5 mg QD</td>
<td>20-40 mg QD</td>
</tr>
<tr>
<td>ARBs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candesartan</td>
<td>4-8 mg QD</td>
<td>32 mg QD</td>
</tr>
<tr>
<td>Irbesartan</td>
<td>25-50 mg QD</td>
<td>50-100 mg QD</td>
</tr>
<tr>
<td>Valzor</td>
<td>20-40 mg BID</td>
<td>160 mg BID</td>
</tr>
<tr>
<td>BB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carvedilol</td>
<td>3.125 mg BID</td>
<td>25-50 mg BID</td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>1.25 mg QD</td>
<td>10 mg QD</td>
</tr>
<tr>
<td>Metoprolol ER</td>
<td>12.5-25 mg QD</td>
<td>200 mg QD</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>12.5-25 mg QD</td>
<td>25-50 mg QD or BID</td>
</tr>
</tbody>
</table>

Digitalis

- No mortality benefit but...
- Does provide symptomatic relief
  - Use after ACE-I/ARBs, BB, diuretics fail to provide relief
- Not recommended as 1st line in
  - Acute exacerbation
  - Systolic dysfunction + Atrial fibr
**Vasodilators**
- Nitroglycerin, Nitroprusside, Nesiritide
- Symptomatic relief in acute decompensation
- Added if symptomatic after maximizing other first line meds
- In chronic HF, oral nitrate combined with hydralazine

**Inotropes**
- Dopamine, Dobutamine, Milrinone
- Oral agents associated with increased mortality
- Continuous vs. intermittent infusion for palliation of symptoms in patients with refractory end-stage HF
- Need for continuous inotrope infusion = poor prognosis: 20-25% 1 year survival

**Adverse Effects**
- **ACE-I/ARBS**
  - Hypotension
  - K retention
  - Renal failure
  - Cough
  - Angioedema
- **Digoxin**
  - Cardiac arrhythmias
  - GI distress
  - Neurological complaints
- **BB**
  - Fluid retention
  - Worsening HF
  - Fatigue
  - Bradycardia, heart block
  - Hypotension
- **Aldosterone antagonists**
  - Hyperkalemia

**Bottomline..**
- Titrate meds to target dose for maximal benefit – Survival + Symptom relief

**Query 1**
When do we discontinue diuretics on end stage heart failure patients?
- Significant hypotension
- Declining renal function

**Query 2**
Beta-blockers have to be used “cautiously” in patients with heart failure. At what point and how should they be discontinued?
- Significant hypotension or bradycardia
- May rettitrate once stable
- Ideal taper 4-6 weeks long.....
- Try some form of taper over a few days
Devices

- Implantable Cardioverter Defibrillators (ICD)
  - Reduces risk of sudden cardiac death
- Cardiac Resynchronization Therapy (CRT)
  - ↓ mortality and hospitalizations
  - Improved QOL

Ventricular Assist Devices (VADs)

- Left, right or BiVad
- Patients with a life expectancy < 2yrs
- Bridge to transplant (BTT)
- Bridge to recovery (BTR)
- Destination therapy (DT)
  - Patient not a transplant candidate
  - Requires permanent mechanical circulatory support

Ventricular Assist Devices

- High risk surgery with complex post-implant care
- Early complications
  - Bleeding
  - Sepsis
  - Multi-organ failure
- Late complications
  - Thromboembolism
  - Infection
- In hospital mortality about 27%, 1 yr survival nearly 60%
- Improved quality of life

Query 3

When to turn a LVAD off? Is this just one more decision family has to make?

Approaching End of Life - VAD

- Turning off LVAD
  - Ethically challenging
  - LVAD is not a replacement treatment
  - Patients have the right to refuse treatment
  - Unethical to continue a treatment patient has refused

- Preparedness planning
  - Psychosocial
  - Caregiver concerns
  - QOL
  - Ethics
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Role of Palliative Care

- Supportive care
  - Education and self-management
  - Communication
  - Psychosocial and spiritual issues
  - Symptom management
- Decision-making
  - Preferences for CPR, need for ICD
  - Cardiac transplant, LVAD
  - Advance directives

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- Psychosocial and spiritual issues
- Symptom management
- Decision-making
  - Preferences for CPR, need for ICD
  - Cardiac transplant, LVAD
  - Advance directives

Identifying the Patient with End Stage HF

- Marked decline in functional ability and quality of life
- Frequent hospitalizations for exacerbations despite:
  - Maximal medical therapy
  - Identification and treatment of reversible causes

Approaching End Stage HF

- Educate, educate, educate
- Revisit goals of care
- For patients with ICD - Discuss if and when to turn off ICD
- If patients opt for LVAD as DT or BTT: preparedness planning

Current Hospice Guidelines

- NYHA class IV
- Optimal medical management
  - Patient refuses device (ICD/CRT/LVAD) or transplant
  - Patient not a device or transplant candidate
- Supportive but not required
  - LVEF < 20%
  - Treatment resistant, symptomatic arrhythmias
  - H/o cardiac arrest or CPR
  - Unexplained syncope
  - Embolic stroke of cardiac origin
  - Concomitant HIV
Query 4

I am curious about maximal medical management of heart failure patients whose death is imminent due to another co-morbidity (ex. ESRD and have decided to forgo dialysis).

- If hypotensive, but still able to take PO meds, cut back instead of stopping meds
- If death is imminent, will likely need to discontinue meds contributing to hypotension or circulatory failure

When the Goal is Palliation….

- Optimize medical treatment – known to palliate symptoms and prolong life
  - Diuretics, fluid and salt restriction
  - ACE-I/ARBs/BB
  - Small, stable changes in BUN/Creat acceptable
  - Moderate hypotension OK
  - Monitor weight

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Symptom Burden

- Large proportion of patient families report quality of life (QOL) as being poor to fair in the last week of life
- The 4 most common symptoms reported by patients/family members in the last 6 mths of life
  - Pain
  - Dyspnea
  - Fatigue
  - Confusion

Symptoms

- Dyspnea and pain: Opioids, Benzodiazepines
- Fatigue/depression: Stimulant (Methylphenidate)
- Sleep disturbance: CPAP/BiPAP
- Anorexia
- Weight loss
- Anxiety: Benzodiazepines

Pain

- Prevalence of pain increases with NYHA class
  - 90% of patients with Stage IV HF
- Often described as generalized/diffuse pain
- So far, no HF pain syndrome described
  - ? HF + comorbidities
- Undertreated despite known high prevalence!

Rx mainstays
- Avoid NSAIDs
- Low dose opioids, titrate up as needed
- OA: joint injections
Dyspnea

- Maximize HF medications if tolerated
- Low dose opioids
- Oxygen: only if hypoxic
- Continuous inotrope infusion ($$$ + ↑↑↑ mortality)
- Nitrates for afterload reduction
- Cochrane review of dyspnea in COPD
  - Hawthorn extract
  - Breathing training
  - Chest wall vibration

Other Symptoms

- Fatigue
  - Underlying cause
  - Ritalin
  - Energy conservation techniques
  - DME or adaptation of home environment
- Depression
  - Consider Ritalin or an SSRI
- Anxiety
  - Benzodiazepines

Summary

- HF is a major public health problem
- Treatment of HF varies by stage
- Prognostication is challenging
- Sudden cardiac death is common and may occur at any time during the course of the disease
- Always attempt to achieve target doses of drugs with proven mortality benefit
- Maximal medical therapy should be continued as long as possible due to palliative benefits
- Educate = empower, ? Action plans

References