Cardiovascular Clinical Practice Guideline
Pilot Implementation
Pharmacologic Management of Chronic Heart Failure
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Outline

• Stages of Heart Failure
• Algorithm for treating Heart Failure Stages
• Medications used in Heart Failure
  – ACE Inhibitors
  – β-blockers
  – Diuretics
  – Digoxin
  – ARBs (AIIRAs) angiotensin receptor II blockers
  – Spironolactone
  – Hydralazine / Isosorbide dinitrate
Chronic Heart Failure
Normal Heart Architecture vs Dilated Heart
New York Heart Association Class Symptoms of Disease

- **I**: no physical activity limitations; ordinary activity does not cause fatigue, SOB
- **II**: slight limitation of physical activity; ordinary activity causes fatigue, SOB
- **III**: marked limitation of physical activity; comfortable at rest, but physical activity causes fatigue, SOB, palpitation, angina
- **IV**: symptoms present at rest; unable to carry out physical activity without discomfort
Stages of Heart Failure (ACC/AHA) 
Progression of disease

• Stage A:
  – High risk for developing heart failure, but no structural heart disease or symptoms
  – HTN, DM, CAD, previous exposure to cardiotoxic drugs [adriamycin]; (+) family hx of cardiomyopathy

• Stage B:
  – Evidence of structural heart disease, but no symptoms of heart failure
  – LV systolic dysfunction (LVEF <40%); LVH; previous MI; valvular heart disease
  – Correlates with New York Heart Association Class I
Stages of Heart Failure

• **Stage C:**
  - Evidence of structural heart disease and current or previous symptoms of heart failure
  - Symptoms may be classified as NYHA Class I, II, III or IV HF

• **Stage D:**
  - Refractory symptoms of HF at rest, despite maximal medical therapy, are hospitalized, and require specialized interventions or hospice care
  - All Stage D patients are considered to have NYHA Class IV symptoms
Goals of Therapy for Heart Failure

- Pharmacologic Therapy
  - Improve symptoms
  - Increase functional capacity
  - Improve quality of life
  - Slow disease progression
  - **Reduce need for hospitalization
  - **Prolong survival
- Aim to achieve target doses of medications
- Regular follow-up required to assess medication therapy and assess changes in functional status
Therapy for Heart Failure

• Non-pharmacologic therapy
  – EtOH abstinence
  – Tobacco abstinence / cessation
  – Dietary sodium restriction (2-3 gm / day)
  – Daily weight monitoring
  – Weight reduction, if applicable
  – Participation in exercise programs
  – Always a part of HF therapy, regardless of presence of medication therapy

• Manage other cardiac conditions; underlying causes
  – Treat HTN, lipids, DM, thyroid disease, anemia

• Flu vaccine each Fall; pneumococcal vaccine
Stages of Heart Failure

Stage A
High risk with no symptoms

Stage B
Structural heart disease, no symptoms

Stage C
Structural disease, previous or current symptoms

Stage D
Refractory symptoms requiring special intervention

- Aldosterone antagonist, nesiritide
- Consider multidisciplinary team
- Revascularization, mitral-valve surgery
- Cardiac resynchronization if bundle-branch block present
- Dietary sodium restriction, diuretics, and digoxin
- ACE inhibitors and beta-blockers in all patients
- ACE inhibitors or ARBs in all patients; beta-blockers in selected patients
- Treat hypertension, diabetes, dyslipidemia; ACE inhibitors or ARBs in some patients
- Risk-factor reduction, patient and family education

Hospice
VAD, transplantation
Inotropes
Treatment of Chronic Heart Failure

• **Stage A:**
  – Risk factor modification
  – Treat underlying medical condition (HTN, lipids, etc)

• **Stage B:**
  – Risk factor modification
  – Post MI pts: ACE inhibitor + β-blocker
    • regardless of presence of LV dysfunction
    • Prevent future HF development; improve overall survival
  – Evidence of LV dysfunction, but without symptoms: ACE inhibitor + β-blocker
Treatment of Chronic Heart Failure

- **Stage C**
  - **ACE inhibitor** for all patients, unless not tolerated or contraindicated
    - Reduces mortality
    - Contraindications: angioedema, pregnancy, ↑ K+ > 5.5
  - **β-blocker** should be used with ACE inhibitor, unless not tolerated or contraindicated
    - Reduces mortality
    - Patient must be stable (minimal or no signs of fluid overload)
    - Contraindications: LBBB, 2° heart block
  - **Diuretic** if signs of fluid overload (crackles, S3, edema)
  - **Digoxin** if persistent symptoms despite ACE, β-blocker, diuretic
    - Do not use digoxin if bradycardia
Treatment of Chronic Heart Failure

• Stage C (continued)
  – **AIIRA (ARB)** if unable to tolerate ACE due to cough, angioedema
    • Reduces hospitalizations for HF
  – **Hydralazine / ISDN** if unable to tolerate ACE due to hypotension, renal insufficiency, angioedema
  – **Spironolactone** (aldosterone antagonist)
    • Use low dose if NYHA Class IV HF and LVEF < 35%
    • Must have preserved renal function and normal K+
    • Reduces mortality
    • Reduces hospitalizations for HF
Treatment of Chronic Heart Failure

• **Stage D**
  – Often require special treatment interventions
    • IV inotropes (dobutamine)
    • Mechanical circulatory support (ventricular assist device)
    • Consideration for cardiac transplant
    • Hospice care
  – Refer to HF specialist

• **Special Circumstances:**
  – Afib: warfarin; β-blocker for rate control
  – Diastolic dysfunction:
    • Preserved LV function; “stiff” ventricles
    • Follow annotation “D”; try to reduce Heart Rate (often see CCBs used); treat HTN
Site of Action of HF Medications

- Beta-blockers
- Digoxin, inotropes
- Cardiac-resynchronization therapy
- ACE inhibitors, angiotensin-receptor blockers, aldosterone antagonists
- Diuretics, aldosterone antagonists, nesiritide
- Peripheral arteries
- ACE inhibitors, angiotensin-receptor blockers, vasodilators, alpha-blockade, nesiritide, exercise
ACE Inhibitors

- ↓ mortality 12-30%, ↓ hospitalization rates
- Monitor K+; ↓ dose if K>5.5
  - Be careful if on concomitant K+ supplements; spironolactone
- Monitor SCr; ↓ dose if SCr ↑ > 0.5 mg/dL
- Want to achieve target doses of drugs used in clinical trials (lisinopril > 20 mg/d, enalapril 20 mg/d, captopril 50 mg tid)
- If patient hypotensive, refer to cardiologist
- Common pitfalls:
  - No ACE inhibitor on board
  - Dose too low
  - Cough: ACE often D/C’d without adequate investigation (asthma, allergies, GERD, URI)
ACE Inhibitors

• VANF:
  – Lisinopril ($0.24/day; joint DoD/VA contract)
  – Captopril
  – Fosinopril
  – Enalapril
  – *Ramipril; *Criteria for use

• DoD BCF:
  – Lisinopril ($0.24/day; joint DoD/VA contract)
  – ramipril
β-blockers

- β-blockers have been shown to ↓ mortality 30-35%; ↓ hospitalization
- Metoprolol, carvedilol, bisoprolol have proven benefit
- Caution: Need to “start low” and go slow (q2 week dosage changes)
- Make sure not volume overloaded before initiating
- Monitor weight, HR, and blood pressure when initiating therapy
- If worsening dyspnea, can ↑ diuretic dose
- Avoid heart rate < 50 bpm
- 1st 4-6 weeks is the crucial period
- Educate patients fatigue, SOB will resolve
**β-blockers**

**VANF:**
- Metoprolol immediate release (generic Lopressor) metoprolol tartrate
- *Metoprolol sustained release (Toprol XL) [metoprolol succinate]*
  - Start 25-50 mg qd; goal 200 mg qd, or as tolerated
  - *Criteria for use*
- *Carvedilol (Coreg; mixed α/β blocker, antioxidant)*
  - Start 3.125 mg bid; goal 25 mg BID-50 mg BID
  - *Criteria for use*

**DoD BCF:** Metoprolol immediate release (generic Lopressor) metoprolol tartrate
Diuretics

• Loop diuretics used most commonly
  – Furosemide, bumetanide
  – Loops effective in setting of renal insufficiency, CrCl < 30 mL/Min
    • Thiazides not effective if ↓ renal function
• Decrease symptoms of fluid retention
• If patient resistant to large doses of loops (>160 mg/day furosemide) add metolazone 2-3x/week
  • Watch for electrolyte disturbances, azotemia
• Adjust diuretic dose if ↓ BP, ↓ renal function
• Monitor K+; may need K+ supplement
Digoxin

• Does not improve survival; improves patient symptoms

• Add digoxin in patients who are symptomatic, but do not have bradycardia
  – Added on to ACE, β-blocker, diuretic

• If symptoms don’t improve after 1-2 months, reassess need for digoxin

• Use doses of 0.125 mg if renal insufficiency
AIIRAs (ARBs)

- None are on the VANF or DoD BCF, but contracting initiative is ongoing
- ACE Avg cost/day: $0.24; ARB avg cost/day: $0.75
- Recommended only if patients can’t tolerate or contraindications to ACE
  - ARBs are not superior to ACEs; much more data with ACEs
- Valsartan, candesartan have evidence of ↓ mortality, ↓ hospitalizations
- Unknown if new HF guidelines from ACC/AHA will place ARBs 1st line with ACEs
- If angioedema with ACE, may be able to use an ARB
- Same concerns with renal insufficiency, K+, pregnancy, B/L renal artery stenosis as with ACEs
Hydralazine / ISDN

- Hydralazine: arterial vasodilator
- Isosorbide dinitrate: peripheral vasodilator
- Reserve for ACE intolerant patients
  - Angioedema, renal insufficiency, cough
- Hydralazine: requires multiple daily dosing; dizziness; nausea (take with food); postural hypotension
- ISDN: multiple daily dosing; flushing, H/A
- Use is starting to decrease since ARBs are now available
Spironolactone

• One trial showed ↓ mortality in pts with NYHA class III/IV symptoms and LVEF <35%
• Reserve for moderate to severe patients
• Must monitor K+
  – Caution with ACE; avoid K+ supplement
  – Deaths due hyperkalemia have occurred
• Must monitor renal function
  – Caution in elderly if reduced renal function
  – ↑ risk of hyperkalemia if reduced renal function
• Low dose (25 mg/day)
• Gynecomastia occurs in 10%
• Eplerenone (Inspra):
  – touted to cause less gynecomastia than spironolactone; very expensive; same concerns with K+
Medications to Avoid in HF

• Anti-arrhythmic agents
  – $\uparrow$ risk of sudden death

• Non-dihydropyridine CCBs
  – Avoid verapamil, dilitazem, nifedipine
  – (Dihydropyridine CCBs amlodipine and felodipine have been studied in HF)

• NSAIDS
  – Can use salsalate

• Chemo agents
  – Adriamycin
  – trastuzumab (Herceptin), used in breast CA
Questions??

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