University of New Mexico Hospitals

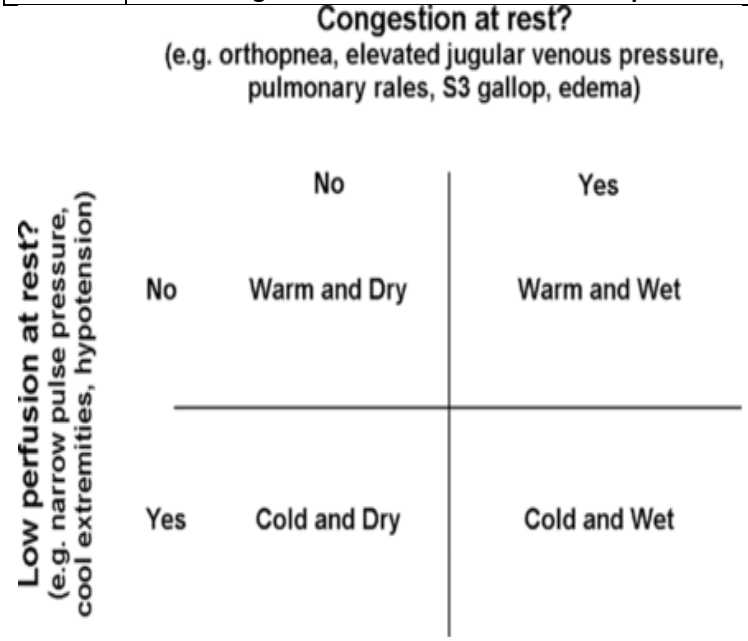
Heart Failure

Heart Failure results from any structural or functional impairment of ventricular filling or ejection of blood.
HFrEF: EF ≤40%, HFpEF: EF ≥50%, HFpEF borderline: EF 41-49%, HFpEF improved: EF >40%

ACCF/AHA Stages of HF		NYHA Functional Classification	
A	High risk for HF but w/o structural heart disease or symptoms of HF	**None**	
B	Structural heart disease but w/o s/s of HF	**I**	No limitation of physical activity. Ordinary physical activity doesn't cause symptoms of HF
C	Structural heart disease with prior or current symptoms of HF	**I**	No limitation of physical activity. Ordinary physical activity doesn't cause symptoms of HF
		II	Slight limitation of physical activity. Comfortable at rest but ordinary physical activity results in symptoms of HF
		III	Marked limitation of physical activity. Comfortable at rest but less than ordinary physical activity results in symptoms of HF
		IV	Unable to carry on any physical activity w/o symptoms of HF or symptoms of HF at rest
D	Refractory HF requiring specialized interventions	**IV**	Unable to carry on any physical activity w/o symptoms of HF or symptoms of HF at rest

- **Labs/Diagnostic tests**: **(ACTIVATE THE HF POWERPLAN):** CBC, UA, serum electrolytes (including Ca+ & Mg2+), BUN, SCr, glucose, fasting lipid profile, LFTs, TSH, screening for hemochromatosis and HIV
- **Place patients on DVT prophylaxis**
- Diagnostic tests for rheumatologic diseases, amyloidosis, pheochromocytoma, 12-lead ECG, BNP, 2-dimensional echocardiogram with Doppler (new HF); EF evaluation in acute change in status

HFrEF	• Na+ is <130mmol/L =Fluid restriction 1.5 L/day • Fluid restriction =2L/day for all other HF pts • **Control**: HTN, lipid disorders, obesity, DMII • **ACEI/ARBs**: **Beta Blockers**: **Statins** (in pts with MI) • **ICD**: reasonable in pts w/ asymptomatic ischemic cardiomyopathy who are at least 40 days post-MI, have an LVEF ≤30%, & on GDMT • **AVOID: Nondihydropyridine CCB as they may be harmful in pts** w/ EF≤40%; tobacco use, cardiotoxic agents
HFpEF	• **HTN**: Use of **beta-blocking agents, ACE inhibitors, and ARBs** • **Diuretics** should be used for relief of symptoms due to volume overload • **Coronary revascularization** for patients w/ CAD in whom angina or demonstrable MI is present despite GDMT • Manage **AF** to improve symptomatic HF • **ARBs might be considered to decrease hospitalizations**



ACC/AHA/HFSA guideline update CHRONIC HF recommendations:

- ACEi or ARB or (ARNI) angiotensin receptor –neprilysin inhibitors + evidence based BB & Aldosterone antagonist in selected pts w/ CHRONIC HFrEF to ↓morbidity & mortality. - PARADIGM trial
- Replace an ACEi or ARB by an ARNI in CHRONIC HFrEF (NYHA class II/III) w/ an adequate BP who are already tolerating a reasonable dose of ACEi or ARB.
  - ❖ ARNI is associated w/ risk of hypotension, renal insufficiency, & angioedema
- Use of ACEi before ARB in pts w/ prior or current symptoms of chronic HFrEF for those pts in whom ARNI is not appropriate, for all classes of HFrEF
- ARNI should not be administered concomitantly w/ ACEi or w/in 36 hrs of the last dose of an ACEi, Or in pt w/ hx of angioedema
- Ivabradine to reduce HF hospitalization in pts w/ symptomatic (NYHA class II-III) stable chronic HFrEF (LVEF ≤35%) receiving guideline-directed evaluation & management, including a BB at max tolerated dose, & who are in SR w/ a HR of 70 bpm or greater at rest.
  - ❖ pts who had a MI w/in 2 months were excluded from trial

Diuretics in HF

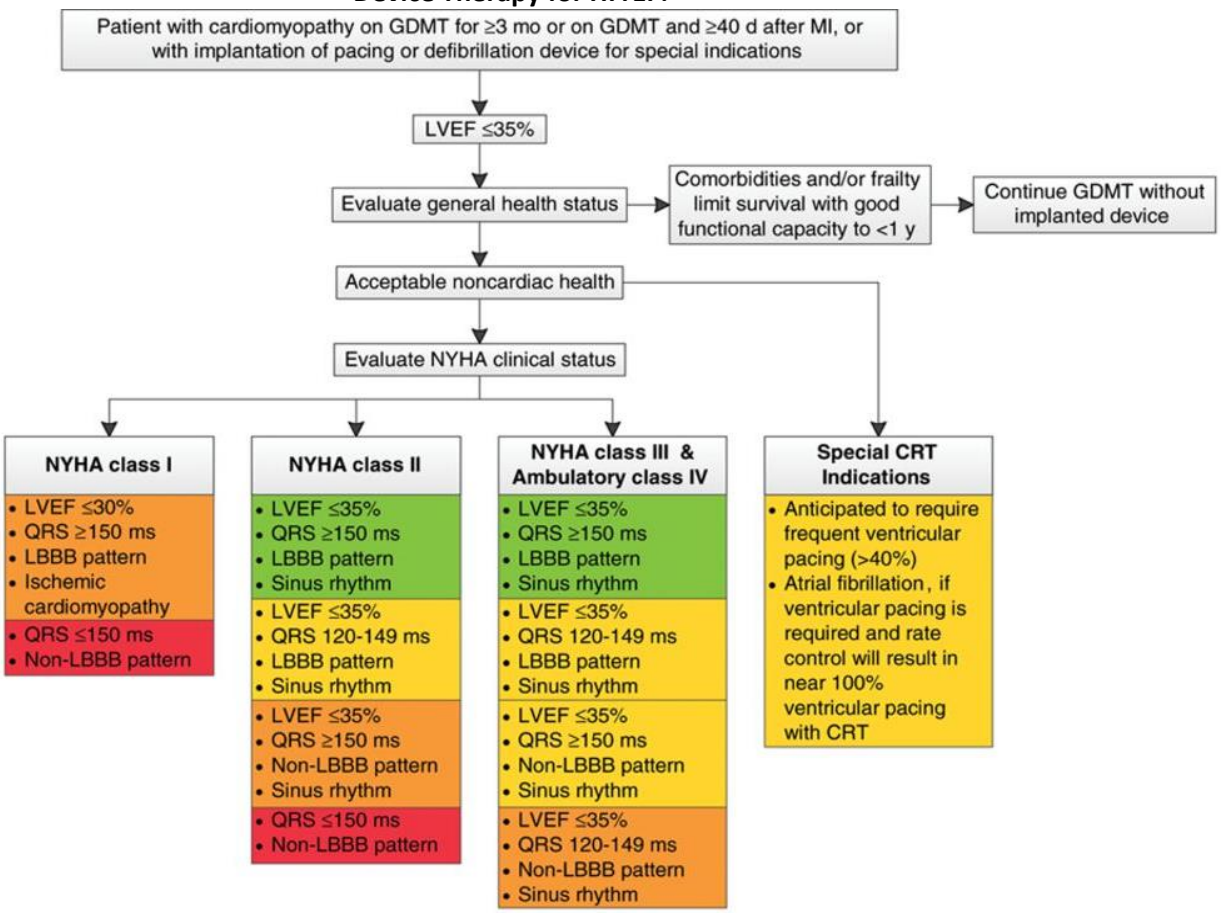
Drug	Initial Dose(s) in **naïve pts**	Max dose/24hr
Loop diuretics:	• Goal is >1 L output within 3-4 hrs of administration • If no response after 1st dose double the dose • **HX of loop diuretic use:** initial dose should be IV and greater than or equal to their chronic oral daily dose; then dose should be serially adjusted Furosemide 40mg =bumetanide 1mg= ethacrynic acid 50mg = torsemide 20mg	
• **Bumetanide**	**IV push**: 1mg BID; any dose over 1mg consider placing in a piggyback 2/2 side effects of a push **IV gtt rate** start at 0.5mg/hr titrate to adequate output **PO**: 0.5 to 1mg daily to BID	10 mg PO/IV push 2mg/hr =gtt rate
• **Furosemide**	**IV push**: 20-40mg BID/TID, doses >40mg consider placing in a piggyback **IV gtt rate**: 10mg/hr titrate up; use nurse titration protocol **PO:** 20 to 40 mg Q day/BID	600 mg
• **Ethacrynic acid (non-sulfa)**	**IV push**: 25-50mg (single IV doses should not exceed 100mg), doses >25mg consider placing in a piggyback **PO**: 25-50mg daily to BID	200 mg
Thiazide diuretics	for sequential nephron blockade: **GIVE 30 min before loop diuretic to be most effective for diuresis**	
• **Chlorothiazide**	250 to **500 mg IV** daily or BID	1000 mg
• **Metolazone**	2.5 to 10 **mg PO** daily or BID (Do not give daily as outpt as pt will get tolerant)	20 mg
Potassium-sparing diuretics* Aldosterone receptor antagonists (AA):	Keep K+ >4 • If acute MI with EF ≤ 40% + s/s of HF or DM • NYHA class II-IV +EF ≤35%, K+<5 and Scr <2 in females and <2.5 in Males • TOPCAT trial: EF ≥45% if pt has had >1 admission of HF in the past yr OR BNP ≥100 **Inappropriate use of AA may be harmful**	
• **Spironolactone**	12.5 to 25 mg daily	50 mg
• **Eplerenone**	25mg daily	50mg

Drugs to treat HF

Class of drug	Recommended population	Drug
Diuretics:	HF w/ fluid retention	***See Diuretics Chart
ACE Inhibitors:	all pts w/ HFrEF	Captopril 6.25 mg 3 times (Max 50 mg 3 times) Lisinopril 2.5 to 5 mg daily (Max 20 to 40 mg once) Enalapril 2.5 mg twice (Max 10 to 20 mg twice) Fosinopril 5 to 10 mg daily (Max 40 mg once) Quinapril 5 mg twice (Max 20 mg twice) Ramipril 1.25 to 2.5 mg daily (Max 10 mg once)
ARBs:	HFrEF who are ACE inhibitor intolerant (only 3 approved in HFrEF)	Losartan 25 to 50 mg daily (Max 50 to 150 mg daily) Valsartan 20 to 40 mg twice (Max 160 mg twice) Candesartan 4 to 8 mg daily (Max 32 mg daily)
Routine combined use of an ACE inhibitor, ARB, and aldosterone antagonist is potentially harmful		
Beta blockers (BB):	Use of 1 of the 3 BB proven to reduce mortality in all stable pts If pt is BB naïve, do not start BB for HF until pt is off IV diuretics	Metoprolol succinate extended release (metoprolol CR/XL) 12.5 to 25 mg once daily (Max 400 mg daily) Carvedilol 3.125 mg twice daily (Max 50 mg twice) Carvedilol CR 10 mg once daily (Max 80 mg once) Bisoprolol 1.25 mg once daily (Max 10 mg once)
Hydralazine and isosorbide dinitrate:	African Americans w/ NYHA class III–IV HFrEF on GDMT, or in pts w/ HFrEF who cannot be given ACEI or ARBs (use of isosorbide mononitrate is used in place of dinitrate for compliance)	Fixed-dose combo: 37.5 mg hydralazine/20 mg ISDN 3 times daily (Max 75 mg hydralazine/40 mg ISDN 3 times daily) Hydralazine: 10-25 mg, 3 or 4 times daily & ISDN: 20- 30mg 3 or 4 times daily (Max Hydralazine: 300 mg daily in divided doses & ISDN: 120 mg daily in divided doses)
Digoxin:	Used in pts who have EF ≤40% and have had ≥2 admission for HF in the last yr	Initial: 0.125-0.25mg daily Low Dose: 0.0625mg daily in pts >70yo, impaired renal function, low lean body mass **Digoxin plasma conc range: 0.5-0.9ng/mL**
Anticoagulation	Pts w/ chronic HF w/ permanent/persistent/paroxysmal AF + an additional risk factor for cardioembolic stroke should receive chronic anticoagulant therapy	
Omega-3 PUFA	Omega-3 PUFA supplementation is reasonable to use as adjunctive therapy in HFrEF or HFpEF pts	

Statins	Statins are not beneficial as adjunctive therapy when prescribed solely for HF
NOT Recommended	• Nutritional supplements as treatment for HF • Hormonal therapies other than to correct deficiencies • Long-term use of an infusion of a positive inotropic drug and may be harmful except as palliation

Device Therapy for HFrEF:



Colors correspond to the class of recommendations in the ACCF/AHA Table 1.

Inotropic support:

- Cardiogenic shock pending definitive therapy or resolution
- BTT or MCS in stage D refractory to GDMT
- Short-term support for threatened end-organ dysfunction in hospitalized pts w/ stage D and severe HFrEF
- Long-term support with continuous infusion palliative therapy in select stage D HF
- Routine IV use, either continuous or intermittent, is potentially harmful in stage D HF
- Short-term IV use in hospitalized pts w/o evidence of shock or threatened end-organ performance is potentially harmful

Adrenergic agonists:		
Dopamine	5-10mcg/kg/min 10-15mcg/kg/min	Caution: MAOI SE: tachyarrhythmias, HA, nausea, tissue necrosis
Dobutamine	2.5-5mcg/kg/min 5-20mcg/kg/min	Caution: MAOI, sulfite allergy SE:BP changes, HA, tachyarrhythmias, nausea, fever, hypersensitivity
PDE Inhibitor:		
Milrinone (can use Beta Blocker)	0.2-0.75mcg/kg/mi	Caution: renal dosing, monitor LFTs SE: tachyarrhythmias, decreased BP

Recs for Hospital Discharge:

- 7 day f/u
- PHQ9- document results in D/C summary
- H/H, BNP prior to discharge
- initiation of GDMT if not done or contraindicated document why
- causes of HF, barriers to care, and limitations in support
- HF education, self-care, emergency plans, and adherence
- palliative or hospice care
- referral to cardiac rehab : Doc in D/C summary "I am referring pt to cardiac rehab for Heart Failure"