Heart Failure

HFrEF vs HFpEF, stages, GDMT pillars, warm/cold profiles, shock and diuretics

TYPES, STAGES AND NYHA CLASS

2022 AHA/ACC/HFSA cut-offs. Finerenone, a nonsteroidal MRA, is FDA-approved (2025) for LVEF ≥40%, not HFrEF.

TYPE	LVEF	EXAM POINT
HFrEF	≤40%	Four pillars cut deaths
HFmrEF	41–49%	SGLT2i; MRA or ARNi may help
HFpEF	≥50%	SGLT2i; treat BP, AF, congestion
HFimpEF	Was ≤40%, now >40%	Keep GDMT

STAGE	MEANING
A	At risk (HTN, diabetes, obesity, CAD, cardiotoxins); no structural disease
B	Pre-HF: structural change or high BNP; never symptomatic
C	Structural disease with current or past symptoms
D	Advanced: marked symptoms, repeat admissions despite optimized GDMT

- NYHA I: no limits from HF
- NYHA II: symptoms with ordinary activity
- NYHA III: symptoms with less than ordinary activity
- NYHA IV: symptoms at rest or with any activity

EXAM TIP Stages never move backward: stage C stays C even when symptoms resolve. NYHA class can improve or worsen.

LEFT VS RIGHT FAILURE

LEFT-SIDED (LUNGS)	RIGHT-SIDED (BODY)
Dyspnea, orthopnea, PND, fatigue	JVD, hepatojugular reflux
Crackles, cough	Dependent pitting edema
S3 gallop	Hepatomegaly, ascites, early satiety
High PCWP	High CVP

Left-sided failure is the most common cause of right-sided failure. Obesity lowers BNP and NT-proBNP.

HFREF: THE FOUR PILLARS

Start all four unless contraindicated; titrate per your institution's protocols. Diuretics ease congestion but are not a pillar.

PILLAR	EXAMPLES	WATCH FOR
ARNi (preferred), ACEi or ARB	Sacubitril-valsartan, lisinopril, losartan	Low BP, high K; 36 h ACEi washout before ARNi; no ARNi or ACEi after angioedema
Beta-blocker	Carvedilol, metoprolol succinate, bisoprolol	Bradycardia; not started on IV inotropes; never stop abruptly
MRA	Spironolactone, eplerenone	Start if eGFR >30 and K <5.0; stop if K stays ≥5.5
SGLT2i	Dapagliflozin, empagliflozin	No diabetes needed; genital infection, volume loss, euglycemic DKA; hold ≥3 days before surgery

ACEi dry cough: switch to an ARNi or ARB. Add hydralazine-isosorbide dinitrate for self-identified African American patients with NYHA III–IV symptoms despite optimal therapy.

EXAM TIP Only carvedilol, bisoprolol and metoprolol succinate are proven in HFrEF; metoprolol tartrate is not. Sacubitril-valsartan raises BNP but not NT-proBNP, so follow NT-proBNP.

DECOMPENSATED HF AND SHOCK

Wet = congested (crackles, JVD, edema, weight gain). Cold = poorly perfused (cool skin, narrow pulse pressure, confusion, low urine output, rising lactate).

PROFILE	PICTURE	TREATMENT FOCUS
Warm-dry	Compensated	Titrate oral GDMT
Warm-wet	Most common	IV loop diuretic; vasodilator (nitroglycerin, nitroprusside) if BP allows
Cold-wet	Worst outlook	Inotrope plus diuretic; MCS if failing
Cold-dry	Uncommon	Cautious fluids; inotrope if needed

Pulmonary edema: sit upright, give oxygen and an IV loop diuretic; track urine output, K, BP. Keep GDMT unless contraindicated (e.g., shock); hold or reduce the beta-blocker for marked overload or low output. Refractory congestion: ultrafiltration or CRRT.

EXAM TIP Milrinone (a PDE3 inhibitor) works despite beta-blockers. It vasodilates (watch BP) and needs a lower rate in renal impairment.

SAFETY Cardiogenic shock: SBP <90 mm Hg for >30 min or pressors needed, plus hypoperfusion (urine <30 mL/h, lactate >2 mmol/L); typically CI <2.2 and PCWP >15. Revascularize if MI. Norepinephrine for hypotension, plus an inotrope (dobutamine or milrinone) for low output. Temporary MCS (e.g., Impella, VA-ECMO) if drugs fail; routine IABP or ECMO is not advised in MI shock.

DIURETIC MONITORING

- Daily standing weight, same time; strict intake and output
- Daily K, Mg, Na, BUN and creatinine while titrating
- BP and orthostatic symptoms; avoid over-diuresis
- Push usual IV furosemide doses (20–80 mg) over 1–2 min; infuse high doses no faster than 4 mg/min
- Tinnitus or hearing loss: ototoxicity (rapid or high doses, renal failure, aminoglycosides)
- Poor response: higher IV loop dose, or add metolazone (watch K, Na)
- Small creatinine rise with good decongestion: not a reason to stop

IV loop doses often start at ≥2× the home oral dose, per your institution's protocols.

SAFETY Low K or Mg raises the risk of digoxin toxicity. MRAs and ACEi/ARB/ARNi raise K; check labs before giving.

PATIENT TEACHING

- Weigh each morning after voiding, before eating, same scale
- Report a gain of 2–3 lb in a day or 5 lb in a week, or new dyspnea or swelling
- Limit sodium (processed, canned, restaurant food); often 1,500–2,300 mg/day
- Restrict fluids only if prescribed
- Take GDMT daily even when well; never stop a beta-blocker suddenly
- Avoid NSAIDs and potassium salt substitutes
- Take the diuretic early in the day; rise slowly; stay active

Sources (26) are listed with links at icubasics.com/sheets/heart-failure.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.