HEART FAILURE

HISTORY

Symptoms
- ❑ Dyspnea at rest or with exertion
- ❑ Chronic cough
- ❑ Wheezing
- ❑ Weight gain
- ❑ Fatigue
- ❑ Orthopnea
- ❑ Paroxysmal nocturnal dyspnea
- ❑ Nocturia (greater perfusion of renal vasculature)
- ❑ Peripheral edema
- ❑ Right upper quadrant pain (liver congestion)
- ❑ Anorexia/nausea (edema of the gut or impaired GI perfusion)
- ❑ Chest pain
- ❑ Palpitations (could indicate underlying arrhythmia)

Medical History
- ❑ Heart failure
  - ❑ Last echo
  - ❑ Dry weight
- ❑ Valve disease, new or worsening?
- ❑ Myocarditis
- ❑ Arrhythmia
- ❑ Ischemia/prior ischemic workup
- ❑ Follow with a cardiologist?
- ❑ Family history of heart failure or cardiac disease

Medications
- ❑ Current GDMT therapy
- ❑ Diuretic dose
- ❑ Missed or changed doses?
- ❑ Assess for medication precipitants

Assess for Precipitants
- ❑ Dietary/medication adherence or changes
- ❑ Uncontrolled hypertension
- ❑ Acute infection
- ❑ AKI
- ❑ Pulmonary embolism
- ❑ Toxins, alcohol, cocaine

PHYSICAL EXAM

Cardiac Exam

Inspection & Palpation
- ❑ Laterally displaced and/or enlarged PMI may indicate left ventricular hypertrophy

Auscultation
- ❑ To help determine S1 and S2, you may palpate the right carotid artery while auscultating the chest. S1 falls just before the carotid upstroke, and S2 follows the carotid upstroke
  - ❑ Accentuated second heart sound may be heard in pulmonary hypertension

Abnormal Cardiac Auscultatory Findings
- ❑ Gallops are extra heart sounds (known as S3 and S4), which occur between S2 and S1
  - ❑ 3rd heart sound (systolic dysfunction) "S3" indicates ventricular dilation
  - ❑ 4th heart sound (hypertension and diastolic dysfunction, HCM) "S4" indicates and atrium contracting against a stiff noncompliant left ventricle
- ❑ Murmurs usually indicate valvular pathology

Measuring the Jugular Venous Pressure

Done to assess a patient's intravascular volume status
- ❑ Elevated JVP is indicative of venous congestion

Pulmonary Exam

Auscultation
- ❑ "Cardiac asthma" can be characterized as rales (fine-pitched inspiratory crackles), wet crackles, or wheezing

Percussion
- ❑ Dullness at bases may indicated pleural effusions from fluid overload

Peripheral Exam
- ❑ Assess for warm or cold extremities, capillary refill

Pretibial & Pedal LE Pitting Edema
- ❑ Grade 1 = ≤ 2 mm indentation that disappears immediately
- ❑ Grade 2 = 2-4 mm indentation that lasts 10-15 seconds
- ❑ Grade 3 = 4-6 mm indentation that can last more than a minute
- ❑ Grade 4 = 6-8 mm indentation that can last up to 2-5 minutes

Shifting Dullness Test for Ascites
- ❑ If significant ascites is present, this border will shift which may indicate congestion from volume overload status
- ❑ Hepatomegaly may indicate hepatic congestion from right-sided heart failure

WORKUP

Admission Orders
- ❑ Check NT-proBNP
  - ADHF unlikely if NT-proBNP <300 (NPV 98%), likely if >450 (>900 if age >50)
  - Difficult to interpret in CKD/dialysis. May be falsely low in obesity, HFpEF
- ❑ Ferritin: Screen for & treat iron deficiency in all HF pts independent of Hgb

Medications
- ❑ Avoid: CCB (esp. non-dihydropyridines), NSAIDs, flecainide
- ❑ Other Orders
  - ❑ Telemetry
  - ❑ 2g Na restricted diet
  - ❑ Daily standing weights (get the admission weight!)
  - ❑ Strict I/Os
  - ❑ DVT ppx

STAGING

ACCF/AHA Stages of HF		NYHA Classes of HF		Treatment
A	At high risk for HF but without structural heart disease or symptoms of heart failure	-	-	-
B	Structural heart disease but without signs or symptoms of HF	I	Only with vigorous activities (sports)	• **Initiate ACE inhibitor** • Mild restriction of sodium intake and physical activity • Start a loop diuretic if volume overloaded
C	Structural heart disease with prior or current symptoms of HF	II	With prolonged or moderate exertion (climbing stairs, carrying heavy packages)	• **Initiate an ACE inhibitor AND a loop diuretic** • Add a beta-blocker if no response
		III	With activities of daily living (walking across the room, getting dressed)	
D	Refractory HF requiring specialized interventions	IV	At rest *will also be diaphoretic and have cool extremities at rest	• **Add digoxin (to loop diuretic and ACE inhibitor)** • Add spironolactone if still symptomatic

MANAGEMENT

Early/Acute Management

- ❑ IV loop diuretics 2-2.5x home dose at infusion rate of 20mg/hr

	Furosemide	Torsemide	Bumetanide	Ethacrynic Acid
IV to oral dosing	1:2	1:1	1:1	1:1
PO Equivalent Across Medications	40mg	20mg	1mg	50mg
IV Equivalent Across Medications	20mg	20mg	1mg	50mg

- ❑ Diuretic naïve → IV furosemide 20-40mg 2-3 times daily (20-80 mg) if creatinine clearance is <60)
- ❑ Refractory diuresis: metolazone 2.5-5mg (or chlorothiazide 500mg IV) administered 30min before loop diuretic. May need RHC to clarify hemodynamics or inotropes to augment diuresis. Acetazolamide (500mg daily) may also augment successful decongestion.
- ❑ Worsening renal function occurs in ~23% of pts being treated. Mild-mod "Cr bumps" are likely benign hemodynamic changes.
- ❑ Endpoints: target resolution of signs/symptoms of congestion. Daily weights & hemoconcentration are useful adjuncts.

- ❑ If acute pulmonary edema, NIPPV may improve mortality and reduce need for intubation
- ❑ Vasodilators: arterial/venous dilation can relieve symptoms
  - ❑ Consider esp. in severe HTN, acute MR, acute AR
  - ❑ Floor: isosorbide dinitrate, hydralazine, nitropaste, captopril; SDU/CCU: TNG, nitroprusside
- ❑ Guideline-Directed Medical Therapy (GDMT): if not in cardiogenic shock or new AKI, continue ACEi/ARB/ARNi and βB during ADHF (but do not newly initiate βB)

Guideline-Directed Medical Therapy (GDMT)

Many different methods for initiating and sequencing medications in GDMT

- ❑ Traditional Sequencing
  - ❑ Day 1: initiate ACE inhibitors and titrate to maximum tolerable dose
  - ❑ Week 1-2: initiate beta blocker and titrate to maximum tolerable dose
  - ❑ Week 3-4: initiate MRA and titrate to maximum tolerable dose
  - ❑ Week 4-7: switch to ARNi after 36-hour washout period of ACE inhibitor and titrate to maximum tolerable dose
  - ❑ Week 7-36: initiate SGLT2i and titrate to maximum tolerable dose
- ❑ Rapid Sequencing
  - ❑ Day 1: initiate ARNi, beta-blocker, MRA, and SGLT2i,
  - ❑ Titrate beta blocker in 1–2-week intervals
  - ❑ Titrate ARNi and MRA in 3–4-week intervals
- ❑ Rapid Low Dose Approach
  - ❑ Day 1: initiate beta blocker and SGLT2i, increase doses every 1-2 days (every 2 weeks if outpatient)
  - ❑ Week 1-2: Initiate ARNI and titrate to maximum dose
  - ❑ Week 3-4: Initiate MRA and titrate to maximum dose

Pre-Discharge Optimization

- ❑ Document d/c weight & NT-proBNP
- ❑ Appointment with PCP and/or cardiology
- ❑ Diuretic plan: determine maintenance diuretic dose and provide specific instructions for taking additional rescue doses.
- ❑ Observe on maintenance dose and decide if needs K replacement

TRIALS & STUDIES

RALES (1999)
Spironolactone reduces morbidity and mortality in patients with class III or IV heart failure. It is contraindicated in renal failure.

CONSENSUS (1987) & SOLVD (1991)
ACE inhibitors reduce mortality, prolong survival, and alleviate symptoms in mild, moderate, and severe CHF.

COMET (2003)
Compared two β -blockers in the treatment of CHF and showed that carvedilol led to significant improvement in survival compared with metoprolol.

PARADIGM-HF (2014)
(ARNI)—sacubitril-valsartan was found to be superior to enalapril with respect to mortality and hospitalizations in patients with HFrEF.

PIONEER-HF (2019)
Sacubitril-valsartan is safe to initiate in patients with acute decompensated HF.

DAPA-HF (2019)
Among patients with HFrEF with or without diabetes, initiation of dapagliflozin decreased rates of CV death, worsening HF and all-cause mortality.

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