2013 Updated ACC/AHA Guidelines for the Management of Systolic Heart Failure

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Objectives

- Review the possible causes and pathophysiology of heart failure syndrome
- Explain the rationale for the treatment of heart failure syndrome
- Review current pharmacologic recommendations
- Identify monitoring parameters for patients with heart failure

Definitions

- Ejection Fraction - the percent of blood in the left ventricle after diastole that is ejected in systole
- Cardiac Output = Heart Rate x Stroke Volume
- Mean Arterial Pressure = Cardiac Output x Systemic Vascular Resistance
- Stroke volume
  - Preload, Afterload

Defining Heart Failure

- Clinical Syndrome
- Cardinal Manifestations
  - Dyspnea
  - Fatigue
  - Fluid retention
- Causes
  - Variety of disorders
    - Pericardium, myocardium, endocardium, heart valves, or great vessels
  - Impaired left ventricular (LV) myocardial dysfunction is most common
- No single diagnostic test

Defining Heart Failure

- Heart Failure with Reduced Ejection Fraction
  - Ejection Fraction $\leq$ 40%
  - Inability of the heart to contract effectively
  - Most clinical trials about heart failure have utilized only patients with reduced EF
- Heart Failure with Preserved Ejection Fraction
  - Ejection Fraction $\geq$ 50%
  - Impaired filling or relaxation
  - Efficacious therapies have not been identified

Common Heart Failure Risk Factors

- Age
- Hypertension
- Diabetes Mellitus
- Metabolic Syndrome
- Atherosclerotic Disease

Initial Evaluation and Diagnosis

- History and Physical Examination
- Diagnostic Tests
  - CBC, UA, Electrolytes, BUN, SCr, Glucose, FLP, LFTs, TSH
  - 12 Lead ECG
  - Chest X-Ray, 2D-Echocardiogram (TTE)
- Cardiac Biomarkers
  - BNP or NT-proBNP, Troponin

Heart Failure Staging

- NYHA
  - I
    - No limitation of physical activity
  - II
    - Slight limitation of physical activity
  - III
    - Marked limitation of physical activity
  - IV
    - Unable to carry on physical activity without symptoms of HF, or symptoms of HF at rest
- ACC/AHA
  - A
    - At high risk for HF but without structural heart disease or symptoms of HF
  - B
    - Structural heart disease but without signs or symptoms of HF
  - C
    - Structural heart disease with prior or current symptoms of HF
  - D
    - Refractory HF requiring specialized interventions

Heart Failure Etiologies

- Systolic Dysfunction
  - Dilated Cardiomyopathies
  - Ventricular Hypertrophy
  - Infarction
- Diastolic Dysfunction
  - Increased ventricular stiffness
  - Valvular heart disease
  - Pericardial disease

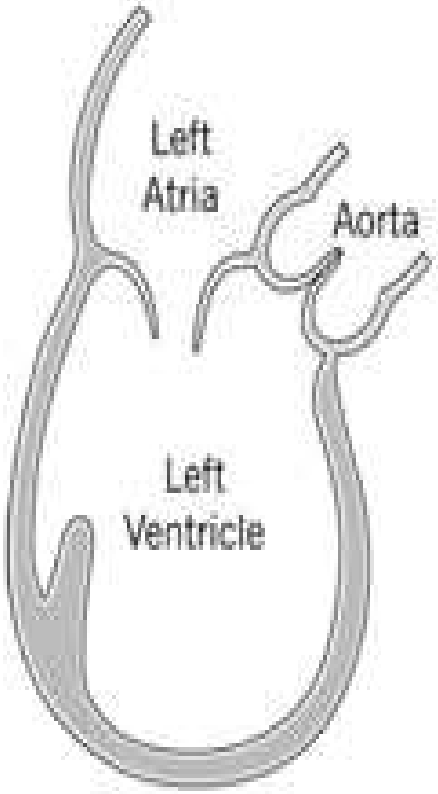


Figure 2
Systolic Heart Failure

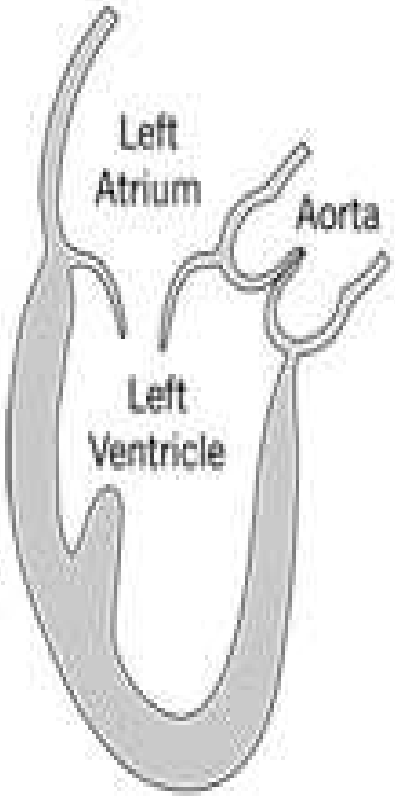


Figure 3
Normal Heart

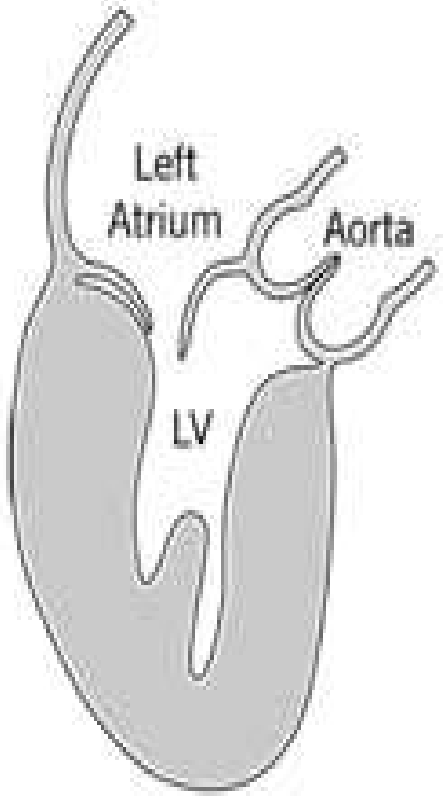
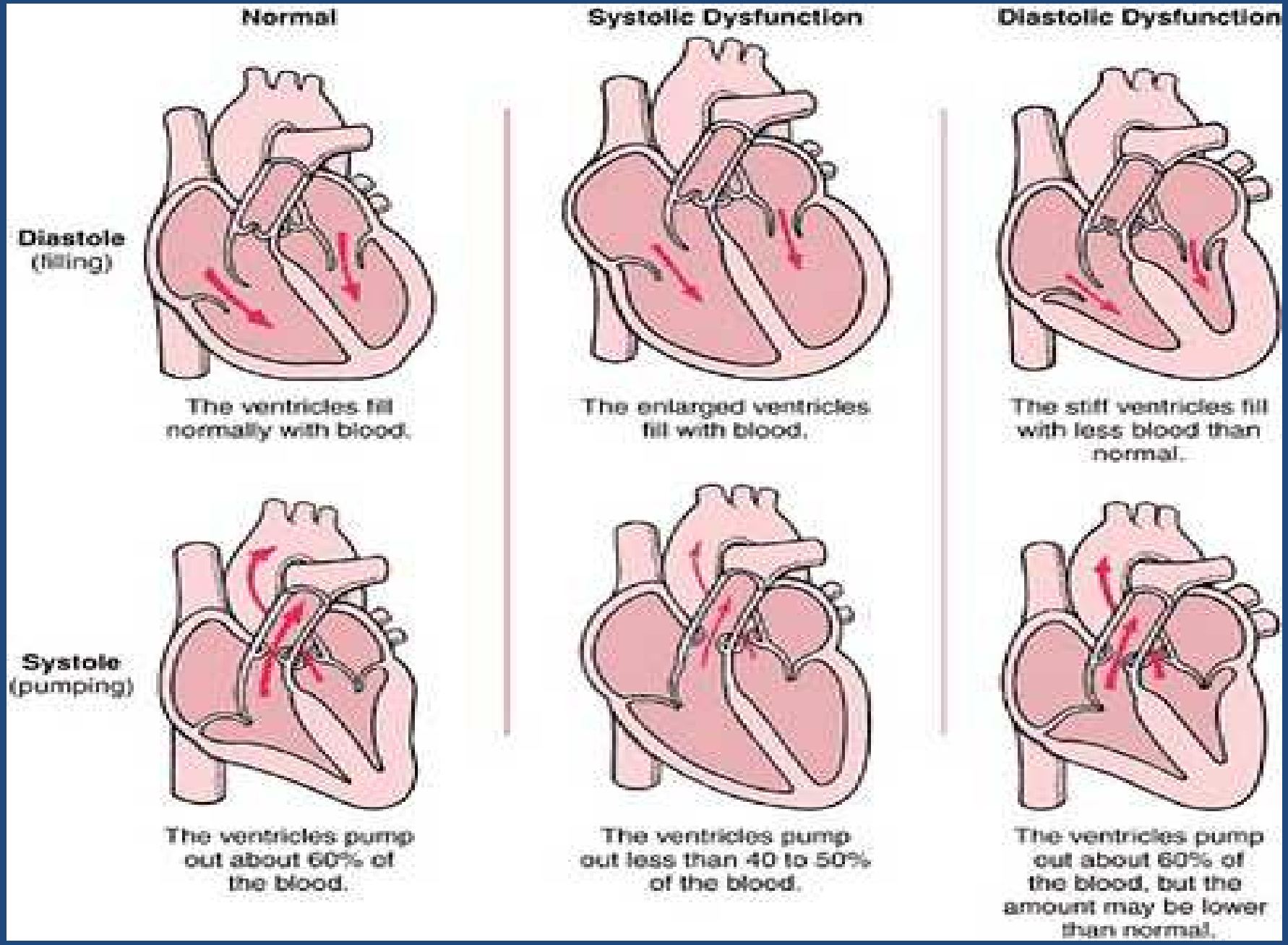


Figure 4
Diastolic Heart Failure

Circulation 2001; 104; e89-e91



http://www.medCirculation 2001; 104; e89-e91.uc.edu/kranias/heart_failure.htm

Medication Therapy for Heart Failure

- Beta Blockers
- Angiotensin Converting Enzyme Inhibitors/ Angiotensin Receptor Binders
- Diuretics
- Aldosterone Antagonists
- Hydralazine/Isosorbide Dinitrate
- Digoxin

Beta Blockers

- Change the progression of the disease
  - Decrease hospitalizations
  - Decrease need for heart transplant
  - Decrease mortality
- Improves survival
- Provides symptomatic and hemodynamic improvement
- Carvedilol, Metoprolol Succinate, Bisoprolol
  - Studied and indicated for use in heart failure

Beta Blockers in Clinical Trials

Trial	Drug	Initial Dose	Maximum Dose
CIBIS-II	Bisoprolol	1.25 mg daily	10 mg daily
COMET	Carvedilol	3.125 mg BID	50 mg BID
COMPARE	Carvedilol-CR	10 mg daily	40-80 mg daily
MERIT-HF	Metoprolol Succ.	12.5-25 mg daily	200 mg daily

Angiotensin Converting Enzyme Inhibitors

- Antagonizes the activation of the RAAS system
- Benefits
  - Improve survival, reduce HF progression, decrease hospitalizations, improve exercise tolerance and reduce dyspnea
- Indicated in ALL patients with heart failure due to left ventricular systolic dysfunction
  - Unless contraindicated

ACEI in Clinical Trials

Trial	Drug	Starting Dose	Maximum Dose
Controlled Trial of Captopril in HF	Captopril	6.25 mg TID	50 mg TID
CONSENSUS	Enalapril	2.5-5 mg BID	10-20 mg BID
ATLAS	Lisinopril	2.5-5 mg daily	20-40 mg daily
FEST	Fosinopril	10 mg daily	40 mg daily
TRACE	Trandolapril	1 mg daily	4 mg daily
Quinapril Heart Failure	Quinapril	5 mg BID	20 mg bid
AIRE	Ramipril	1.25-2.5 mg daily	10 mg daily
PEP-CHF	Perindopril	2 mg daily	8-16 mg daily

Angiotensin Receptor Blockers

- Block angiotensin II effects at the AT_1 Receptor
  - Do not affect bradykinin
- Patients intolerant to ACEI
- Valsartan and Candesartan are FDA approved for use in heart failure
- Adverse Effects
  - Hypotension
  - Renal insufficiency
  - Hyperkalemia
- Contraindications
  - Pregnancy, bilateral renal artery stenosis and hyperkalemia

ARB in Clinical Trials

Trial	Drug	Initial Dose	Maximum Dose
CHARM-ALT	Candesartan	4 mg daily	32 mg daily
VALIANT	Valsartan	20 mg BID	160 mg BID

Diuretics

- Primary target: symptomatic relief
- Thiazides vs. Loops
- Adverse Effects
  - Electrolyte depletion (K, Mg)
    - Cardiac arrhythmias
  - Hypotension
  - Azotemia
- Monitoring
  - Jugular venous pressure, edema, renal function, electrolytes, daily weights

Aldosterone Antagonists

- Block the effects of aldosterone, which is released by angiotensin II stimulation
- Use in patients on optimal heart failure therapy (diuretics, ACEI, beta blockers)
  - Provides mortality benefits
- Recommended for patients with moderately-severe to severe symptoms of HF with reduced LVEF and in certain mild to moderate heart failure (NYHA Class II) patients
- Adverse Effects
  - Hyperkalemia
  - Gynecomastia (spirinolactone)

Aldosterone Antagonists in Clinical Trials

Trial	Drug	Starting Dose	Maximum Dose
RALES	Spironolactone	12.5-25 mg daily	25 mg daily or BID
EPHESUS	Eplerenone	25 mg daily	50 mg daily

Hydralazine/Isosorbide

- Use in patients with symptoms and reduced LVEF that cannot take an ACEI or ARB
- African American > Caucasian patients
  - Considered add-on therapy to standard treatment of heart failure in African Americans
- Adverse Effects
  - Headache
  - Dizziness
  - Nausea
  - Systemic lupus erythematous

Hydralazine/Isosorbide in Clinical Trials

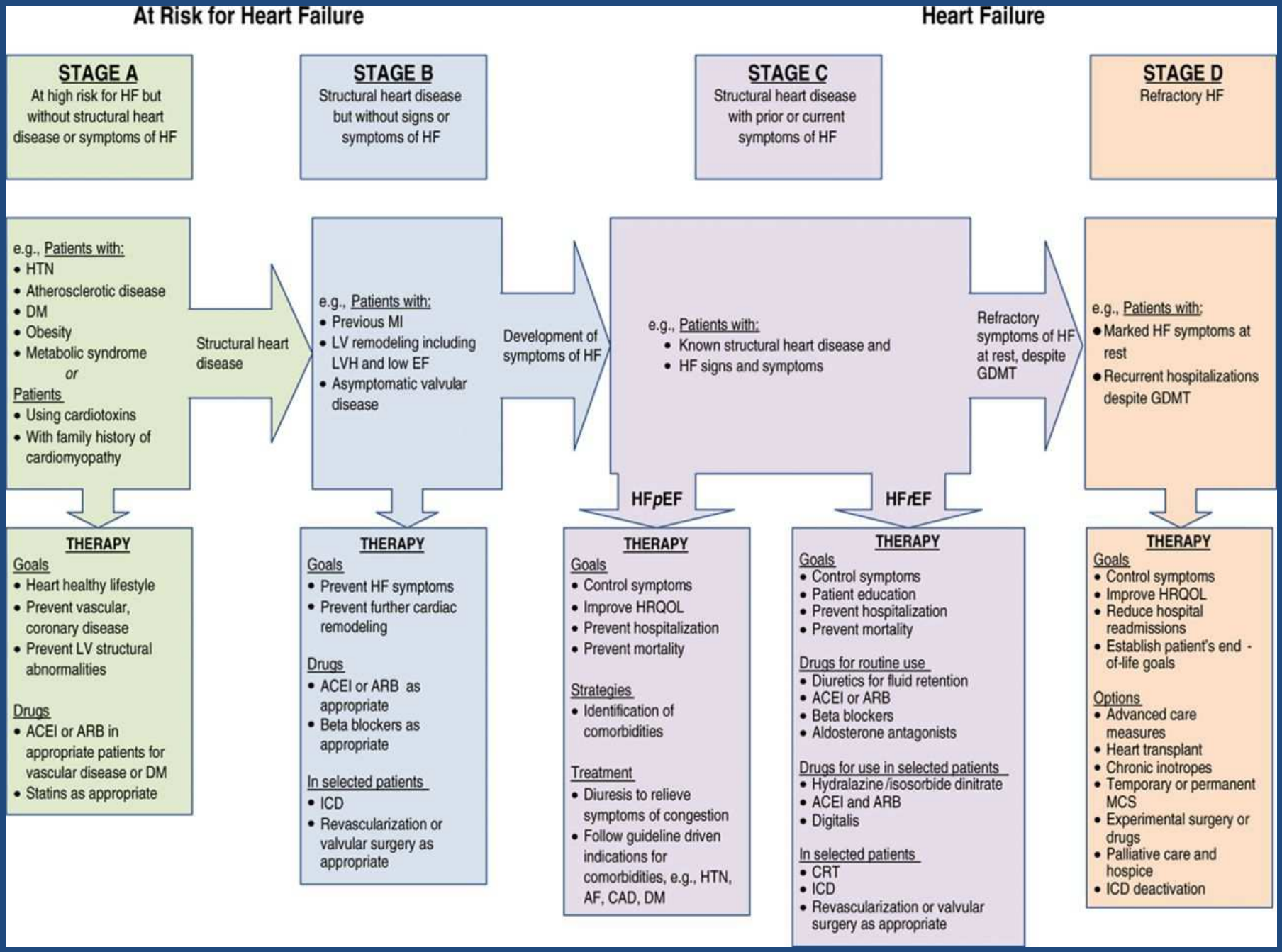
Trial	Drug	Starting Dose	Maximum Dose
V-HeFT	Hydralazine/ Isosorbide Dinitrate	37.5/20 mg TID	75/40 mg TID
A-HeFT	Hydralazine/ Isosorbide Dinitrate	37.5/20 mg TID	225/120 mg TID

Digoxin

- Benefits
  - Improved symptoms of heart failure
  - Improved exercise tolerance
  - Improved quality of life
  - Decreased number of hospitalizations
- No effect on mortality
- Adverse Effects
  - CNS (visual disturbance, photophobia, impaired color vision)
  - GI (anorexia, N/V)
  - Arrhythmia (especially with hypoK+ or hypoMg+)

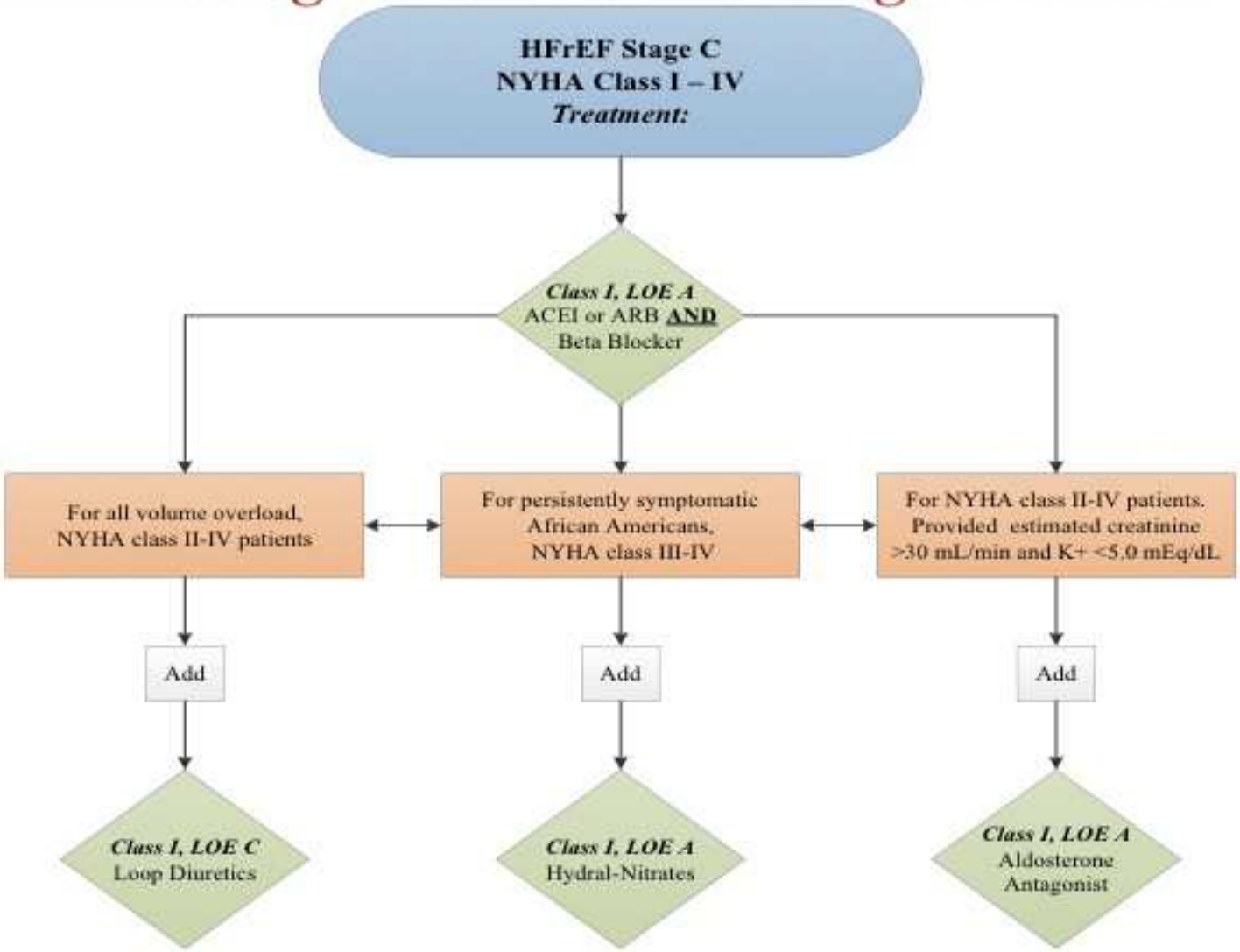
Digoxin in Clinical Trials

Trial	Drug	Median Dose	Outcome
Digitalis Study Group	Digoxin	0.25 mg daily	Decreased hospitalizations; no effect on mortality



Yancy C et al. Circulation 2013;128:e240-e327

Pharmacologic Treatment for Stage C HFrEF



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Additional Recommendations in Stage C Heart Failure

- ARB + ACEI + BB
  - Persistently symptomatic patients with reduced EF in whom an aldosterone antagonist is not indicated/tolerated
- ACEI + ARB + Aldosterone Antagonist
  - Potentially harmful
- Omega-3 Fatty Acids
  - Adjunctive therapy in patients with NYHA class II-IV symptoms and reduced or preserved EF

Additional Recommendations in Stage C Heart Failure

- Nutritional supplements
  - Not recommended with current or prior symptoms of HF with reduced EF
- Hormonal therapies
  - Not recommended except to correct deficiencies

At-Home Monitoring Parameters/Counseling Points

- Daily Weights
  - Assess for volume overload
- Sodium Intake
  - Prevent retaining consumed water
- Water/Fluid Intake
  - Prevent congestive symptoms
- Other medications
  - Certain classes of medications should be avoided because they can worsen your heart failure (Example: NSAIDs)
- Medication compliance
  - Prevent disease progression and exacerbation

References

- UpToDate. Overview of the therapy of heart failure due to systolic dysfunction
- Yancy C et al. 2013 ACCF/AHA Guideline for the Management of Heart Failure. Circulation 2013;128:e240-e327