

Heart Failure

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Questions for clinicians to ask

- Is this heart failure?
- What is the underlying cause?
- What are the associated disease processes?
- Which evidence-based treatment should be pursued?

Goals In Treatment of Heart Failure

- **Prevention/treatment of disease leading to cardiac dysfunction**
- **Morbidity – to improve quality of life and reduce hospitalization**
- **Mortality – increased duration of life**

Assessment of heart failure

- **History**
- **Physical**
- **Laboratory**
- **EKG**
- **Chest X-ray**
- **Echocardiogram**

Risk Factors for Heart Failure

- Hypertension
- Obesity
- Age
- Diabetes
- Smoking
- Sleep apnea
- Thyroid disease
- Chronic lung disease
- History of Rheumatic fever
- Chronic lung disease
- Miscellaneous
- Cardiomyopathy

Symptoms of Heart Failure

- Exertional dyspnea
- Fatigue
- Orthopnea
- Edema
- Unexplained weight gain
- Non-specific

Physical Findings with Heart Failure

- Elevated jugular venous pressure
- Often a third heart sound or “gallop”
- Rales
- Tender, and, or enlarged liver
- Edema

Classification- Stages

- **Stage**
 - **A: @risk of developing**
 - DM, HTN, CAD, FH
 - **B: structural heart disease but asymptomatic**
 - LVH, LV dilatation, prior MI, valve issues
 - **C: Disease and symptoms**
 - Recent hospital admissions
 - **D: Advanced Symptoms**
 - Can't keep him out of the hospital

NYHA Functional Class

- **I – Asymptomatic**
- **II – Symptomatic: slight limitation of physical activity**
- **III – Symptomatic: marked limitation of physical activity**
- **IV – Inability to perform any physical activity without symptoms**

2 Types of CHF

- **Systolic**
- **Can't pump**



- **Diastolic**
- **Can't relax**



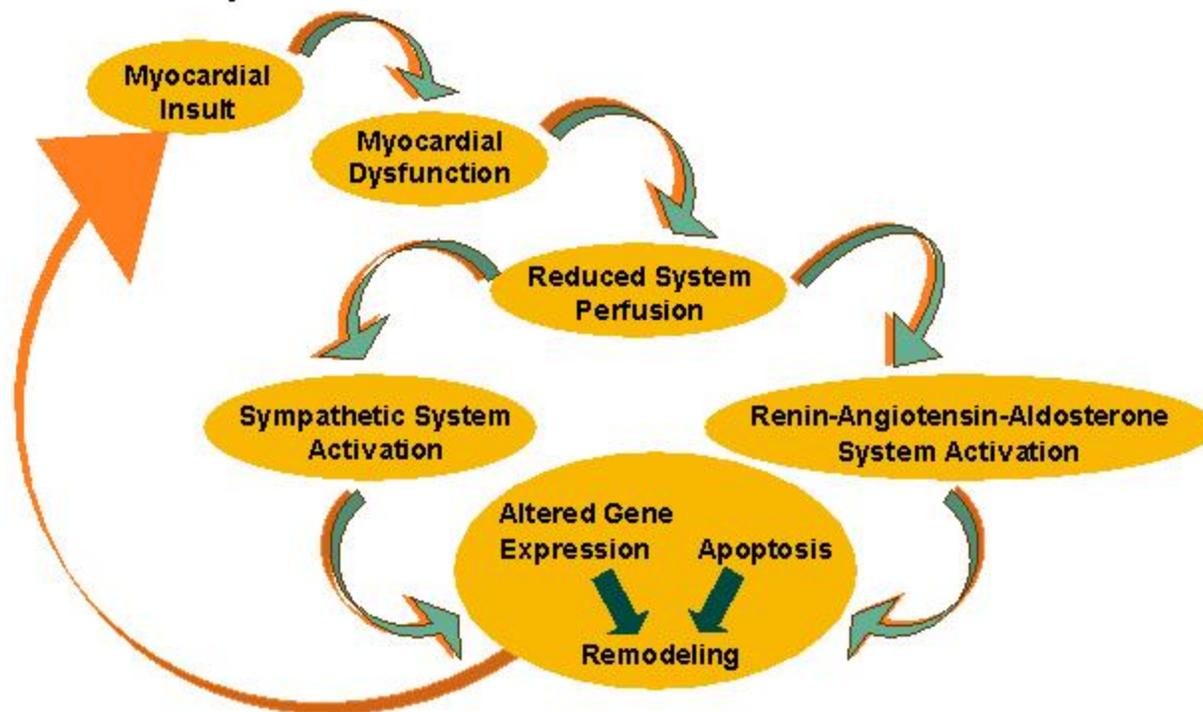
Heart failure definition

- **Systolic heart failure**
- **Heart failure with normal systolic function (“diastolic heart failure”)**
- **Often component of both**

Systolic Heart Failure Mechanism of Action

Pathogenesis of heart failure

Complex cascade



Various etiologies of heart failure

- **HCVD (Hypertensive)**
- **ASHD (Atherosclerotic)**

- **Valvular heart disease**
 - **Congenital heart disease**
 - **Rheumatic valvular heart disease**
 - **Acquired valvular heart disease**

Myocardiopathy

- Hypertrophic cardiomyopathy
- Restrictive cardiomyopathy
- Idiopathic dilated cardiomyopathy
- Congenital heart disease
- Alcoholic cardiomyopathy
- Tachycardia-induced cardiomyopathy
- Toxic induced heart failure, e.g. toxins, chemotherapy
- HIV
- Myocarditis

Systolic Heart Failure General Measures

- **Maintain fluid balance, restrict sodium, daily weights**
- **Awareness of symptoms/signs of heart failure progression**
- **Patient titration of diuretics**
- **Immediate access to treatment for heart failure exacerbation**

Optimizing Pharmacological Therapy

- **ACE/ARB**
- **Beta antagonist**
- **Diuretics**
- **Aldosterone antagonist**
- **Hydralazine/nitrates**
- **Digoxin**

ACE Inhibitors – Systolic Heart Failure

- All patient with systolic dysfunction should receive ACE-I unless intolerant or contraindicated
- Symptomatic improvement may occur weeks to months after initiation
- ACE-I may prevent disease progression and should be continued
- Strive to achieve target doses of specific ACE-I

ACE Inhibitors – Systolic Heart Failure

What are the benefits?

- Alleviate symptoms and improve functional class.
- Decrease risk of death and the combined risk of death or hospitalization.
- Benefits observed in mild, moderate, severe symptomatic heart failure

ACE Inhibitors – Systolic Heart Failure

- **Use in Clinical Practice**
- **Low dose followed by gradual increments to achieve target doses**
- **Contraindications: angioedema or oliguric renal failure, pregnancy.**
- **Caution:**
 - **Systolic BP < 90 mmHg**
 - **Creatinine > 2 mg/dL**
 - **Bilateral renal artery stenosis**
 - **Potassium > 5.5 mmol/L**

Angiotensin Receptor Blockers in Systolic Heart Failure

- Indicated for the treatment of heart failure (NYHA Class II-IV) in patient who are intolerant of ACE inhibitors
- Usually used because of bothersome cough from ACE inhibitors
- More costly

Systolic Heart Failure – Beta Blockers

Guidelines for use

- **Clinically stable out-patients with mild to moderate heart failure.**
- **Initiate low dose with close observation and titration every 2 – 4 weeks**
- **Cautions: reactive airway disease and sinus node dysfunction.**

Systolic Heart Failure - Spironolactone

- **RALES study – Class III-IV Heart Failure**
- **Exclusion**
 - Creatinine > 2.5 mg/dl
 - Potassium > 5.0 mmol/L
- **Target dose 25-50 mg; mean dose 25 mg**
- **Hyperkalemia is main risk, especially with ACE**
- **30% reduction in risk of HF deaths**

Systolic Heart Failure - Digitalis

- **DIG Trial: Neutral effect on primary end-point of all cause mortality**
- **Fewer hospitalizations digoxin group.**
- **Digoxin combined with ACE-I and diuretics reduces risk of worsening heart failure.**

Systolic Heart Failure – Anticoagulation and Antiplatelet Drugs

- Patients with atrial fibrillation and/or clinically overt systemic or pulmonary thromboemboli should receive warfarin, goal INR 2 to 3.
- Warfarin merits consideration for patients with LVEF $\leq 35\%$ after careful risk/benefit assessment.
- Warfarin (coumadin) contraindicated in pregnancy

Systolic Heart Failure – Hydralazine – Nitrate Combination

- **Combination of hydralazine and isosorbide dinitrate**
 - **African Americans and Caribbeans especially benefit**
 - **Mostly utilized in patients with HF intolerant of ACE inhibitors**

Systolic Heart Failure – Role of Calcium Channel Blockers

- In general, calcium blockers should be avoided in HF
- Of the available agents, clinical trials have provided long-term safety data only for amlodipine and felodipine.

Systolic Heart Failure – Role of Antiarrhythmic Agents

- Some class III antiarrhythmic agents, e.g. amiodarone, do not appear to increase the risk of death in patients with chronic heart failure.
- In general, antiarrhythmics risky in patients with LVEF <35%

Pharmacologic Therapy – Measures to be AVOIDED

- Use of antiarrhythmic agents to suppress asymptomatic ventricular arrhythmias.
- Use of most calcium channel antagonists.
- Use of nonsteroidal anti-inflammatory agents, COX-2 inhibitors.
- Insulin Sensitizers: pio/rosiglitazone, metformin.

Diastolic Heart Failure

- HTN is #1 cause
- Obesity
- More prevalent with increasing age
- Women>Men
- Echo is integral in the diagnosis
- Control the HR and the HTN
- Diuretics, Beta Blockers, ARB/ACE, CCB's

Heart Failure (HF) with Preserved LV Systolic Function Overview

- Up to 50% of patients with symptomatic HF have a preserved LVEF.
- Accounts for 40% of HF hospitalizations.
- More common in women, elderly and obese, and those with concomitant hypertension, LVH or diabetes.
- Annual mortality rate appears lower than that of patients with systolic HF.
- Few clinical trials are available to guide clinical management.

Systolic Heart Failure – Medical Management Summary

- Educate the patient
- Dietary measures
- Importance of medication compliance and follow-up
- What meds and foodstuffs to avoid

Systolic Heart Failure – Medical Management Summary

- Diuretics are essential in the management of heart failure patients who manifest fluid retention.
- ARB's should be considered when ACE-I intolerant patients.
- The additive benefit of an ARB in a patient receiving ACE-I and beta blockers has been demonstrated
- Hydralazine/nitrate combination therapy is inferior to ACE-I therapy, but is an alternative in the ACE-I intolerant patient and can be added to standard therapy, esp. in African Americans.

Systolic Heart Failure – Medical Management Summary

- Calcium channel blockers should be avoided in patients with systolic heart failure when possible.
- Antiarrhythmic drug therapy is generally avoided.
- CRT and ICD's should be utilized in appropriate patients.

Systolic Heart Failure – Medical Management Summary

- **ROLE of anticoagulant and antiplatelet therapy is poorly defined in systolic heart failure**
- **Oral and intravenous positive inotropic agents are not approved for outpatient use**
Intravenous therapy
- **Most importantly, remember prevention of HF**

Heart Failure in African-Americans

- Unique natural history
- Better response to hydralazine-nitrate therapy
- Occurs at an earlier age
- Worst clinical class at time of diagnosis
- Higher incidence of concentric LVH by echocardiogram
- Lower incidence of associated epicardial coronary artery disease
- Markedly increased incidence of hypertension
- Higher rate of hospitalization in the United States

Cardio-Renal Syndrome

Definition: Greater than 25% increase in serum creatinine or rise greater than or equal to 0.3 mg/dL that occurs during attempt at diuresis.

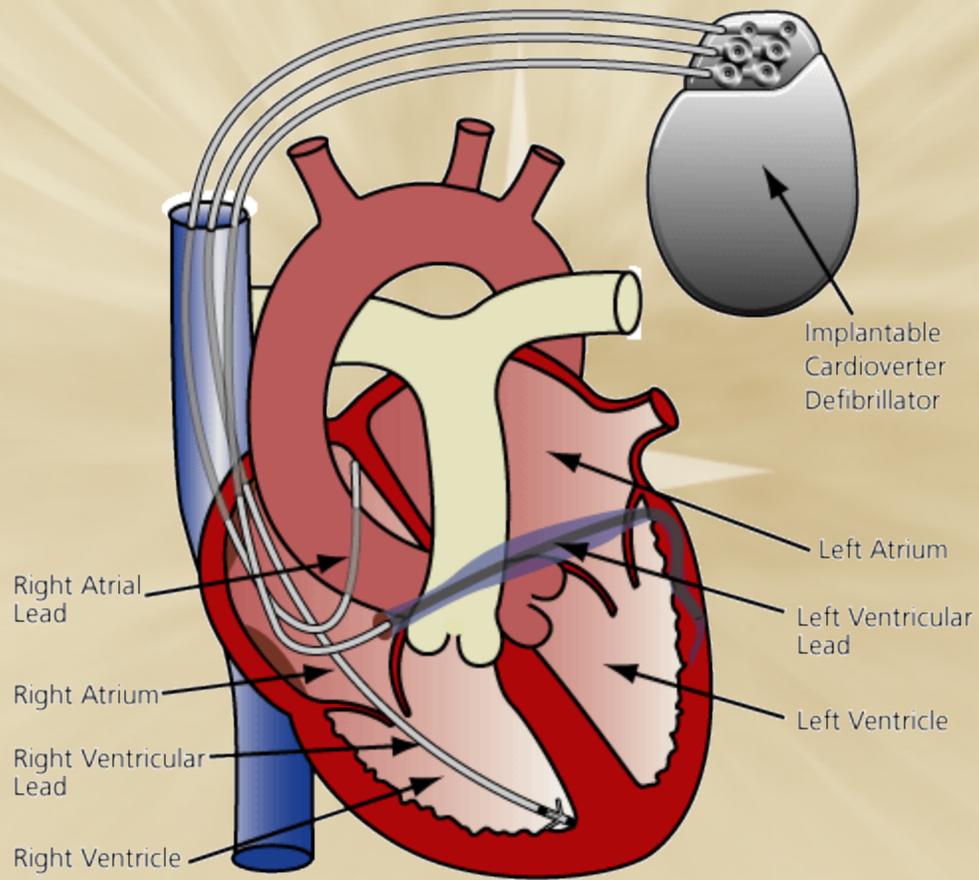
- **Twofold increase in mortality.**
- **Occurs with both systolic and diastolic heart failure.**
- **Associated with older age, elevated baseline creatinine levels, lower blood pressure, longer duration of heart failure, and low sodium levels.**

Device Adjuncts

- ICD (Internal cardiac defibrillator)
- CRT (Cardiac resynchronization therapy)
- Ultrafiltration

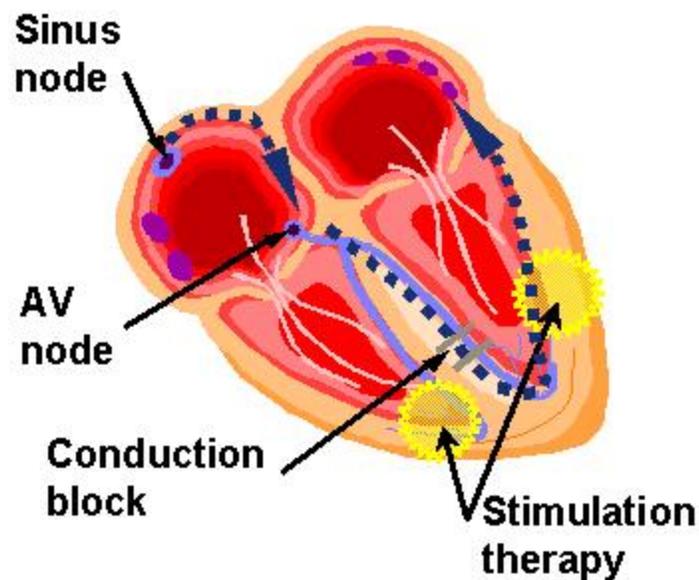
Cardiac Resynchronization Therapy in Heart Failure – patient selection

- Sinus rhythm.
- QRS prolongation (greater than 120 msec).
- Impaired contractility (LVEF less than 35%).
- NYHA class III or IV heart failure symptoms despite optimized diuretic, vasodilator, and beta blocker therapy.
- Mechanical dyssynchrony.



Issues associated with heart failure

Mechanism II-ventricular resynchronization



- Intraventricular Activation
- Organized ventricular activation sequence
- Coordinated septal and free-wall contraction
- Improved pumping efficiency

Welcome

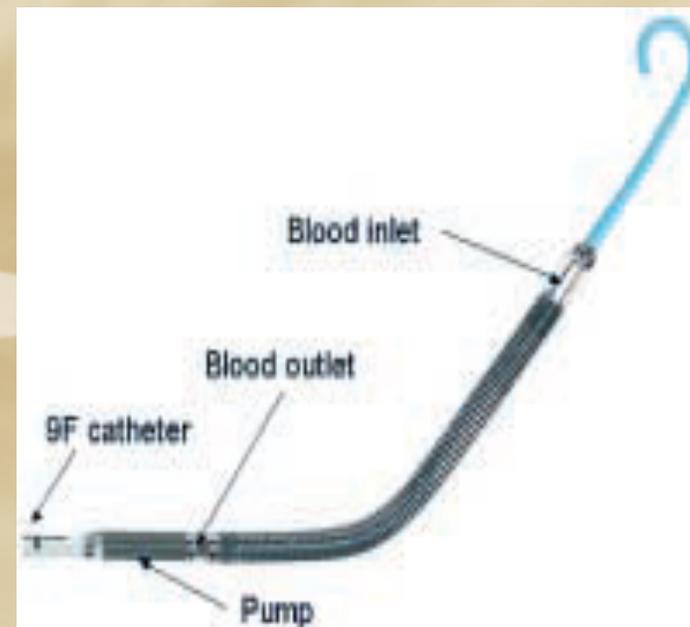
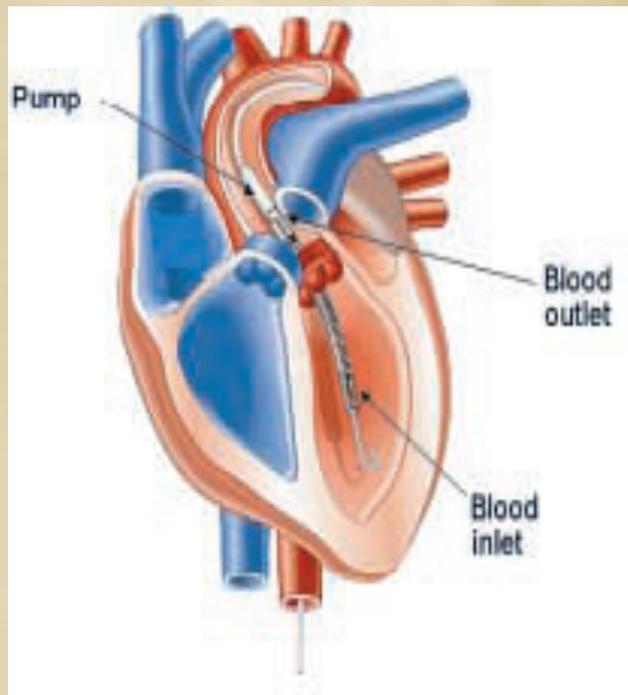


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Other Options: Ultrafiltration

- Isotonic fluid removal.
- Higher clearance of sodium load.
- Does not further activate sympathetic nervous system, renin-angiotensin-aldosterone system.
- More rapid removal of fluid.
- No clear benefit on renal function.
- Greater cost.
- No data on mortality.
- Specialized nursing expertise required.
- Catheter-related complications (thrombosis infection).

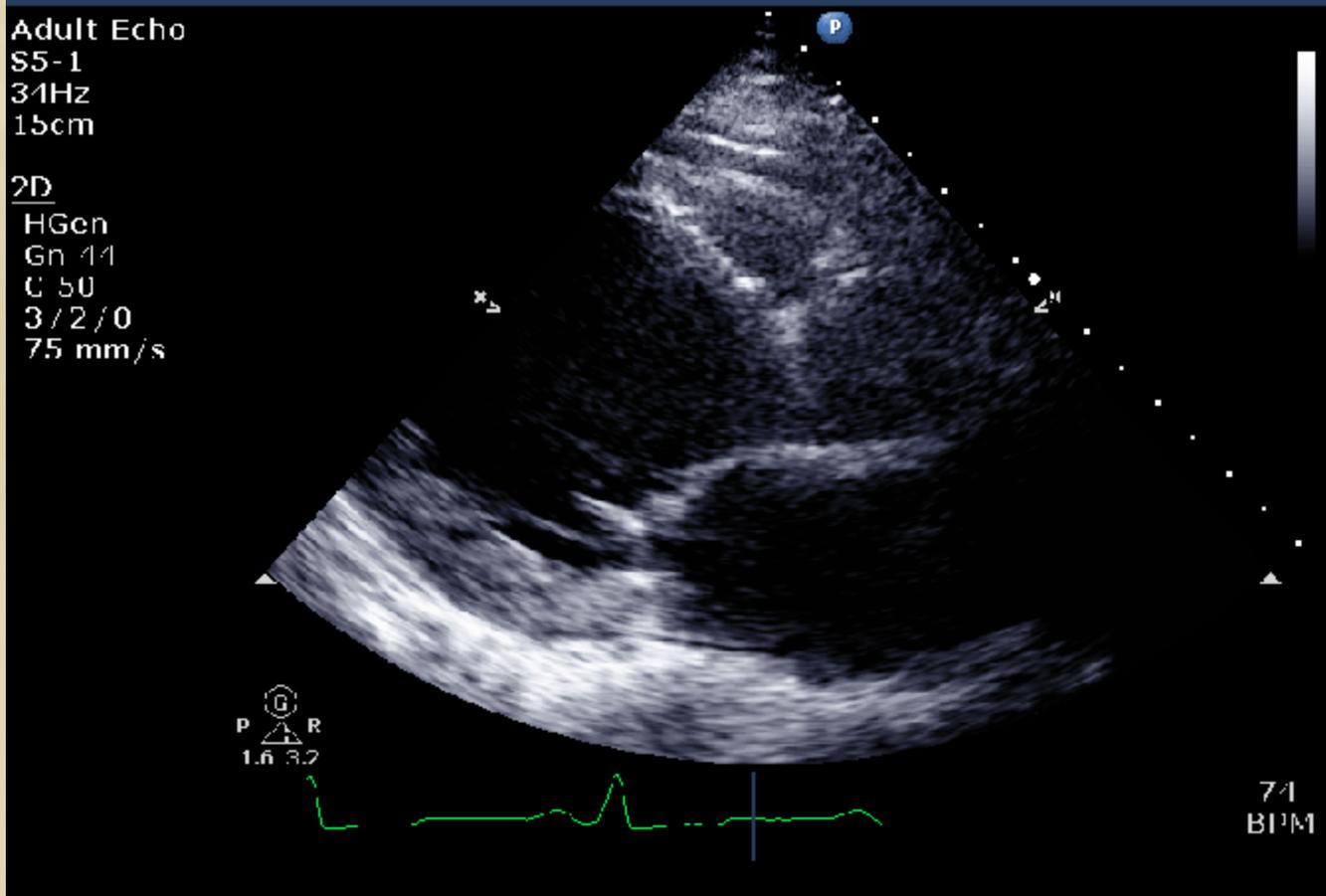
Percutaneous LVAD



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H2888 Philips Healthcare TIS 0.6 10:15:48 AM

Adult Echo
S5-1
34Hz
15cm

2D
HGen
Gn 11
C 50
3/2/0
75 mm/s



Case Presentation

- A 28 year old gravida 3, para 2 presents during the third trimester of pregnancy with increasing shortness of breath and edema of the lower extremities. Her blood pressure is 140/90. Pulse is 85 and regular. She has a grade 2/6 systolic murmur at the apex with a third heart sound. There is positive hepatojugular reflux and 2+ pitting edema.
- ECG show regular rhythm and no LVH
- CBC and renal function normal

Options for treatment include:

- a. Furosemide
- b. Enalapril
- c. Apresoline
- d. Digitalis
- e. Diltiazem

Case Presentation

- A 68 year old man presents with exertional fatigue and shortness of breath. He has a long history of hypertension and has noticed recent onset of palpitations. His physical examination is unremarkable other than an irregular rhythm with a rate of 120 beats per minute. His initial EKG documents atrial fibrillation.
- What laboratory tests are appropriate?

Initial recommendations include all of the below except:

- a. Diuretics on a PRN basis
- b. Digitalis
- c. Beta blockers
- d. ACE inhibitor
- e. Amiodarone

Case 26 - Stump the Faculty

