Terminology updates

- Systolic heart failure → Heart Failure with reduced Ejection Fraction (HFrEF)
    - LVEF ≤40%
- Diastolic heart failure → Heart Failure with preserved Ejection Fraction (HFpEF)
    - LVEF ≥50%
- Heart Failure with mildly reduced Ejection Fraction (HFmrEF)
    - LVEF 40-50%
- Heart Failure with improved Ejection Fraction (HFimPEF)
    i. Symptomatic HF with a baseline LVEF ≤40%, a ≥10-point increase from baseline LVEF, and a second measurement of LVEF >40%

ACC/AHA Staging

- ACC/AHA Stage A: At risk for heart failure
    - No signs or symptoms of heart failure
    - Normal biomarkers and no evidence of structural/functional heart failure
    - Risk factors include HTN, DM, CAD, obesity, exposure to cardiotoxic medications, familial cardiomyopathy, etc.
- ACC/AHA Stage B: Pre-heart failure
    - No signs or symptoms of heart failure, but at least ONE of the following:
        - Structural heart disease
        - Elevated filling pressures
        - Risk factors w/ increased BNP or persistently elevated troponin
- ACC/AHA Stage C: Symptomatic heart failure
    - Current or previous signs/symptoms of heart failure
- ACC/AHA Stage D: Advanced heart failure
    - Marked heart failure symptoms interfering with daily life and w/ recurrent hospitalizations despite GDMT

NYHA Functional Classification

- NYHA FC I: No symptoms or limitations with ordinary activity
- NYHA FC II: Slight limitation of physical activity
- NYHA FC III: Marked limitation of physical activity, no symptoms at rest
- NYHA FC IV: Unable to carry out physical activity, even at rest

Targeted Treatment Pathways

- Catecholamine stimulation → Beta Blockers (BB)
- Vasoconstriction → Hydralazine/isosorbide dinitrate
- Renin-angiotensin-aldosterone → Angiotensin converting enzyme inhibitors (ACEi), Angiotensin receptor blockers (ARB), Angiotensin receptor II blocker-neprolysin inhibitors (ARNi), Mineralocorticoid receptor antagonists (MRA)
- Sodium-glucose co-transporters → Sodium-glucose co-transporter II inhibitors (SGLT2i)

Current Guideline Recommendations (2022 guidelines are italicized)
MEDICATION RECOMMENDATIONS

1. **HFrEF ACC/AHA Stage A**

Class 1 Recommendations

a. 1 (LOE A) recommendations
    i. *SGLT2i should be used in patients who have Type 2 Diabetes Mellitus AND either established cardiovascular disease OR high cardiovascular risk*

2. HFrEF ACC/AHA Stage B

Class 1 Recommendations

a. 1 (LOE A)
    i. ACEi for LVEF ≤40%
    ii. Statin for remote hx of MI or ACS
b. 1 (LOE B-R)
    i. BB for LVEF ≤40% and recent/remote hx of MI or ACS
c. 1 (LOE C-LD)
    i. BB for LVEF ≤40% in the absence of MI or ACS

Class 3 Recommendations

d. 3 (LOE B-R)
    i. Thiazolidinediones increase the risk of heart failure and heart failure related hospitalizations in patients with LVEF <50%
e. 3 (LOE C-LD)
    i. Nondihydropyridine calcium channel blockers (CCBs) may be harmful

3. HFrEF ACC/AHA Stage C

Class 1 Recommendations

a. 1 (LOE A)
    i. ARNi in patients with HFrEF and current/previous NYHA FC II-III symptoms
        1. ACEi if ARNi not feasible, ARB if intolerant to ACEi
    ii. BB in patients with HFrEF and current/previous symptoms of heart failure (bisoprolol, carvedilol, metoprolol succinate)
    iii. MRA in patients with HFrEF and NYHA II-IV symptoms if eGFR is >30 and serum potassium is <5
    iv. SGLT2-I in patients with symptomatic HFrEF, irrespective of the presence of T2DM
    v. Hydralazine/isosorbide dinitrate in combination for patients who self-identify as African American with NYHA III-IV heart failure on optimal medial therapy
b. 1 (LOE B-R)
    i. ARNi for patients with chronic, symptomatic HFrEF and NYHA FC II-III symptoms already tolerating ACEi or ARB
c. 1 (LOE B-NR)
    i. Diuretic therapy recommended to relieve congestion in patients with HF who have fluid retention
    ii. Thiazide diuretic can be added when patients do not respond to moderate or high dose loop diuretics

Class 2 Recommendations

d. 2a (LOE B-R)

i. Ivabradine for patients with symptomatic, NYHA FC II-III stable, chronic HFrEF (LVEF <35%) who are already receiving GDMT including maximally tolerated BB, and who continue to be in NSR with a HR ≥70 at rest

e. 2b (LOE B-R)
   i. ***Oral soluble guanylate cyclase stimulator (vericiguat)*** *may be considered In selected high-risk patients with HFrEF and recent worsening of HF already on GDMT to reduce HF hospitalization and cardiovascular death*

f. 2b (LOE C-LD)
   i. Hydralazine/isosorbide dinitrate can be considered in patients with current or previous symptomatic HFrEF who are unable to receive first line agents such as ARNi, ACEi, or ARB

Class 3 Recommendations

g. 3 (LOE A)
   i. Dihydropyridine CCBs should not be used to treat heart failure
   ii. Non-dihydropyridine CCBs are not recommended
   iii. Class 1C antiarrhythmic medications and dronedarone may increase mortality
   iv. Thiazolidinediones increase the risk of worsening HF symptoms and hospitalizations

h. 3 (LOE B-R)
   i. ARNi should not be administered concomitantly or within 36hrs of ACEi
   ii. Vitamins, nutritional supplements, and hormonal therapy are not recommended in patients with HFrEF other than to correct specific deficiencies
   iii. DPP-4 inhibitors can increase the risk of heart failure hospitalization in T2DM
   iv. NSAIDs worsen HF symptoms and should be avoided or withdrawn
   v. MRA should be discontinued in patients whose serum potassium cannot be maintained <5.5

i. 3 (LOE C-LD)
   i. ARNi and ACEi should not be administered to patients with any history of angioedema

Additional recommendations for ACC/AHA Stage C HFrEF

j. IV Iron
k. Cardiac Rehab
l. Palliative Care
m. Tight glycemic control for type 2 diabetics
n. Management of obstructive sleep apnea

4. HFrEF ACC/AHA Stage D

Class 1 Recommendations

a. 1 (LOE C-LD)
   i. When consistent with the patient's goals of care, timely referral for HF specialty care is recommended to review HF management and assess

suitability for advanced HF therapies (e.g., LVAD, cardiac transplantation, palliative care, and palliative inotropes)

5. **HF(MR)EF**

Class 2 Recommendations

a. 2a (LOE B-R)
    i. *SGLT2-I can be beneficial in decreasing heart failure hospitalizations and cardiovascular mortality*
b. 2a (LOE B-NR)
    i. BB, ARNi, ACEi, ARB, and MRA may all be considered to reduce the risk of hospitalization and CV mortality – particularly if LVEF is on the lower end of spectrum (i.e. 41% instead of 49%)

6. **HF(IMP)EF**

Class 1 Recommendations

a. 1 (LOE B-R)
    i. GDMT should be continued to prevent relapse of heart failure and recurrent LV dysfunction, even in patients who may become symptomatic

7. **HFPEF**

Class 1 Recommendations

a. 1 (LOE C-LD)
    i. Patients with HFpEF and HTN should have medication titrated to attain blood pressure targets in accordance with published clinical practice guidelines

Class 2 Recommendations

b. 2a (LOE B-R)
    i. *SGLT2i may be beneficial in decreasing heart failure hospitalizations and CV mortality*
c. 2a (LOE C-EO)
    i. Management of atrial fibrillation can be useful to improve symptoms
d. 2b (LOE B-R)
    i. MRA, ARB, and ARNi may be considered to decrease hospitalizations in selected patients

Class 3 Recommendations

e. 3 (LOE B-R)
    i. Routine use of PDE-5 inhibitors to increase activity or quality of life is ineffective

DEVICE RECOMMENDATIONS

1. ICD

- **1 (LOE A):** Primary prevention for patients with:
    - NICM or ischemic heart disease at least 40 days post-MI w/ LVEF ≤35%
    - NYHA FC II or III symptoms on GDMT
    - Expectation of meaningful survival >1yr
- **1 (LOE B-R):** Primary prevention for patients with:
    - LVEF ≤30% at least 40 days post-MI

    - NYHA FC I symptoms on GDMT
    - Expectation of meaningful survival >1yr

2. CRT-D

- **1 (LOE B-R):** Primary prevention for patients with:
    - LVEF ≤35%
    - Sinus rhythm, LBBB
    - QRS duration ≥150ms
    - NYHA FC II-III or ambulatory FC IV symptoms on GDMT

3. MitraClip

- **2a (LOE B-R):** *In patients with chronic severe secondary MR related to LV systolic dysfunction (LVEF <50%) who have persistent symptoms (NYHA class II, III, or IV) while on optimal GDMT for HF (Stage D), TEER is reasonable in patients with appropriate anatomy as defined on TEE and with LVEF between 20-50%, LVESD ≤70mm, and pulmonary artery systolic pressure ≤70mmHg.*

4. CardioMEMS

- **2b (LOE B-R):** *In selected adult patients with NYHA FC III symptoms and history of heart failure hospitalization in the past year OR elevated BNP on maximally tolerated stable GDMT and optimal device therapy, the usefulness of wireless monitoring of PA pressure by an implanted hemodynamic monitor to reduce the risk of HF hospitalizations is uncertain*

5. LVAD (ACC/AHA Stage D ONLY)

- **1 (LOE A):** In select patients with advanced HFrEF with NYHA FC IV symptoms who are dependent on continuous inotropic therapy or temporary MCS, durable LVAD implantation is effective for improving functional status, quality of life, and survival
- **2a (LOE B-R):** In patients with advanced HFrEF who have NYHA FC IV symptoms despite maximally tolerated doses of guideline directed medical therapies, durable MCS can be beneficial to improve symptoms, functional class, and to reduce mortality

6. Heart Transplant (ACC/AHA Stage D ONLY)

- **1 (LOE C-LD):** For selected patients with advanced heart failure despite guideline directed medical therapy, cardiac transplantation is indicated to improve survival and quality of life

7. Additional devices mentioned in guidelines with no formal recommendation:

- Baroreflex activation
- Cardiac contractility modulation