2022 ACC HF GUIDELINES

Date	@August 10, 2025
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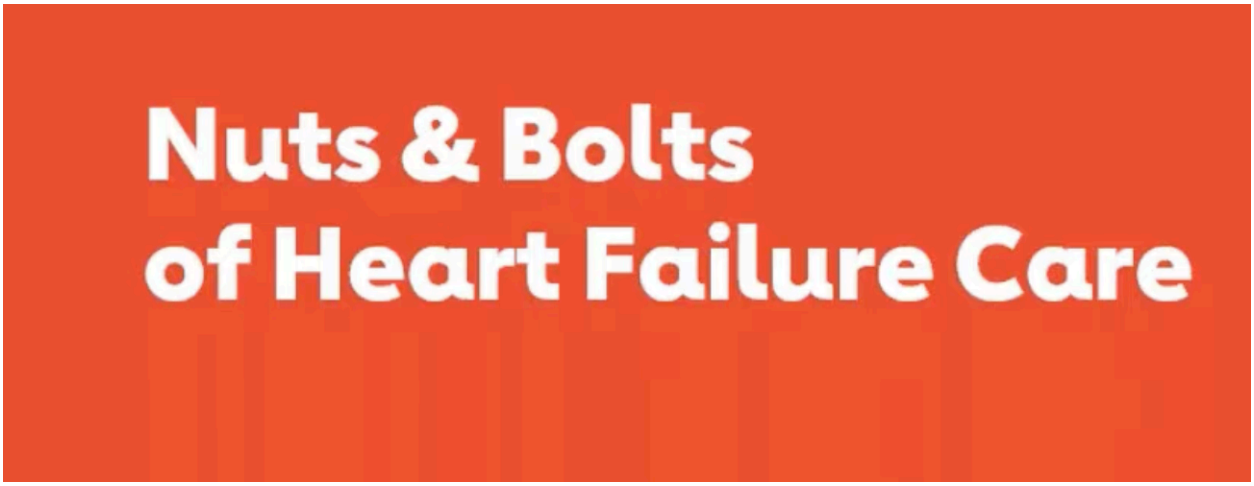
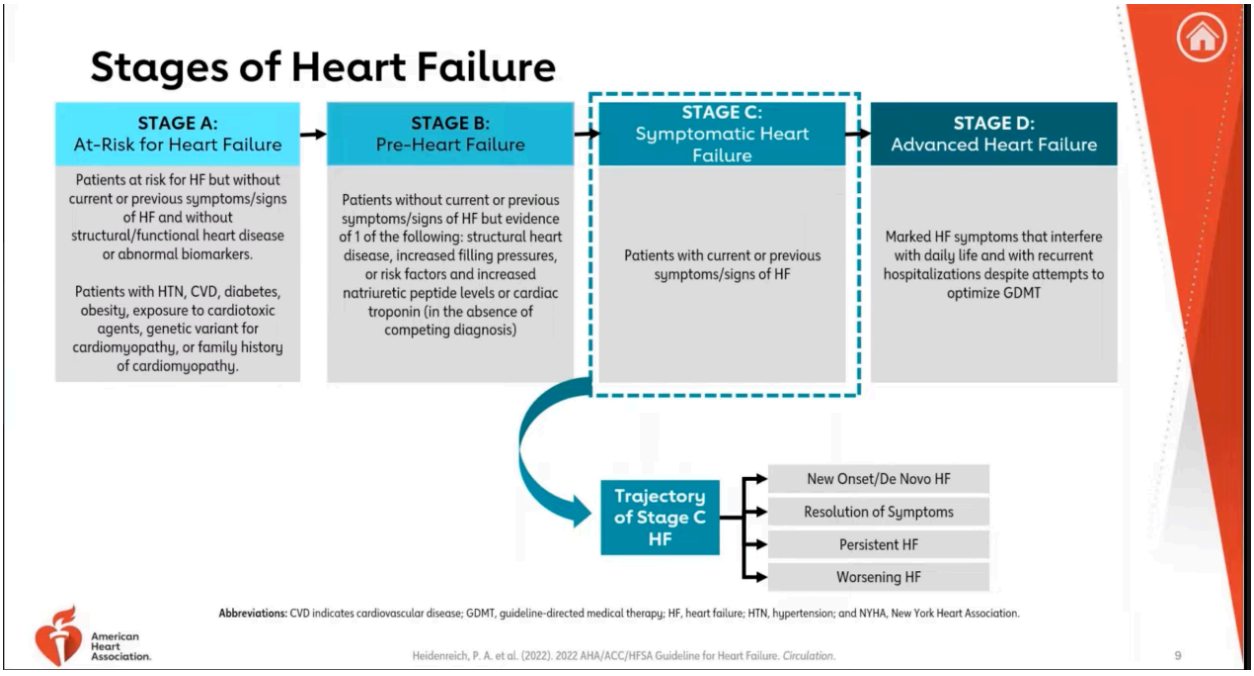
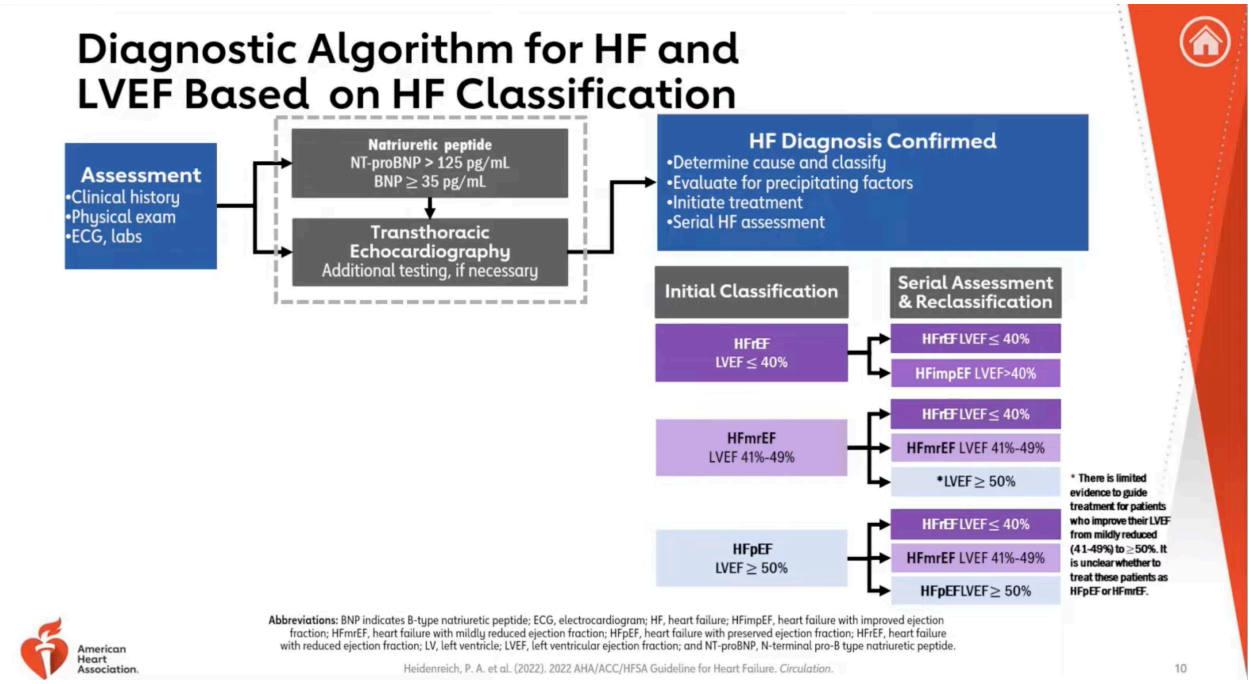




Good morning. We're looking at the **AHA/ACC stages of heart failure**. This system is critical for understanding disease progression and guiding treatment.

- **Stage A** is **at-risk heart failure**. These patients have risk factors like hypertension or diabetes but no structural heart disease and no symptoms. Our goal is prevention.
- **Stage B** is **pre-heart failure**. Patients have structural changes, like a low ejection fraction, but are still asymptomatic. We start therapies here to prevent progression.
- **Stage C** is **symptomatic heart failure**. These patients have current or previous symptoms, such as dyspnea or edema. This is where we focus on managing symptoms and optimizing guideline-directed medical therapy.
- **Stage D** is **advanced heart failure**. Patients have severe symptoms despite optimal treatment. They require advanced therapies like transplantation or palliative care.

This staging system gives us a roadmap from prevention to advanced care, distinct from the NYHA classification which only focuses on symptoms.



Diagnostic Algorithm for Heart Failure

This slide outlines the diagnostic algorithm for heart failure, integrating clinical assessment with key diagnostic tests to confirm the diagnosis and classify the

type of heart failure.

It all starts with a comprehensive **initial assessment**, which includes the patient's **clinical history**, a thorough **physical exam**, and initial tests like an **ECG and routine labs**. This is where you'll be looking for classic symptoms like dyspnea, orthopnea, or edema, as well as signs like an S3 gallop or jugular venous distension.

If heart failure is suspected, the next step is to measure **natriuretic peptides**. The slide specifies cutoffs: a **BNP of 35 pg/mL or greater**, or an **NT-proBNP of 125 pg/mL or greater**. An elevated natriuretic peptide level is highly suggestive of heart failure, though other conditions can also cause an increase.

The next crucial test is a **transthoracic echocardiogram**. This is non-negotiable. The echo provides essential information about the heart's structure and function, particularly the **left ventricular ejection fraction (LVEF)**. The LVEF is what allows us to classify the type of heart failure.

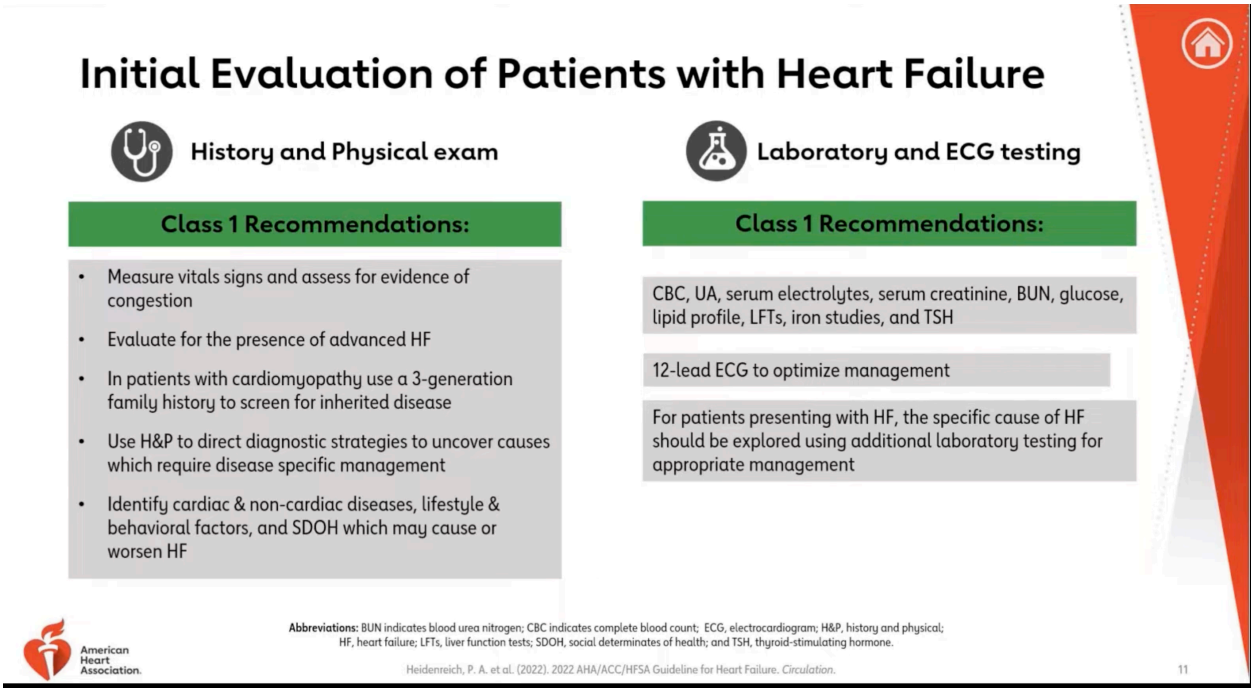
Based on the LVEF, we can make an initial classification:

- **HFrEF (Heart Failure with reduced Ejection Fraction):** This is defined by an **LVEF of 40% or less**. This is the classic systolic heart failure where the heart can't pump effectively.
- **HFmrEF (Heart Failure with mildly reduced Ejection Fraction):** This is for patients with an **LVEF between 41% and 49%**. This is a newer classification for a group of patients who don't quite fit into HFrEF or HFpEF.
- **HFpEF (Heart Failure with preserved Ejection Fraction):** This is when the **LVEF is 50% or greater**. In these patients, the heart's pumping function is preserved, but the issue is typically diastolic dysfunction, meaning the ventricle can't relax and fill properly.

Once the diagnosis is confirmed and classified, the algorithm shifts to management. We need to **evaluate for precipitating factors** like a recent MI or arrhythmias, **initiate appropriate treatment** based on the specific classification, and then perform **serial heart failure assessments** to monitor the patient's response to therapy.

The bottom half of the slide addresses how we **reclassify patients** over time. For example, a patient with HFrEF whose LVEF improves to over 40% is now classified

as having **heart failure with improved ejection fraction** (HFimpEF). This is an important distinction, as these patients should continue on their evidence-based HFrEF therapies, even with the improved LVEF. Conversely, a patient initially classified as HFmrEF might be reclassified if their LVEF changes over time.. This slide outlines the **initial evaluation for patients with heart failure**, a critical first step in management. It's broken down into two main sections: the **history and physical exam**, and **laboratory and ECG testing**.

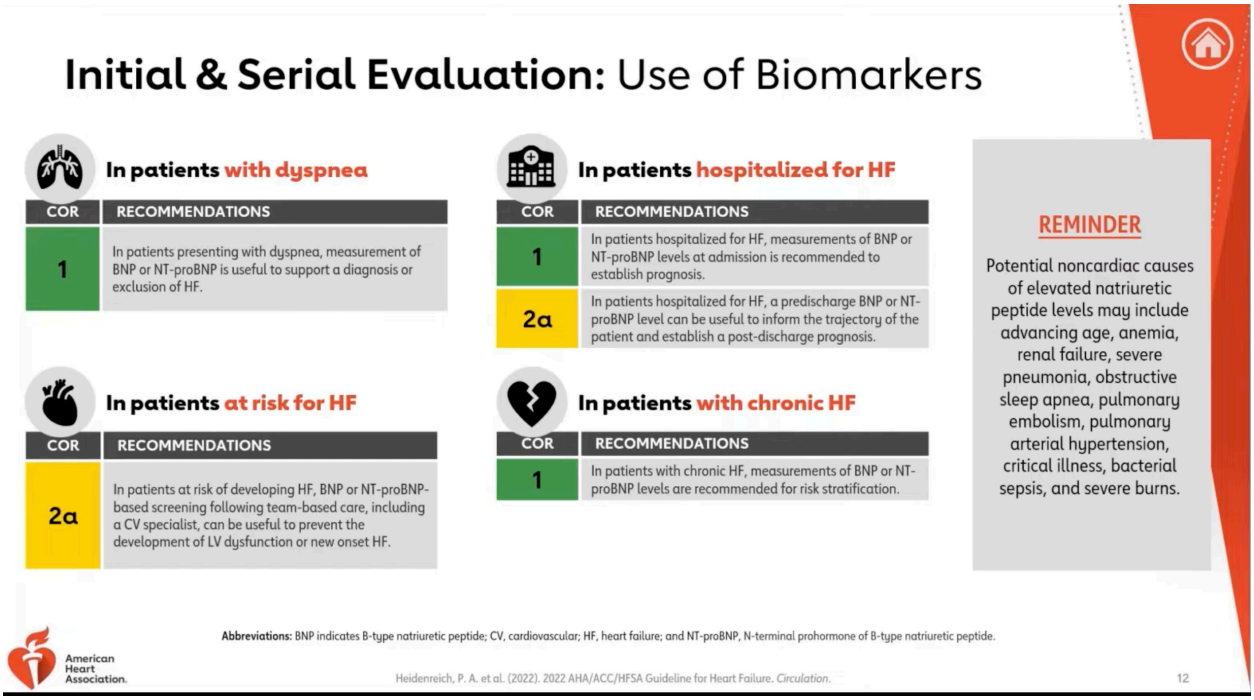


On the left, we have the **history and physical exam**, with several Class I recommendations. First, always **measure vital signs and assess for evidence of congestion**. This means checking for elevated JVP, listening for crackles or an S3 gallop, and looking for peripheral edema. Second, **evaluate for signs of advanced heart failure** which can impact prognosis and treatment options. Third, in patients with a known **cardiomyopathy, take a 3-generation family history** to screen for inherited causes, which is a key part of our genetic evaluation. Fourth, a good history and physical should help **direct diagnostic strategies to uncover causes that require specific management**, for example, identifying a murmur that suggests a valvular etiology. Finally, it's crucial to **identify cardiac and non-cardiac comorbidities**, as well as lifestyle, behavioral factors, and **Social**

Determinants of Health (SDOH), all of which can contribute to or worsen heart failure.

On the right, we have the **laboratory and ECG testing**, also with Class I recommendations. The initial lab panel should be comprehensive and include a **CBC, urinalysis, serum electrolytes, serum creatinine and BUN, glucose, lipid profile, liver function tests, iron studies, and TSH**. These tests help us screen for common comorbidities, like anemia or thyroid disease, and assess end-organ function. Next, a **12-lead ECG** is a standard part of the workup to optimize management by revealing things like left ventricular hypertrophy, Q waves from a prior MI, or arrhythmias like atrial fibrillation. Lastly, the slide emphasizes that we must **explore the specific cause of heart failure** using additional testing as appropriate, to ensure we can provide targeted therapy. For example, if you suspect amyloidosis, you'd order specific tests to confirm that diagnosis.

This initial evaluation provides the foundation for confirming the diagnosis, determining the underlying etiology, assessing severity, and formulating an effective treatment plan.



Initial and Serial Evaluation: Use of Biomarkers

This slide focuses on the crucial role of **natriuretic peptides**—specifically **BNP** and **NT-proBNP**—in the diagnosis and management of heart failure. These are Class I and Class IIa recommendations from the guidelines.

First, let's look at their use in patients with dyspnea.

A Class 1 recommendation states that in patients presenting with dyspnea, measuring BNP or NT-proBNP is useful to support a diagnosis or exclusion of heart failure. An elevated level strongly suggests heart failure as the cause of the dyspnea, while a very low level makes it highly unlikely. This is often the first step after the initial history and physical.

Next, for patients hospitalized for heart failure.

There's another Class 1 recommendation that measurements of BNP or NT-proBNP at admission are recommended to help establish the prognosis. High levels at admission indicate a higher risk for adverse outcomes. Additionally, a Class 2a recommendation suggests that a predischarge BNP or NT-proBNP level can be useful to inform the patient's trajectory and help establish a post-discharge prognosis. A persistently high or rising level before discharge is a red flag.

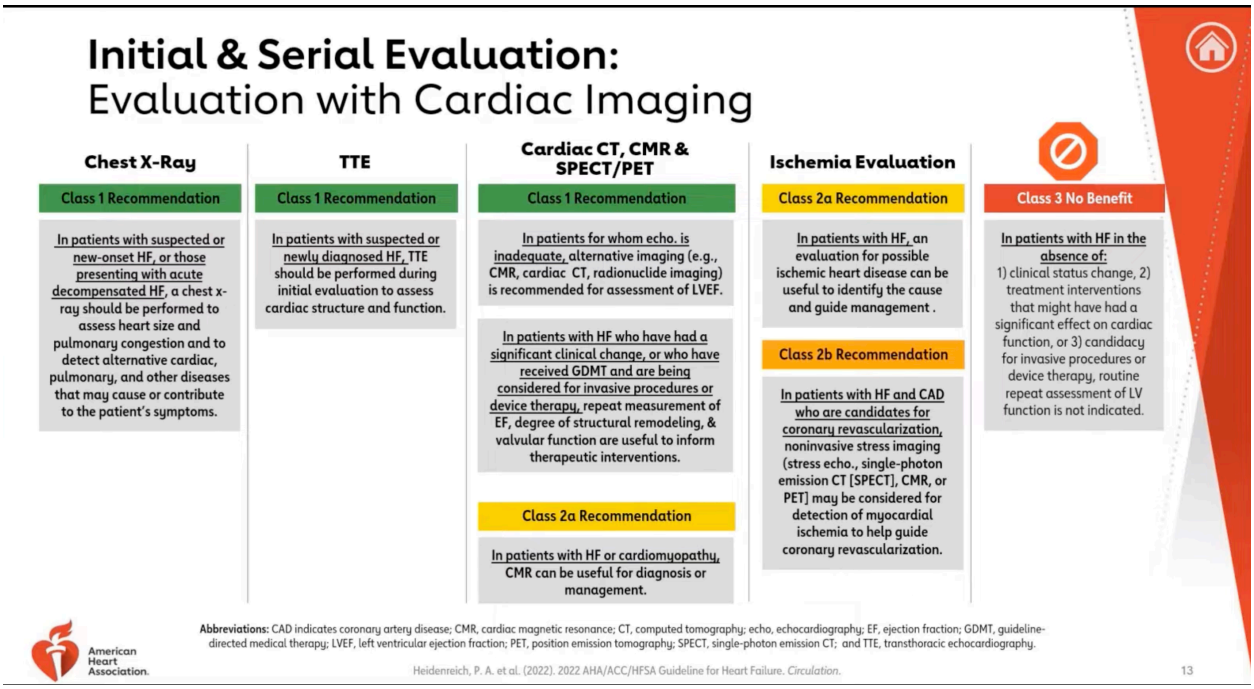
For patients at risk for heart failure, which we discussed as Stage A.

A Class 2a recommendation states that BNP or NT-proBNP-based screening, following a team-based approach, can be useful to prevent the development of left ventricular dysfunction or new-onset heart failure. This is for our high-risk, asymptomatic patients.

Finally, in patients with chronic heart failure.

A Class 1 recommendation advises that serial measurements of BNP or NT-proBNP are recommended for risk stratification. Trends in these levels over time can indicate the effectiveness of our therapy and help predict future events.

A key **reminder** on the slide highlights that there are **noncardiac causes of elevated natriuretic peptides**. These can include **advancing age, renal failure, severe pneumonia, obstructive sleep apnea, pulmonary embolism, and sepsis**. It is essential to consider these comorbidities when interpreting natriuretic peptide levels to avoid misdiagnosing heart failure.



Initial and Serial Evaluation: Cardiac Imaging

This slide reviews the use of various cardiac imaging modalities for heart failure evaluation, from initial diagnosis to serial monitoring. It's broken down by the type of test and its corresponding guideline recommendations.

Let's start with **Chest X-ray**. This is a **Class 1 recommendation** for patients with suspected or newly diagnosed heart failure, or those presenting with acute decompensation. The chest x-ray helps us assess heart size and pulmonary congestion and can identify other causes of the patient's symptoms, like pneumonia.

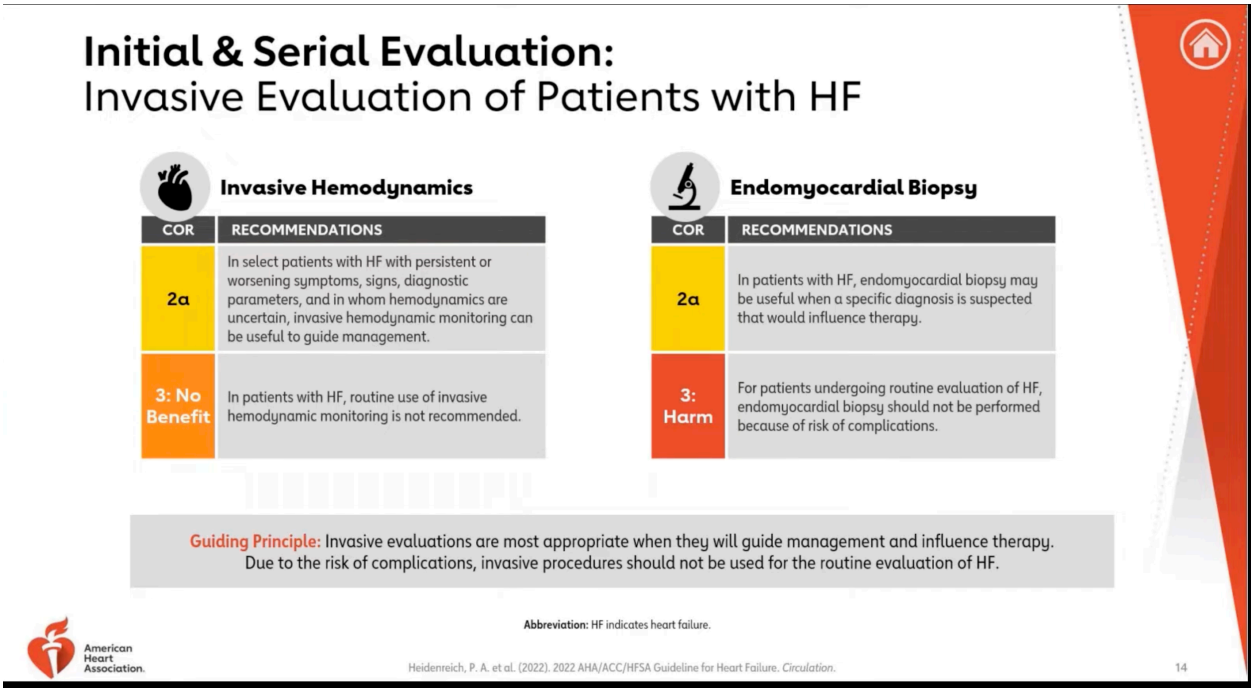
Next is the **Transthoracic Echocardiogram (TTE)**. This is another **Class 1 recommendation**. For any patient with suspected or newly diagnosed heart failure, a TTE should be performed during the initial evaluation to assess cardiac structure and function, most importantly, the left ventricular ejection fraction.

For more advanced imaging, we have **Cardiac CT, CMR, and SPECT/PET**. A **Class 1 recommendation** states that these are useful for patients where the echo is inadequate, or if we need more detailed information. This is particularly helpful for assessing structural abnormalities. There's also a **Class 2a recommendation** that **CMR**, or cardiac magnetic resonance, can be useful for diagnosis and

management in patients with heart failure or cardiomyopathy. This is the gold standard for assessing volume, mass, and fibrosis. Finally, for patients with heart failure who have had a significant clinical change or are being considered for invasive procedures, a repeat assessment of EF, structural remodeling, and valvular function can be useful to inform therapeutic decisions. This is also a **Class 1 recommendation**.

Now let's look at **Ischemia Evaluation**. A **Class 2a recommendation** suggests that in patients with heart failure, an evaluation for possible ischemic heart disease can be useful to identify the cause and guide management. A **Class 2b recommendation** states that in patients with heart failure and known coronary artery disease, noninvasive stress imaging (like stress echo or SPECT) may be considered to detect myocardial ischemia, which can guide a decision for coronary revascularization.

Finally, a crucial point in the **Class 3** section, labeled **"No Benefit"**. This states that in patients with heart failure who have no clinical status changes, have not had any recent interventional treatments, and are not being considered for new invasive procedures, **routine repeat assessment of LV function is not indicated**. This is to avoid unnecessary testing in stable patients.



Invasive Evaluation of Patients with Heart Failure

This slide outlines the appropriate use of invasive procedures, specifically **invasive hemodynamics** and **endomyocardial biopsy**, in the evaluation of heart failure patients. The overarching **guiding principle** is that these invasive evaluations should only be used when they are likely to directly **guide management and influence therapy**, due to the inherent risk of complications.

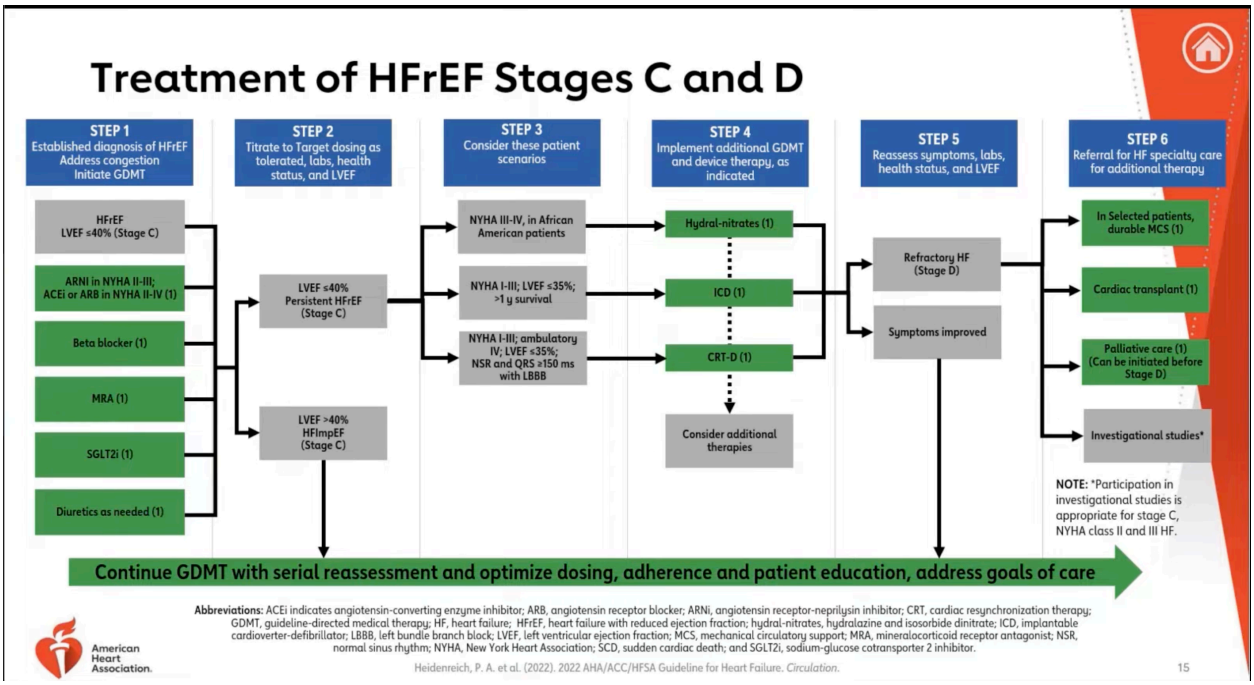
Invasive Hemodynamics

For **invasive hemodynamic monitoring**, the guidelines provide a **Class 2a recommendation**. This procedure, which typically involves a Swan-Ganz catheter, is considered useful in select patients with **persistent or worsening symptoms** and when diagnostic parameters are uncertain. It helps to guide management by providing precise measurements of filling pressures and cardiac output. Conversely, a **Class 3 recommendation**, or **"No Benefit"**, states that **routine use of invasive hemodynamic monitoring is not recommended** in patients with heart failure. This means we don't place a Swan-Ganz catheter in every patient admitted with heart failure; we reserve it for complex, refractory cases.

Endomyocardial Biopsy

Regarding **endomyocardial biopsy**, a **Class 2a recommendation** suggests it may be useful when a **specific diagnosis is suspected that would influence therapy**. For example, if you suspect giant cell myocarditis or cardiac sarcoidosis, an endomyocardial biopsy is necessary to confirm the diagnosis and initiate targeted immunosuppressive therapy. However, a **Class 3 recommendation**, or **"Harm"**, explicitly states that **endomyocardial biopsy should not be performed for routine evaluation of heart failure** due to the risk of complications, such as cardiac perforation or arrhythmia.

In summary, the key takeaway is to be highly selective with these invasive procedures. Their use is appropriate for challenging clinical scenarios where a clear benefit is expected, but they should be avoided for routine assessment.



Treatment of HFrEF Stages C and D

This slide presents a step-by-step algorithm for managing heart failure with reduced ejection fraction (HFrEF) in symptomatic patients (Stage C) and those with advanced disease (Stage D). The core principle is to establish the diagnosis and then systematically initiate and optimize **Guideline-Directed Medical Therapy (GDMT)**.

Step 1: Establish Diagnosis and Initiate GDMT

The process begins with a confirmed diagnosis of **HFrEF**, defined by an **LVEF of 40% or less**, in a patient who is symptomatic (Stage C). The initial GDMT should be started promptly, including four foundational classes of drugs:

1. An **ACE inhibitor or ARB**, or ideally, an **ARNI** (angiotensin receptor-neprilysin inhibitor), which has superior outcomes.
2. A **Beta-blocker**.
3. A **Mineralocorticoid Receptor Antagonist (MRA)**, such as spironolactone or eplerenone.

4. A **Sodium-Glucose Cotransporter 2 (SGLT2) inhibitor**, like dapagliflozin or empagliflozin.

Diuretics should also be used as needed to address congestion and manage symptoms, but they are not considered part of the core GDMT that modifies the disease itself.

Step 2: Titrate to Target Dosing

Once initiated, these medications must be titrated to the maximum tolerated dose. This is a critical step because the mortality benefit is dose-dependent. We must consider a patient's lab values, health status, and LVEF throughout this process. The goal is to get all four pillars of GDMT to their optimal doses.

Step 3: Consider Specific Patient Scenarios

The algorithm then branches based on specific patient presentations:

- For **NYHA class III-IV patients** and **African American patients** still experiencing symptoms despite being on standard GDMT, the addition of **hydralazine-nitrates** should be considered.
- For patients with **persistent HFrEF (LVEF ≤ 40%)** who are still symptomatic (Stage C), the slide reminds us to check for eligibility for device therapy.
- Specifically, for patients with **HFrEF** and an **LVEF less than or equal to 35%** who are expected to live for more than a year, an **ICD (implantable cardioverter-defibrillator)** is indicated for primary prevention of sudden cardiac death.
- For patients with **HFrEF** and an **LVEF less than or equal to 35%** who are also in a normal sinus rhythm with a **QRS duration greater than or equal to 150 ms** and have a left bundle branch block (LBBB) morphology, **CRT-D (cardiac resynchronization therapy with a defibrillator)** is indicated.

Step 4: Implement Additional Therapies

Based on the criteria above, additional GDMT and device therapies are implemented as indicated.

Step 5: Reassess and Optimize

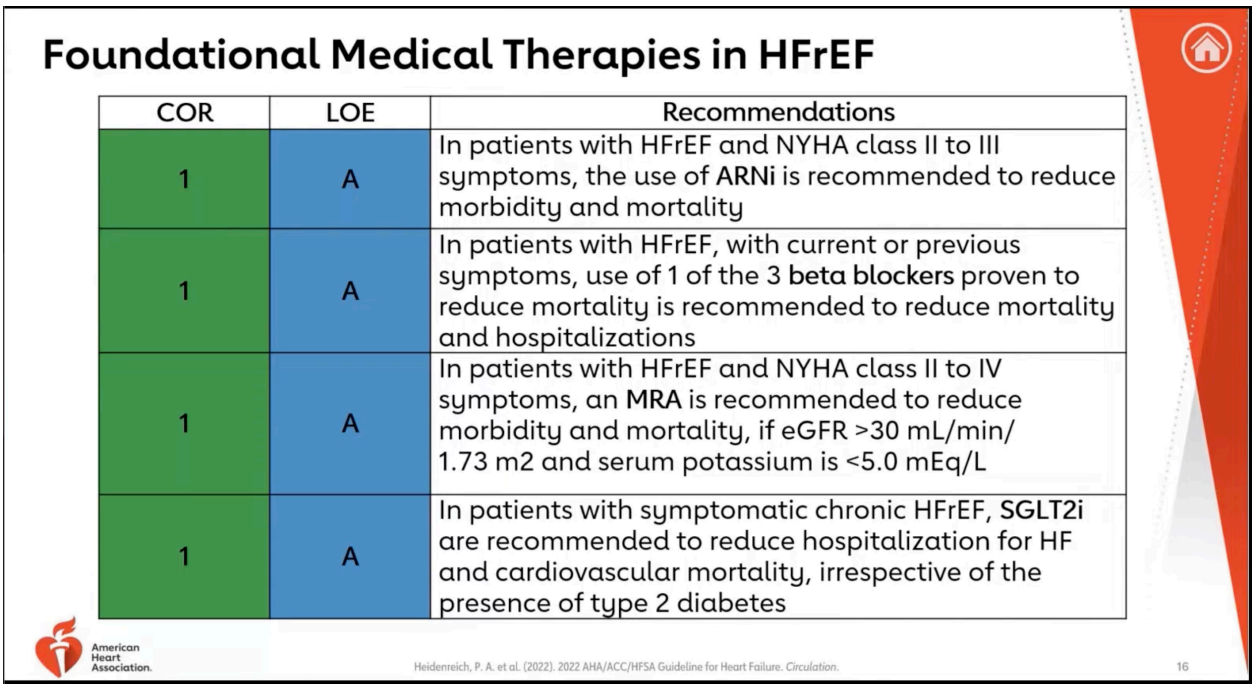
The algorithm emphasizes the importance of **serial reassessment** of symptoms, labs, health status, and LVEF. If symptoms have improved, we continue GDMT. If the patient has **refractory heart failure** (Stage D), meaning persistent symptoms despite being on optimal GDMT, we move to the final step.

Step 6: Referral for HF Specialty Care

For patients with advanced, Stage D heart failure, referral to an HF specialty center is necessary to consider more advanced therapies. These include:

- **Durable mechanical circulatory support (MCS)**, like an LVAD.
- **Cardiac transplantation**.
- **Palliative care**, which can also be initiated earlier in the disease course, even in Stage D.
- **Participation in investigational studies**.

The final note is a crucial reminder to **continue GDMT** with serial assessments and to optimize adherence, while also addressing goals of care throughout the patient's journey.

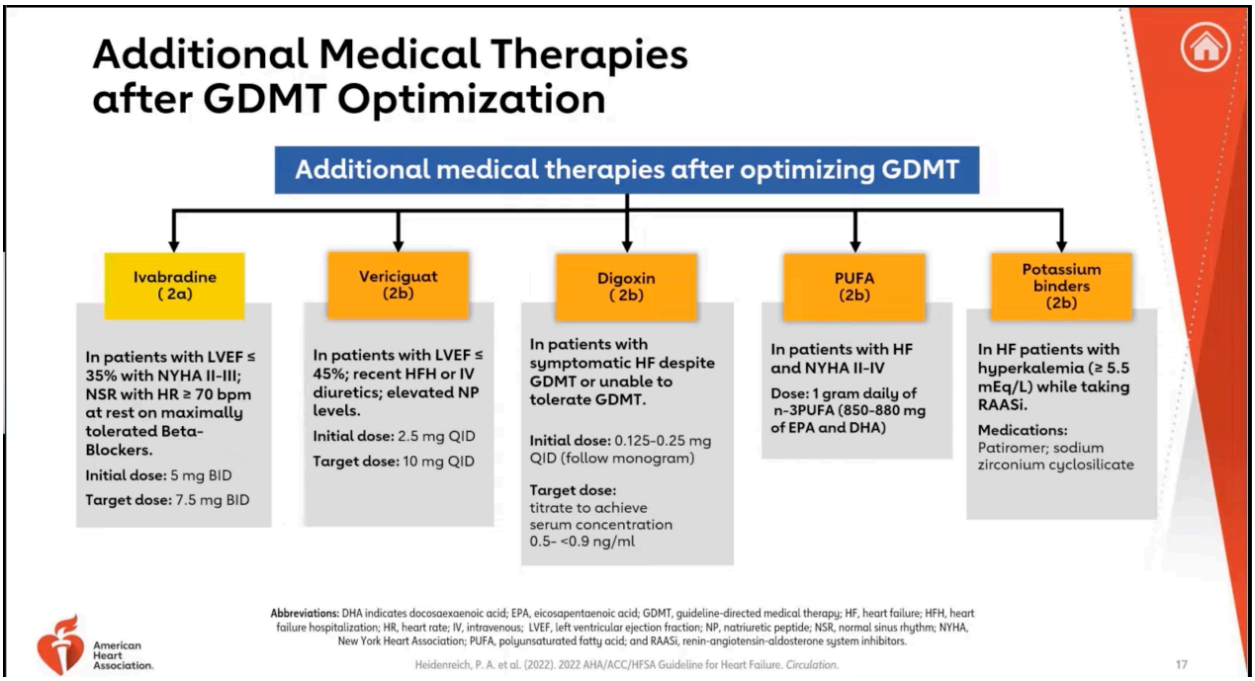


Foundational Medical Therapies in HFrEF

This slide summarizes the four core classes of drugs that form the backbone of **Guideline-Directed Medical Therapy (GDMT)** for patients with **Heart Failure with reduced Ejection Fraction (HFrEF)**. These are all **Class 1 recommendations** with a **Level of Evidence A**, meaning they are highly effective and supported by multiple high-quality randomized controlled trials.

1. **Angiotensin Receptor-Neprilysin Inhibitor (ARNI):** The slide states that in patients with HFrEF and **NYHA class II to III symptoms**, the use of an ARNI is recommended to reduce both morbidity and mortality. These agents, like sacubitril/valsartan, have been shown to be superior to ACE inhibitors.
2. **Beta-Blockers:** The use of **one of the three beta-blockers** proven to reduce mortality—specifically **bisoprolol, carvedilol, or metoprolol succinate**—is recommended for patients with HFrEF and current or previous symptoms. These medications reduce mortality and hospitalizations by blocking the effects of sympathetic nervous system overactivation on the heart.
3. **Mineralocorticoid Receptor Antagonists (MRA):** An MRA is recommended for patients with HFrEF and **NYHA class II to IV symptoms** to reduce morbidity and mortality. The key is that the patient must have an **eGFR greater than 30 mL/min/1.73 m²** and a **serum potassium less than 5.0 mEq/L** to avoid the risk of hyperkalemia and renal dysfunction.
4. **Sodium-Glucose Cotransporter 2 (SGLT2) Inhibitors:** Finally, SGLT2 inhibitors are recommended for patients with **symptomatic chronic HFrEF** to reduce hospitalizations and cardiovascular mortality. This benefit is seen **irrespective of the presence of type 2 diabetes**, making them a foundational therapy for all eligible HFrEF patients.

These four drug classes work synergistically to address the neurohormonal pathways involved in heart failure, and initiating and optimizing all of them is crucial for providing the best possible care for our patients.



Additional Medical Therapies After GDMT Optimization

This slide covers several **additional medical therapies** to consider for patients with heart failure after their foundational **Guideline-Directed Medical Therapy (GDMT)** has been optimized. These therapies typically have **Class 2a or 2b recommendations**, meaning their use is beneficial but not as universally indicated as the core GDMT.

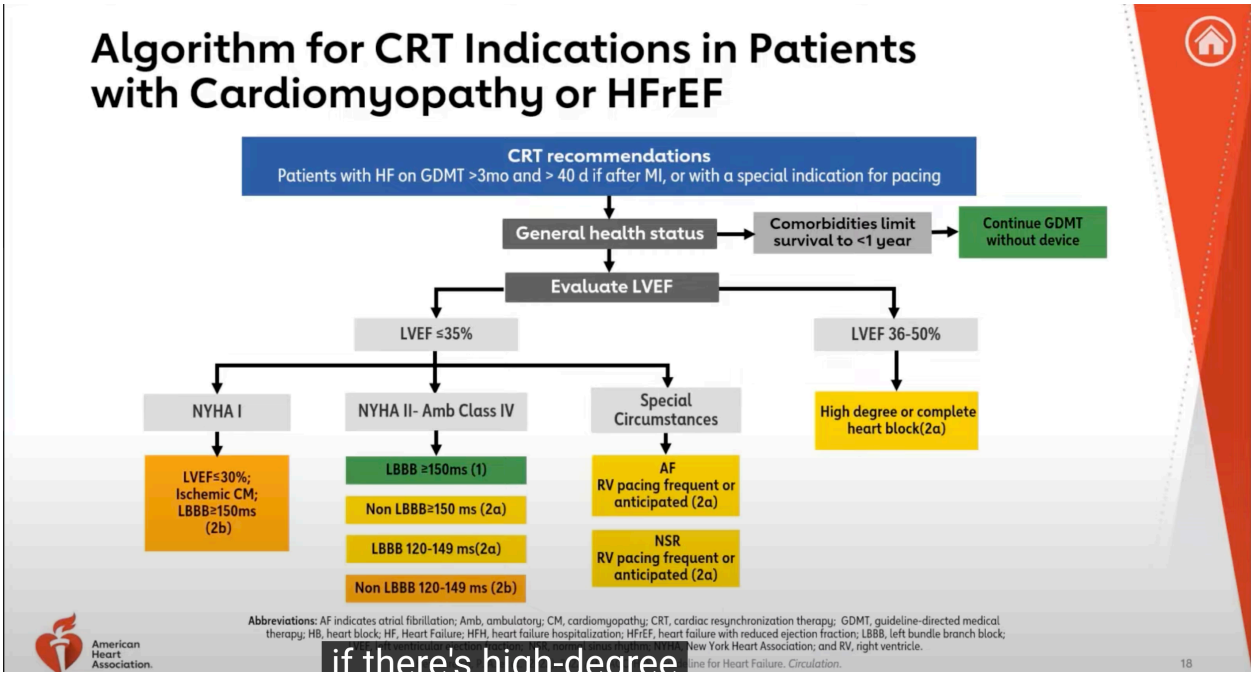
First, **Ivabradine** is a **Class 2a recommendation**. It's indicated for patients with HFrEF and an **LVEF less than or equal to 35%**, who are in normal sinus rhythm with a **heart rate of 70 bpm or greater** at rest, despite being on maximally tolerated beta-blockers. Ivabradine is a funny channel blocker that lowers heart rate without affecting contractility. The initial dose is **5 mg BID**, with a target dose of **7.5 mg BID**.

Next, we have **Vericiguat**, a soluble guanylate cyclase stimulator, which is a **Class 2b recommendation**. It's for patients with HFrEF with an **LVEF less than or equal to 45%**, who are symptomatic after a recent heart failure hospitalization or require IV diuretics, and have elevated natriuretic peptide levels. The initial dose is **2.5 mg QID**, with a target dose of **10 mg QID**.

Digoxin is another **Class 2b recommendation**. It's considered for patients with symptomatic heart failure despite being on optimal GDMT or if they can't tolerate GDMT. Digoxin is not a mortality-reducing drug, but it can help control symptoms. The goal is a low target serum concentration of **0.5-0.9 ng/mL** to achieve symptomatic relief while avoiding toxicity.

Then we have **PUFA**, or polyunsaturated fatty acids, which is a **Class 2b recommendation**. Specifically, **n-3 PUFA** can be used in patients with HF and **NYHA class II-IV symptoms**. The recommended dose is **1 gram daily** of an omega-3 fatty acid formulation containing both EPA and DHA.

Finally, the slide mentions **potassium binders**, which are a **Class 2b recommendation**. These are for patients who develop **hyperkalemia** (potassium greater than or equal to 5.5 mEq/L) while taking a **RAASi** (renin-angiotensin-aldosterone system inhibitor), such as an ARNI or MRA. The goal is to allow these patients to continue on these crucial GDMT medications, as their mortality benefits are substantial. The medications mentioned are **Patiromer** and **sodium zirconium cyclosilicate**.



Algorithm for CRT Indications in Patients

This slide provides a detailed algorithm for determining which heart failure patients are candidates for **Cardiac Resynchronization Therapy (CRT)**. This therapy is about optimizing ventricular contraction and is a key part of managing a specific subset of patients.

The algorithm starts with the fundamental criteria: the patient must have **heart failure on optimal Guideline-Directed Medical Therapy (GDMT)** for at least 3 months, or 40 days after a myocardial infarction. Patients with a special indication for pacing are also considered.

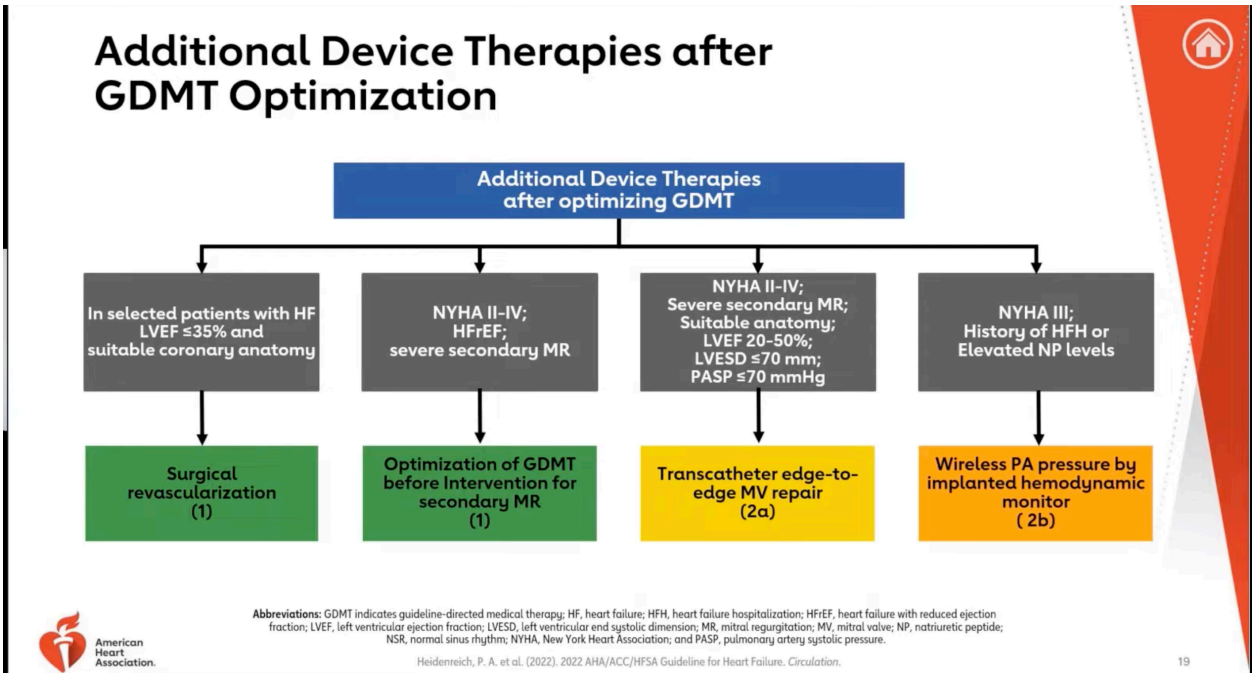
Next, we evaluate the patient's **general health status** and comorbidities. If comorbidities limit their survival to less than one year, a CRT device is not typically recommended, and we would continue with GDMT alone.

The algorithm then branches based on the patient's **Left Ventricular Ejection Fraction (LVEF)**:

- **For patients with an LVEF between 36% and 50%:**
    - CRT is considered a **Class 2a recommendation** for those with a **high-degree or complete heart block**. In these cases, CRT is not necessarily about resynchronizing a wide QRS, but rather about preventing pacing-induced dyssynchrony from a right ventricular lead.
- **For patients with an LVEF of 35% or less:**
    - The decision is further refined by **NYHA functional class and QRS duration/morphology**.
    - **NYHA Class I:** CRT is a weaker recommendation. For patients with **ischemic cardiomyopathy** and an **LVEF less than 30%** with an **LBBB and a QRS of 150ms or more**, it's a **Class 2a recommendation**. For other QRS morphologies, it's a **Class 2b**.
    - **NYHA Class II-Ambulatory Class IV:** This is the most common group where CRT is indicated.
        - For patients with an **LBBB and a QRS of 150ms or more**, CRT is a **Class 1 recommendation**. This is the classic indication where we see the most significant benefit.

        - For patients with a **non-LBBB and a QRS of 150ms or more**, it's a **Class 2a recommendation**.
        - For patients with an **LBBB and a QRS of 120-149ms**, it's a **Class 2a recommendation**.
        - For patients with a **non-LBBB and a QRS of 120-149ms**, it's a **Class 2b recommendation**.
    - **Special Circumstances:** The algorithm also considers special cases, such as patients with **atrial fibrillation** or in **normal sinus rhythm** who require frequent or anticipated right ventricular pacing. These are also **Class 2a recommendations**.

In essence, the algorithm prioritizes patients with more severe symptoms (NYHA II-IV), a very low LVEF, and a wide QRS, particularly with LBBB morphology, as the strongest candidates for CRT.



Additional Device Therapies After GDMT Optimization

This slide outlines several advanced therapies and procedures to consider after a patient with heart failure has been optimized on **Guideline-Directed Medical Therapy (GDMT)**.

Surgical Revascularization

For selected patients with **heart failure**, an **LVEF less than or equal to 35%**, and suitable **coronary anatomy**, **surgical revascularization** is a **Class 1 recommendation**. This is typically for patients with significant coronary artery disease that is contributing to their heart failure. Restoring blood flow to the myocardium can improve cardiac function and patient outcomes.

Secondary Mitral Regurgitation

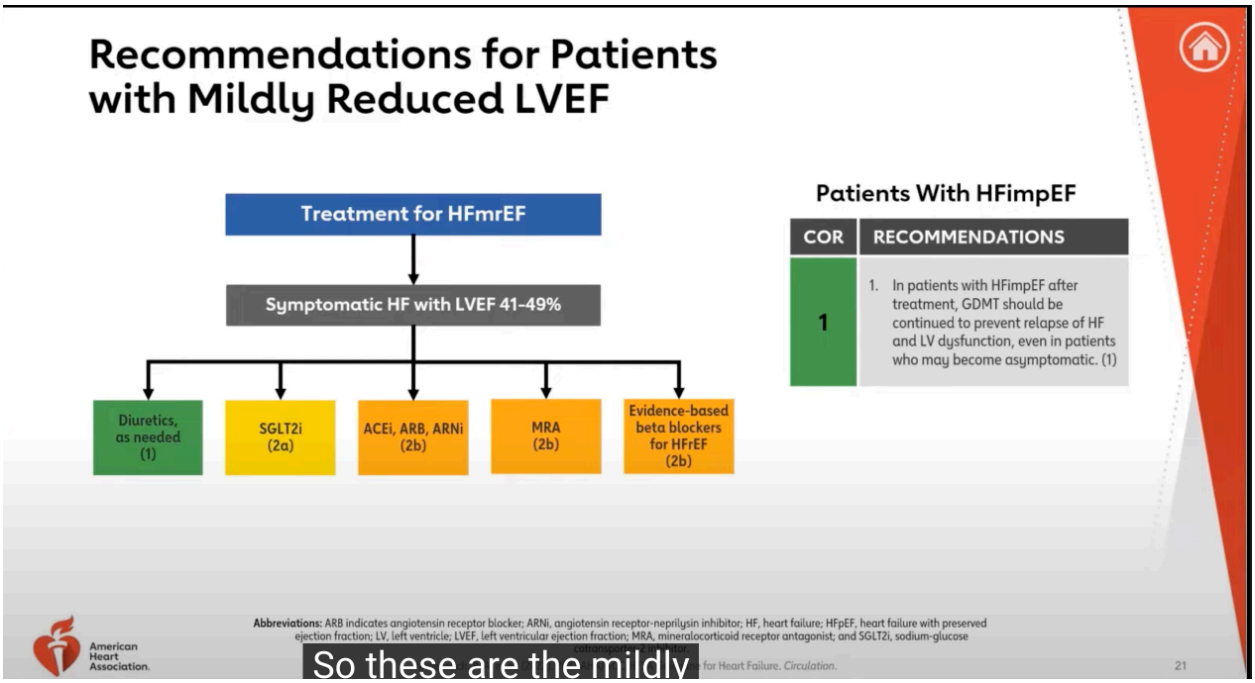
In patients with **NYHA class II-IV symptoms** due to **HFrEF** and **severe secondary mitral regurgitation (MR)**, the first step is to **optimize GDMT** before considering an intervention. This is a **Class 1 recommendation** because a significant amount of secondary MR can improve with just medical therapy alone.

Transcatheter Edge-to-Edge MR

Following GDMT optimization, for patients with persistent **NYHA class II-IV symptoms** and **severe secondary MR**, who have a specific anatomy (LVEF 20-50%, LVESD ≤ 70 mm, PASP ≤ 70 mmHg), **transcatheter edge-to-edge MR repair**, such as with a MitraClip, is a **Class 2a recommendation**. This procedure can improve symptoms and reduce hospitalizations in this carefully selected group.

Wireless PA Pressure Monitoring

Finally, for patients with **NYHA class III symptoms**, a recent history of heart failure hospitalization, or elevated natriuretic peptide levels, a **wireless pulmonary artery (PA) pressure monitor** is a **Class 2b recommendation**. This device allows for remote monitoring of a patient's PA pressures, enabling clinicians to make proactive adjustments to their medications, particularly diuretics, to prevent decompensation and hospitalizations.



Recommendations for Patients with Mildly Reduced LVEF

This slide addresses the management of two specific heart failure subtypes: **HFmrEF** (Heart Failure with mildly reduced Ejection Fraction) and **HFimpEF** (Heart Failure with improved Ejection Fraction).

Treatment for HFmrEF

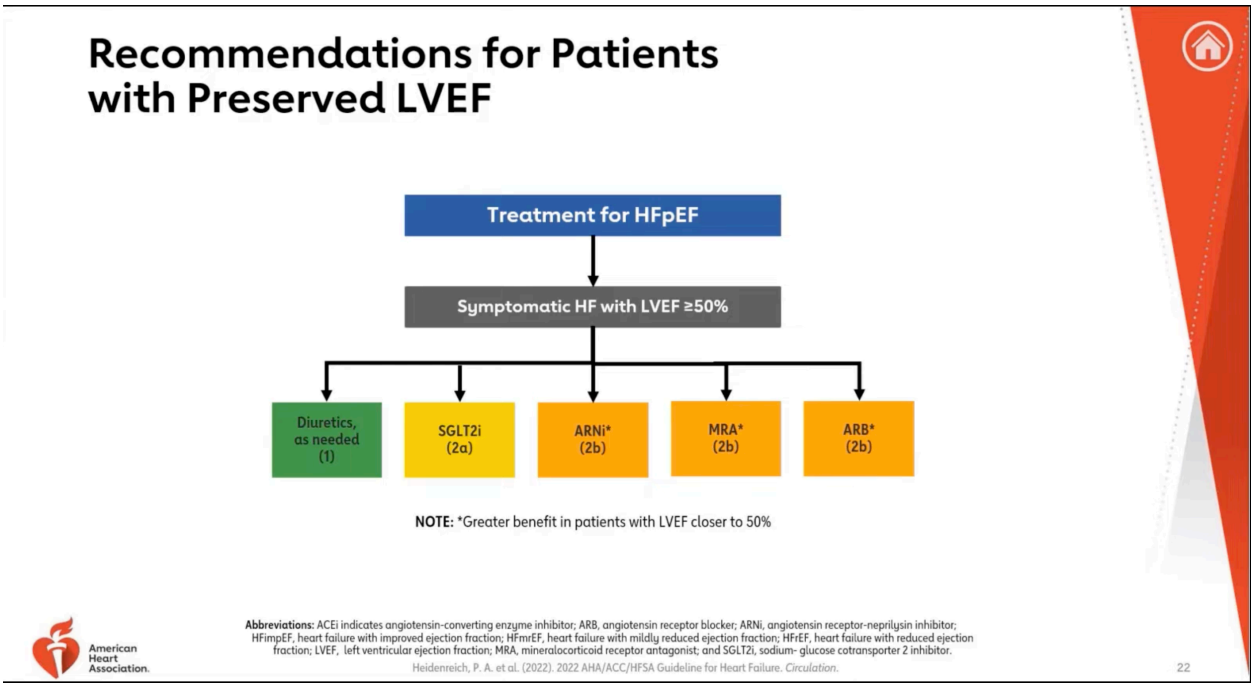
First, for patients with **symptomatic heart failure** and an **LVEF between 41-49%**, the slide outlines the recommended therapies. These are typically **Class 2a or 2b recommendations** because the evidence base is not as strong as it is for HFrEF.

- **Diuretics:** These are a **Class 1 recommendation** to be used as needed to manage symptoms of congestion.
- **SGLT2 inhibitors:** These are a **Class 2a recommendation**.
- **ACE inhibitors, ARBs, or ARNIs:** These are a **Class 2b recommendation**.
- **Mineralocorticoid Receptor Antagonists (MRA):** These are also a **Class 2b recommendation**.
- **Evidence-based Beta-blockers for HFrEF:** These are another **Class 2b recommendation**.

The key takeaway for HFmrEF is that while the core pillars of GDMT are considered, the strength of the recommendations is generally lower compared to HFrEF.

Patients with HFimpEF

Second, for patients with **HFimpEF**, meaning their LVEF has improved after treatment, there is a strong **Class 1 recommendation**. This states that GDMT should be **continued indefinitely** to prevent a relapse of heart failure and left ventricular dysfunction. This is true even in patients who have become completely asymptomatic. The evidence shows that stopping these therapies can lead to a return of both symptoms and ventricular dysfunction.



Recommendations for Patients with Preserved LVEF

This slide outlines the treatment strategy for **Heart Failure with preserved Ejection Fraction (HFpEF)**, which is defined as **symptomatic heart failure with an LVEF greater than or equal to 50%**. The management of HFpEF is more focused on symptom control and addressing comorbidities, as the evidence base for mortality reduction is not as robust as it is for HFrEF.

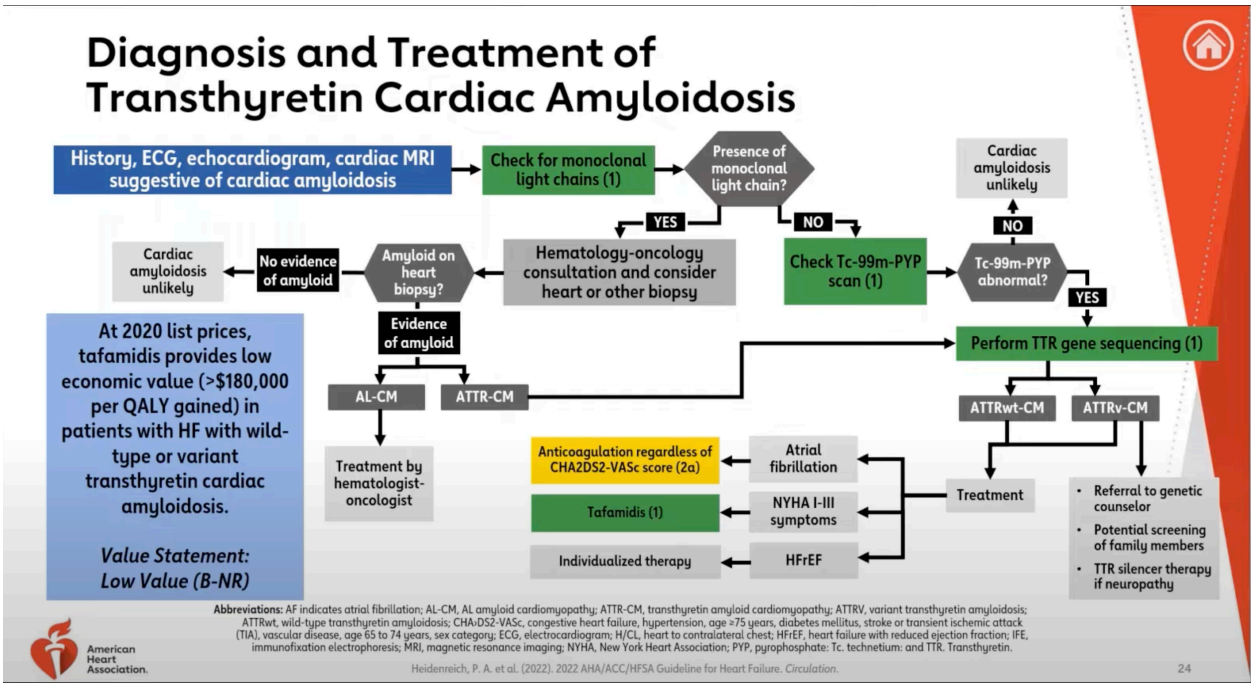
First, **diuretics** are a **Class 1 recommendation** to be used as needed to manage symptoms of congestion. These are essential for improving quality of life by reducing fluid overload.

The slide then lists several other medications with a **Class 2a or 2b recommendation**:

- **SGLT2 inhibitors** are a **Class 2a recommendation**.
- **ARNI** (angiotensin receptor-neprilysin inhibitor) is a **Class 2b recommendation**.
- **MRA** (mineralocorticoid receptor antagonist) is a **Class 2b recommendation**.
- **ARB** (angiotensin receptor blocker) is a **Class 2b recommendation**.

A key **note** on the slide highlights that there is a **greater benefit in patients with an LVEF closer to 50%**. This suggests that while these medications are considered for all HFpEF patients, their efficacy may be more pronounced in those who are on the borderline with HFmrEF.

In summary, the treatment of HFpEF focuses on diuretics for symptom relief, with SGLT2 inhibitors and other neurohormonal blockers being considered to improve outcomes, particularly in those with a lower-end preserved ejection fraction.



Diagnosis and Treatment of Transthyretin Cardiac Amyloidosis

This slide provides an algorithm for the diagnosis and treatment of transthyretin cardiac amyloidosis (ATTR-CM), a condition that is increasingly being recognized as a cause of heart failure.

The evaluation begins with a **clinical history, ECG, echocardiogram, and/or cardiac MRI** that is **suggestive of cardiac amyloidosis**. The first step in the algorithm is to **check for monoclonal light chains** in the blood or urine.

If **monoclonal light chains are present**, the patient should be referred for a **hematology-oncology consultation** and a **heart or other organ biopsy** to definitively distinguish between AL amyloidosis (light chain) and ATTR amyloidosis. The biopsy will show evidence of amyloid, and immunohistochemistry can type it. If it is **AL-CM**, treatment is directed by a hematologist-oncologist. If it's **ATTR-CM**, the algorithm continues.

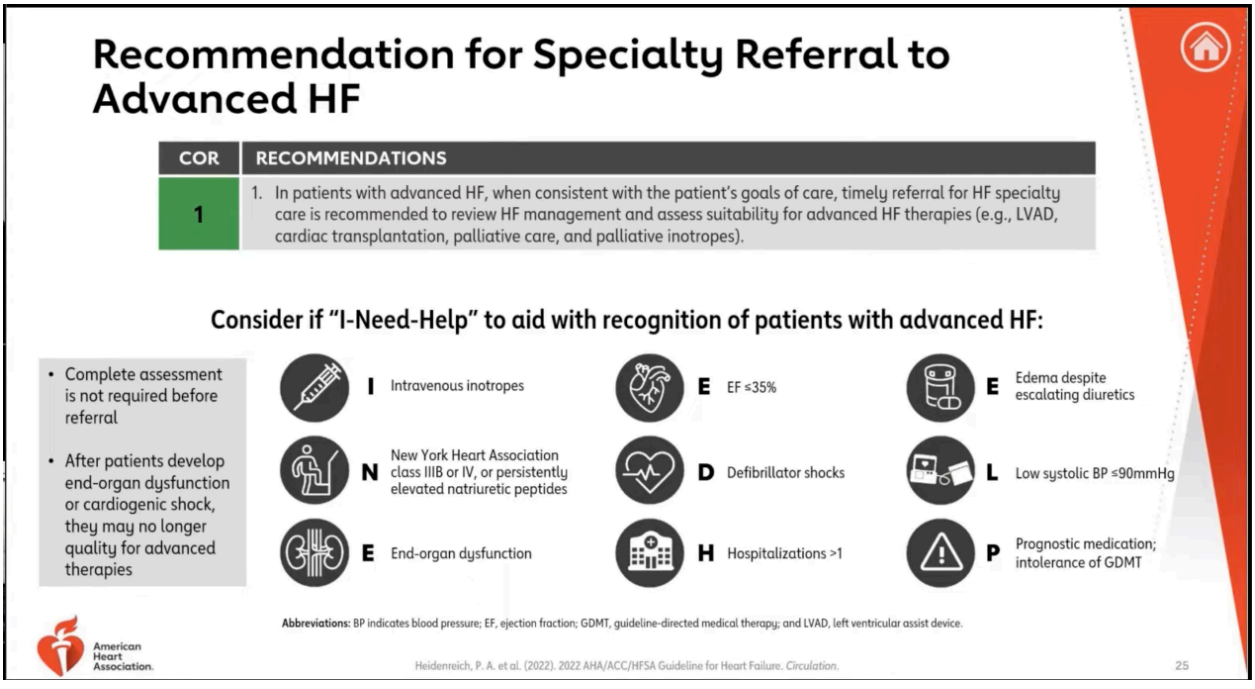
If **monoclonal light chains are absent**, the next step is to perform a **Tc-99m-PYP scan**. This is a highly specific non-invasive test for ATTR-CM. If the **PYP scan is negative or normal**, cardiac amyloidosis is unlikely. If the **PYP scan is abnormal or positive**, the diagnosis of ATTR-CM is highly likely.

A positive PYP scan confirms ATTR-CM, but to differentiate between the two types, **TTR gene sequencing** should be performed. This will distinguish between **wild-type ATTR-CM** (ATTRwt-CM) and **variant ATTR-CM** (ATTRv-CM).

Once ATTR-CM is diagnosed, management is multifaceted:

- **Anticoagulation** is recommended based on the CHA2DS2-VASc score if the patient has **atrial fibrillation**.
- For patients with **NYHA I-III symptoms** and **HFrEF**, the medication **Tafamidis** is a key treatment. It is a TTR stabilizer that has been shown to reduce mortality and cardiovascular hospitalizations. The slide also notes its high cost but favorable cost-effectiveness in patients with wild-type or variant TTR amyloidosis.
- For patients with **variant ATTR-CM**, they should be referred to a **genetic counselor** to assess the risk for family members and to discuss the option of **TTR silencer therapy**, which targets the production of the TTR protein.

This algorithm highlights the importance of ruling out AL amyloidosis first, using the PYP scan as a non-invasive diagnostic tool for ATTR-CM, and then tailoring treatment based on the specific subtype.



Recommendation for Specialty Referral to Advanced HF

This slide presents the key recommendation and a useful mnemonic for identifying patients who require referral to an advanced heart failure specialist.

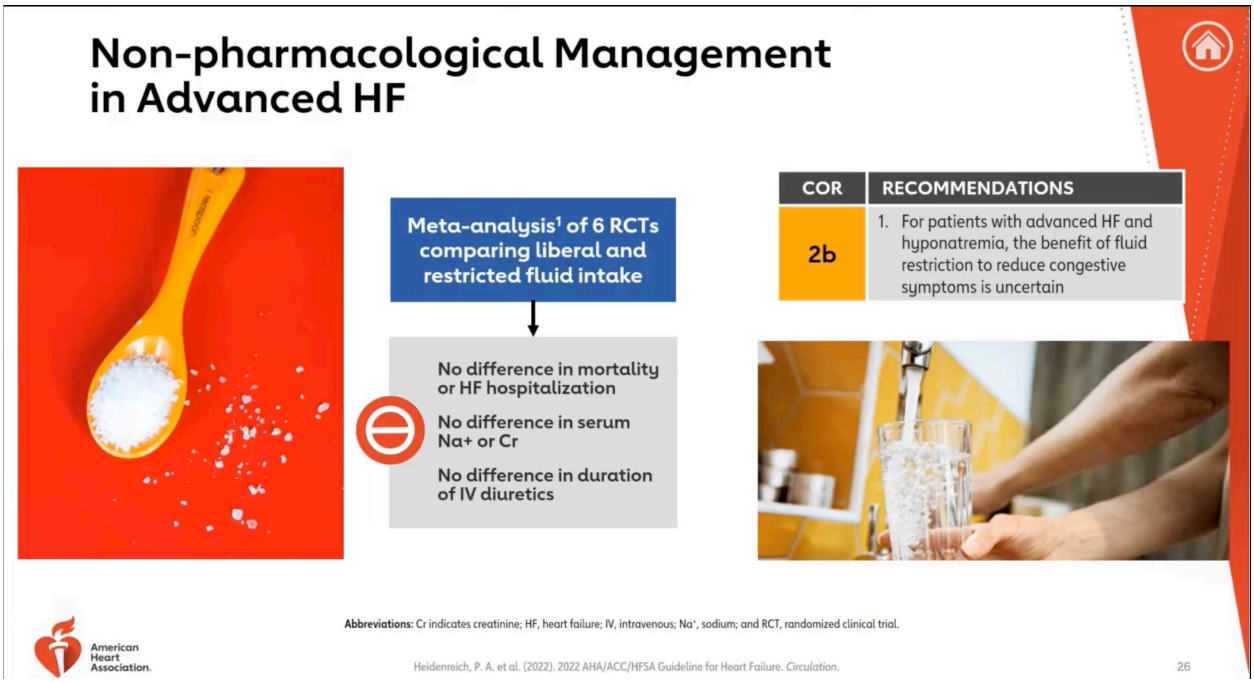
The primary recommendation, a **Class 1 recommendation**, states that in patients with **advanced heart failure**, a **timely referral to an HF specialty care center is recommended**. This referral should be consistent with the patient's goals of care. The purpose is to review their management and assess their suitability for advanced therapies like a **left ventricular assist device (LVAD), cardiac transplantation, palliative care, or palliative inotropes**.

To help us recognize these patients, the slide offers a mnemonic: **"I-NEED-HELP"**. Let's break down what each letter stands for:

- **I** - **Intravenous inotropes**: This suggests dependency on continuous inotropic support.
- **N** - **New York Heart Association class IIIB or IV**, or **persistently elevated natriuretic peptides**: This indicates severe symptoms or a high disease burden despite therapy.
- **E** - **End-organ dysfunction**: This includes renal or liver dysfunction due to poor cardiac output.
- **E** - **Ejection Fraction < 35%**: A severely reduced EF is a key indicator.
- **D** - **Defibrillator shocks**: Repeated ICD shocks suggest recurrent life-threatening arrhythmias.
- **H** - **Hospitalizations > 1**: More than one hospitalization for heart failure in a short period suggests disease progression.
- **E** - **Edema despite escalating diuretics**: This points to refractory fluid retention.
- **L** - **Low systolic blood pressure (<90 mmHg)**: This is a sign of cardiogenic shock or severe pump failure.
- **P** - **Prognostic medication intolerance or intolerance to GDMT**: The inability to tolerate key guideline-directed medical therapies is a poor prognostic sign.

The slide also notes two important points:

1. A complete assessment is **not required before referral**. Early referral is key.
2. After patients develop severe **end-organ dysfunction**, they may no longer be candidates for advanced therapies, underscoring the importance of timely referral.



Non-pharmacological Management in Advanced Heart Failure

This slide addresses a common clinical question regarding non-pharmacological interventions in advanced heart failure, specifically fluid and sodium restriction.

The central point of the slide is a **meta-analysis of six randomized controlled trials** comparing **liberal versus restricted fluid intake** in patients with advanced heart failure. The key findings were that there was **no difference** in several critical outcomes:

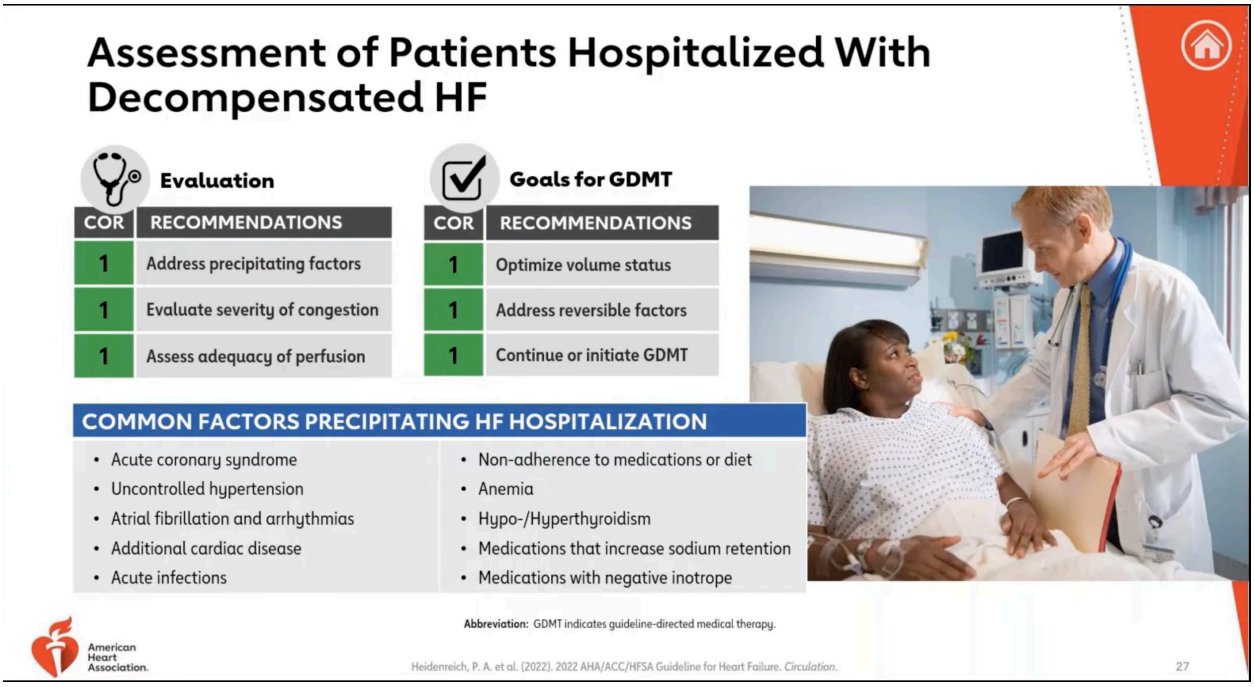
- **Mortality** or **heart failure hospitalization**.
- **Serum sodium or creatinine** levels.
- **Duration of IV diuretics**.

These findings lead to a **Class 2b recommendation** for patients with advanced heart failure and hyponatremia. The slide states that the **benefit of fluid**

restriction to reduce congestive symptoms is uncertain. This contradicts the conventional wisdom that fluid restriction is always necessary. It suggests that a one-size-fits-all, strict fluid restriction may not provide the expected benefits in this specific patient population.

The slide includes two images to illustrate these concepts: a spoonful of salt, representing sodium restriction, and a person getting a glass of water, representing fluid intake.

In summary, for advanced heart failure patients with hyponatremia, the evidence doesn't strongly support the routine use of fluid restriction to improve outcomes or reduce congestion. This highlights the importance of a nuanced approach to fluid management in these complex patients.



Assessment of Patients Hospitalized With Decompensated HF

This slide provides a high-yield framework for the initial workup and management of a patient presenting with acute decompensated heart failure. It's a great tool for making sure you're not missing any critical steps in the first few hours of their hospitalization.

Let's break down the two main sections here: **Evaluation** and **Goals for GDMT**.

Evaluation

First, we have the initial evaluation, which has three key components, all with a Class 1 recommendation. A **Class 1 recommendation** means there's strong evidence and general agreement that the intervention is beneficial, effective, and useful.

1. **Address precipitating factors:** You need to figure out *why* this patient decompensated *now*. It's not just about managing the heart failure itself; it's about finding the trigger. Look at the list on the slide for the common culprits. Did they have a new acute coronary syndrome, like an MI? Is their blood pressure out of control? Are they in new-onset atrial fibrillation? We also need to check for non-adherence to their medications or diet, anemia, thyroid dysfunction, or new medications that might be contributing, like NSAIDs or certain antiarrhythmics with negative inotropic effects. This is a crucial step to prevent rehospitalization.
2. **Evaluate severity of congestion:** This is all about assessing their volume status. Is the patient wet? Are they wet in their lungs, causing dyspnea? Are they wet in their periphery, with pedal edema and ascites? We need to use our physical exam skills—JVP, lung sounds for crackles, assessing for edema—as well as imaging like a chest X-ray to look for pulmonary congestion and labs like BNP to help guide us.
3. **Assess adequacy of perfusion:** This is the other side of the coin. Is the patient cold? Are they getting enough blood flow to their end-organs? We're looking for signs of low cardiac output, which can manifest as cool extremities, low blood pressure, a narrow pulse pressure, and signs of end-organ hypoperfusion like altered mental status or rising creatinine. This is the difference between managing a "wet and warm" patient and a "wet and cold" patient, which has very different therapeutic implications.

Goals for GDMT

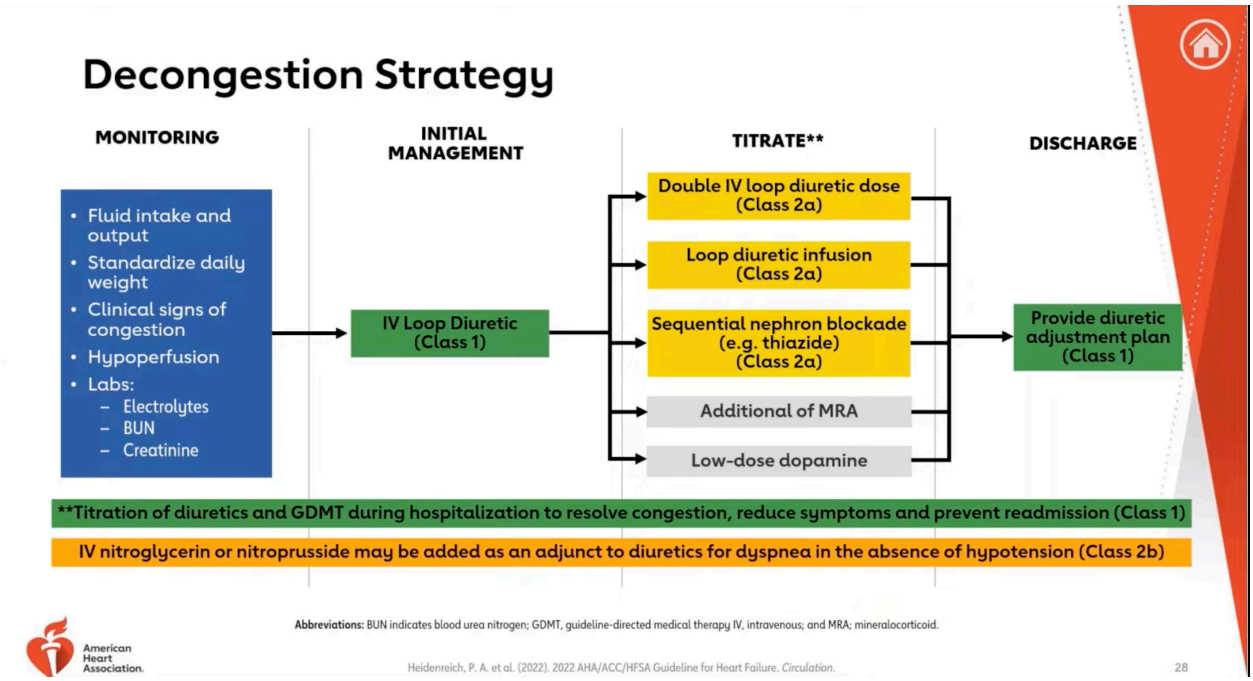
Next, we shift to the immediate goals for guideline-directed medical therapy, or **GDMT**, once again, all with a Class 1 recommendation.

1. **Optimize volume status:** This is your immediate priority. You've evaluated their congestion, now you're going to treat it. For most patients, this means

diuresis. We'll be using loop diuretics, often intravenously, to get that excess fluid off and get the patient to a euvolemic state. This is what provides symptomatic relief for many patients.

2. **Address reversible factors:** This ties back to our initial evaluation. Once you've identified a precipitating factor, you need to actively manage it. If they have a new MI, they need to go to the cath lab. If their hypertension is out of control, you need to manage it. If they have a new arrhythmia, you need to address it. Fixing these issues is key to getting them stabilized.
3. **Continue or initiate GDMT:** For patients who are already on GDMT, you need to make sure they continue taking those medications unless there's a specific contraindication. And for patients who are new to heart failure or not on all the recommended therapies, this hospitalization is the perfect opportunity to initiate those life-saving medications—think beta-blockers, ACE inhibitors/ARBs/ARNI's, mineralocorticoid receptor antagonists, and SGLT2 inhibitors—once they are hemodynamically stable. **Remember**, you should not initiate these medications, particularly beta-blockers, in a patient with active decompensation or shock, but you should continue them if they're already on them and tolerating them. The focus is to start or up-titrate them as the patient's condition improves.

Finally, the slide reminds us of the **Common Factors Precipitating HF Hospitalization**, which we discussed. They fall into categories like new cardiac events, uncontrolled chronic conditions, non-adherence, and iatrogenic causes from new medications. Keeping this list in mind will help you build your differential diagnosis and guide your workup.



Decongestion Strategy

This flowchart outlines a step-wise approach to decongesting a patient with acute heart failure, from initial management through to discharge planning. It's a critical tool for managing their symptoms and preventing readmission.

Let's walk through the flow, starting on the left with **Monitoring**.

Monitoring

Effective decongestion requires constant monitoring. You need to track:

- **Fluid intake and output (I/O):** This is your primary measure of success. You want a net negative balance.
- **Standardize daily weight:** This is the most sensitive and reproducible marker of a patient's volume status. A reduction in weight directly correlates with fluid loss.
- **Clinical signs of congestion and hypoperfusion:** Continue to perform daily physical exams. Are their crackles improving? Is the JVP coming down? Is their edema resolving? Are they staying warm and well-perfused?
- **Labs:** You must regularly check electrolytes, especially potassium and magnesium, which can be depleted by diuretics. Also, monitor BUN and

creatinine to watch for worsening renal function from aggressive diuresis.

Initial Management

The first step in management, a **Class 1 recommendation**, is to start with **IV Loop Diuretics**.

- In a patient admitted with acute decompensated heart failure, especially if they were on oral diuretics at home, IV administration is crucial. It has a faster onset of action and better bioavailability. A common approach is to give an IV dose that is 1 to 2.5 times their home oral dose.

Titration

Now, if that initial dose isn't working—if you're not seeing adequate urine output or clinical improvement—you need to escalate your therapy. This is the "Titrate" box, and these are all **Class 2a recommendations**, meaning the evidence supports their usefulness, but it's not as strong as a Class 1.

You have a few options, and you can try them sequentially:

- **Double the IV loop diuretic dose:** This is often the first and simplest step. Increasing the dose can overcome diuretic resistance.
- **Loop diuretic infusion:** A continuous IV infusion of a loop diuretic may be more effective than intermittent boluses for some patients, as it maintains a consistent drug level and can improve diuretic efficiency.
- **Sequential nephron blockade:** This is a powerful strategy. You're combining a loop diuretic with a diuretic that works on a different part of the nephron, like a thiazide-type diuretic (e.g., metolazone or chlorothiazide). The loop diuretic works on the loop of Henle, while the thiazide works on the distal convoluted tubule. This "double-whammy" approach is very effective for refractory congestion.
- **Additional of an MRA:** Adding a mineralocorticoid receptor antagonist like spironolactone or eplerenone can also help, as these drugs have a weak diuretic effect and block aldosterone-mediated potassium excretion, which is helpful when you're giving high-dose loop diuretics.

- **Low-dose dopamine:** This is a last-line option. Low-dose dopamine can be used to improve renal blood flow and potentially enhance the diuretic effect, though this is not a universally accepted practice and its use is declining.

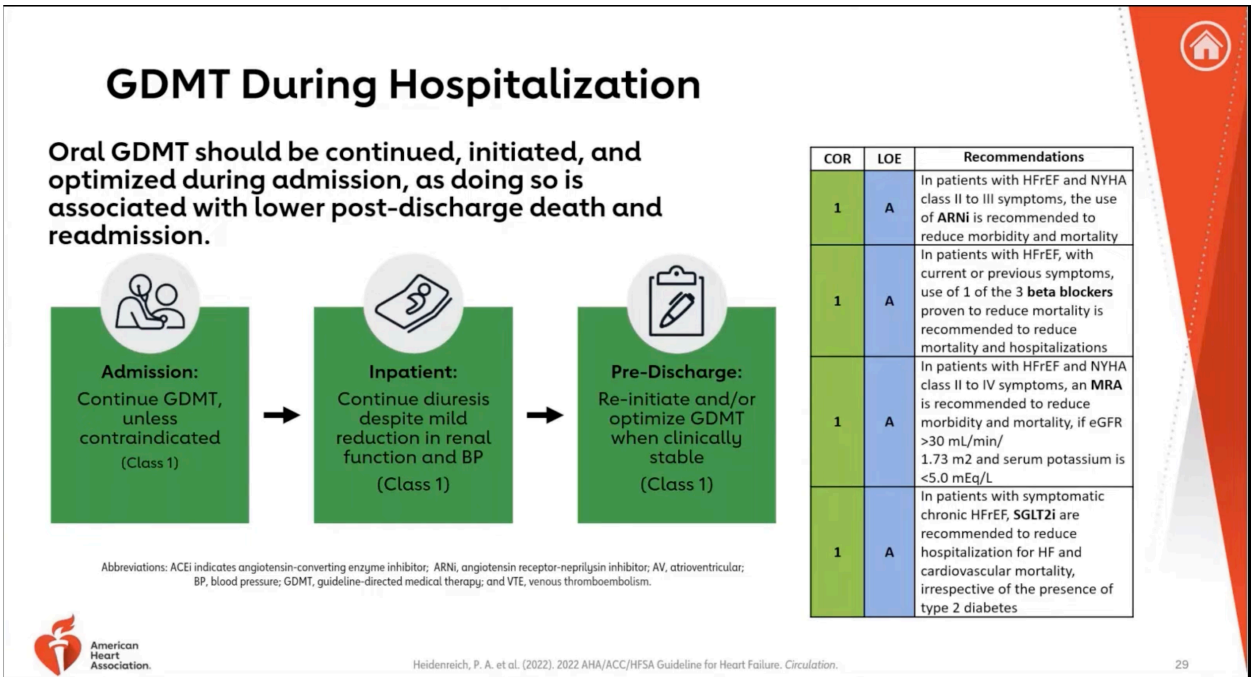
Discharge

Finally, once the patient is decongested and ready to go home, you need a plan.

- **Provide a diuretic adjustment plan (Class 1):** This is essential to prevent readmission. The patient needs to understand how to adjust their oral diuretic dose based on their daily weight or other symptoms. You should give them clear instructions on when to increase or decrease their dose and when to call their doctor.

The banner at the bottom reinforces that the **titration of diuretics and GDMT** throughout the hospitalization is a **Class 1 recommendation** for resolving congestion and preventing readmission.

And a final note: The slide mentions that **IV nitroglycerin or nitroprusside** can be added as an adjunct for dyspnea in the absence of hypotension (**Class 2b**). These are vasodilators that can help reduce preload and afterload, providing symptomatic relief for patients who are very congested but have an adequate blood pressure. They are not primary diuretics but are useful adjuncts.



GDMT During Hospitalization

This slide focuses on the crucial topic of managing guideline-directed medical therapy, or **GDMT**, throughout a patient's hospitalization for heart failure. The core message is that oral GDMT should be continued, initiated, and optimized during admission because it's strongly associated with better outcomes, including lower post-discharge death and readmission rates.

Let's follow the timeline outlined in the three boxes.

Admission

- **Continue GDMT, unless contraindicated (Class 1):** Upon admission, the primary directive is to not stop the patient's existing GDMT unless there's a clear reason to. For example, if a patient is in cardiogenic shock, you might need to hold their beta-blocker. But for most patients, holding these life-saving medications isn't necessary and can be detrimental. This is a common mistake to avoid.

Inpatient

- **Continue diuresis despite mild reduction in renal function and BP (Class 1):** This is a key teaching point. It's common to see a slight bump in a patient's creatinine and a mild drop in blood pressure as you aggressively diurese them. The slide is giving you a Class 1 recommendation to continue diuresis because the benefits of achieving euvolemia often outweigh the risks of a mild, reversible rise in creatinine. You're treating the congestion, and a small rise in creatinine is often a trade-off for effective decongestion. Of course, you must monitor this closely.

Pre-Discharge

- **Re-initiate and/or optimize GDMT when clinically stable (Class 1):** This is the window to act. Once the patient is clinically stable, you should re-initiate any GDMT medications that were held and optimize their doses. This is a perfect opportunity to start medications they weren't on before, like an SGLT2 inhibitor, or up-titrate their ACE inhibitor or beta-blocker. Discharging a patient on a suboptimal GDMT regimen is a major risk factor for early readmission.

The table on the right side provides specific recommendations for GDMT based on the latest guidelines, all with **Class 1, Level of Evidence A**—the strongest possible evidence.

- **ARNI (Angiotensin Receptor-Neprilysin Inhibitor):** For patients with HFrEF and NYHA Class II to III symptoms, using an ARNI is recommended to reduce morbidity and mortality. This class of medication, like Entresto, is now a cornerstone of HFrEF management.
- **Beta-blockers:** For patients with HFrEF, with current or previous symptoms, using one of the three beta-blockers proven to reduce mortality (metoprolol succinate, carvedilol, or bisoprolol) is recommended.
- **MRA (Mineralocorticoid Receptor Antagonist):** For patients with HFrEF and NYHA Class II to IV symptoms, an MRA is recommended to reduce morbidity and mortality, but you must be mindful of their renal function (eGFR > 30) and potassium level (serum potassium < 5.0 mEq/L).
- **SGLT2i (Sodium-Glucose Cotransporter-2 Inhibitor):** For patients with symptomatic chronic HFrEF, SGLT2 inhibitors are recommended to reduce hospitalization for HF and cardiovascular mortality, regardless of whether they have type 2 diabetes. This is a relatively new but incredibly important addition to the heart failure armamentarium.

This slide really emphasizes the importance of using a hospitalization as an opportunity to ensure the patient is on a maximal, evidence-based GDMT regimen to improve their long-term outcomes.

Transitions of Care

This slide addresses a critical phase in the patient's journey: the transition from the hospital back to home. This is a high-risk period for readmission, and a well-structured plan is essential for a successful outcome. The main takeaway is that a **transition of care plan should be communicated prior to discharge**, which is a **Class 1 recommendation**.

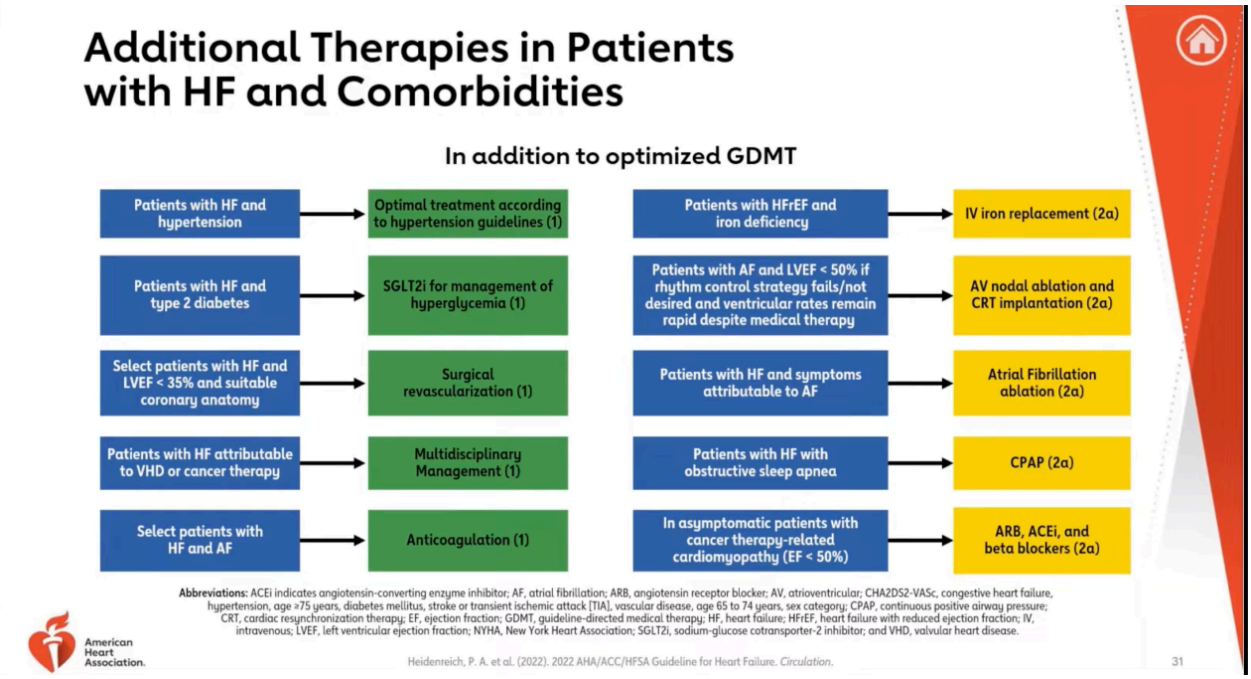
The slide then details what this plan should include.

1. **Early follow-up, ideally within 7 days (Class 2a):** This is very important. Seeing a patient within the first week of discharge allows a provider to assess their volume status, review their medication list, and address any immediate concerns. It helps catch potential problems before they lead to another hospitalization.
2. **Referrals to multidisciplinary HF management programs (Class 1):** This is a gold standard. A dedicated heart failure clinic, a case manager, or a specialized pharmacist can provide ongoing support, education, and medication management that significantly reduces readmission rates and improves quality of life.
3. **Participation in benchmarking programs to improve GDMT and quality of care (Class 2a):** This recommendation is aimed at the healthcare system level.

By participating in programs that track outcomes and adherence to guidelines, hospitals can identify areas for improvement in their heart failure care.

4. **Addressing precipitating causes and high-risk factors:** We've identified these factors throughout the hospitalization, and now it's time to make a plan to manage them. This includes addressing co-morbidities like diabetes or hypertension and considering social determinants of health (SDOH), such as access to healthy food, transportation, and medication affordability, which are often major barriers to adherence.
5. **Adjusting diuretics:** As we saw on the decongestion slide, a clear diuretic adjustment plan is a key part of the discharge instructions. The patient needs to know what to do if their weight goes up or if their symptoms of congestion return.
6. **Coordination of safety laboratory checks:** This involves scheduling follow-up labs to monitor electrolytes and renal function, especially after starting or up-titrating GDMT medications like ACE inhibitors, MRAs, or ARNI's. The follow-up provider needs to know when to check these and what to do with the results.

In essence, a successful discharge plan for a heart failure patient is more than just writing a prescription. It's a comprehensive strategy that connects the inpatient care to the outpatient world, ensuring continuity and support to keep them healthy and out of the hospital.



Additional Therapies in Patients with HF and Comorbidities

This slide expands on our discussion of guideline-directed medical therapy by highlighting additional therapies to consider for patients with heart failure and specific comorbidities. The key here is to look beyond the standard four pillars of GDMT and address these other conditions that significantly impact heart failure outcomes.

Let's go through the chart, starting with the left column, which covers common comorbidities.

Left-Sided Flowchart

- **Patients with HF and hypertension:** For these patients, the recommendation is to provide **optimal treatment according to hypertension guidelines (Class 1)**. This is crucial because uncontrolled blood pressure is a major driver of left ventricular hypertrophy and heart failure with preserved ejection fraction (HFpEF) and can exacerbate symptoms in heart failure with reduced ejection fraction (HFrEF).
- **Patients with HF and type 2 diabetes:** Here, the slide recommends **SGLT2 inhibitors for management of hyperglycemia (Class 1)**. This is a powerful dual-purpose therapy. As we know, SGLT2 inhibitors are now a core

component of GDMT for HFrEF, but they also effectively manage diabetes and are an excellent choice for these patients.

- **Select patients with HF and LVEF < 35% and suitable coronary anatomy:** This is a specific group of patients where **surgical revascularization (Class 1)** may be indicated. The STICH trial demonstrated that for certain patients with ischemic cardiomyopathy, coronary artery bypass grafting (CABG) can improve long-term survival. This is a decision made in consultation with a heart team, including a cardiothoracic surgeon.
- **Patients with HF attributable to VHD or cancer therapy:** These patients require a **multidisciplinary management (Class 1)** approach. For valvular heart disease (VHD), this means working with a cardiac surgeon or interventionalist to determine the timing and type of valve repair or replacement. For cancer therapy-related cardiomyopathy, this involves close collaboration with oncology to manage both conditions.
- **Select patients with HF and AF:** For patients with concomitant heart failure and atrial fibrillation, **anticoagulation (Class 1)** is indicated based on their CHA_2DS_2-VASc score to prevent thromboembolic events, specifically stroke.

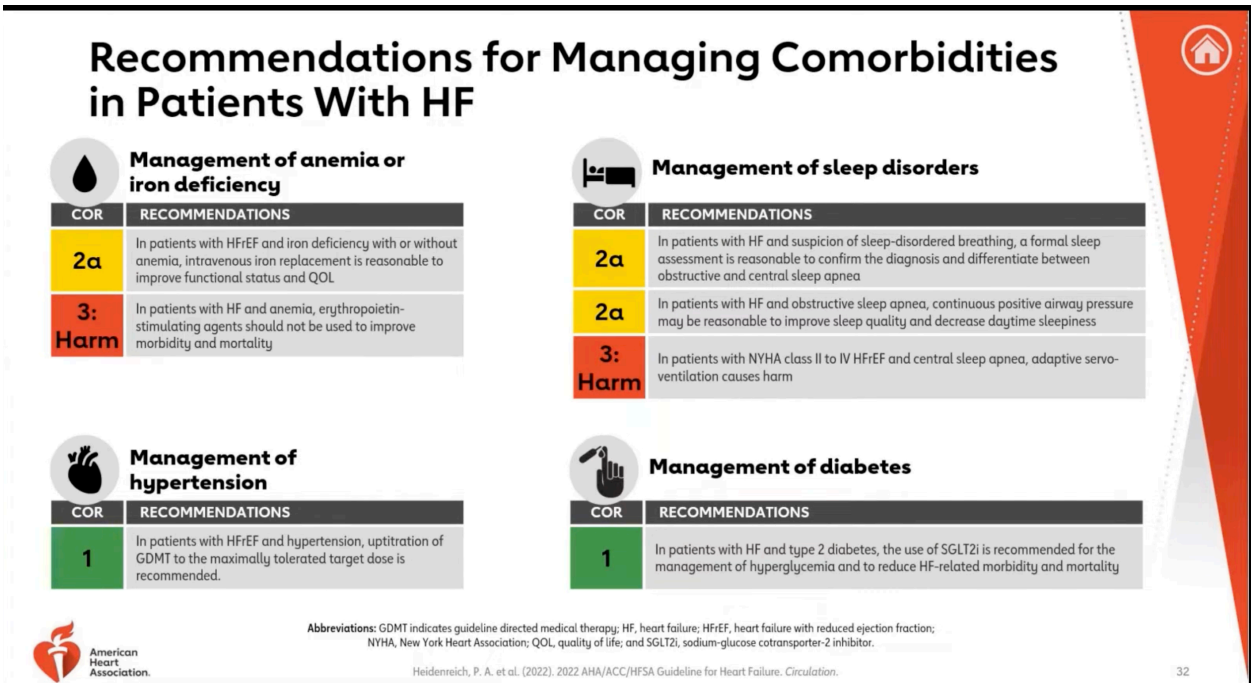
Right-Sided Flowchart

The right side of the slide focuses on more advanced or specific interventions.

- **Patients with HFrEF and iron deficiency:** The recommendation is **IV iron replacement (Class 2a)**. Studies have shown that correcting iron deficiency in these patients can improve symptoms, functional capacity, and quality of life, even in the absence of anemia.
- **Patients with HF and LVEF < 50% if rhythm control strategy fails/not desired and ventricular rates remain rapid despite medical therapy:** For these patients, options include **AV nodal ablation and CRT implantation (Class 2a)**. This is a strategy to control the ventricular rate in atrial fibrillation. You ablate the AV node and implant a biventricular pacemaker (CRT) to resynchronize the ventricles, as you don't want to cause a complete heart block without having a pacemaker to maintain heart function.
- **Patients with HF and symptoms attributable to AF:** In select patients, **atrial fibrillation ablation (Class 2a)** can be considered to restore sinus rhythm,

which may improve heart failure symptoms.

- **Patients with HF with obstructive sleep apnea:** The recommendation here is for **CPAP (Class 2a)**. Treating obstructive sleep apnea can improve heart failure symptoms and quality of life by reducing nocturnal hypoxemia and sympathetic nervous system activation.
- **In asymptomatic patients with cancer therapy-related cardiomyopathy (EF < 50%):** The slide recommends using **ARB, ACEi, and beta-blockers (Class 2a)**. This highlights the importance of starting these protective therapies early, even in asymptomatic patients, to prevent further cardiac remodeling and progression to symptomatic heart failure.



Recommendations for Managing Comorbidities in Patients With HF

This slide summarizes key guideline recommendations for managing four common comorbidities in heart failure patients. These are high-yield points that are crucial for improving patient outcomes.

Management of Anemia or Iron Deficiency

- **Recommendation:** For heart failure with reduced ejection fraction (HFrEF) patients with or without anemia but who have iron deficiency, **intravenous iron replacement is reasonable to improve functional status and quality of life (Class 2a)**. This is an important distinction; you don't need to be anemic to benefit from IV iron. * **Harm:** It's a **Class 3 recommendation (Harm)** to use erythropoietin-stimulating agents in heart failure patients with anemia, as they have not been shown to improve morbidity or mortality and can be associated with adverse effects.

Management of Sleep Disorders

- **Diagnosis:** If you suspect sleep-disordered breathing in a heart failure patient, a formal sleep assessment is reasonable to confirm and differentiate between obstructive and central sleep apnea (**Class 2a**).
- **Treatment:** For patients with heart failure and **obstructive sleep apnea**, continuous positive airway pressure (CPAP) may be reasonable to improve sleep quality and decrease daytime sleepiness (**Class 2a**).
- **Harm:** For patients with New York Heart Association (NYHA) class II to IV HFrEF and **central sleep apnea**, adaptive servo-ventilation causes harm (**Class 3: Harm**). This is a critical point to remember, as ASV, a form of positive airway pressure, was found to increase mortality in this specific patient population.

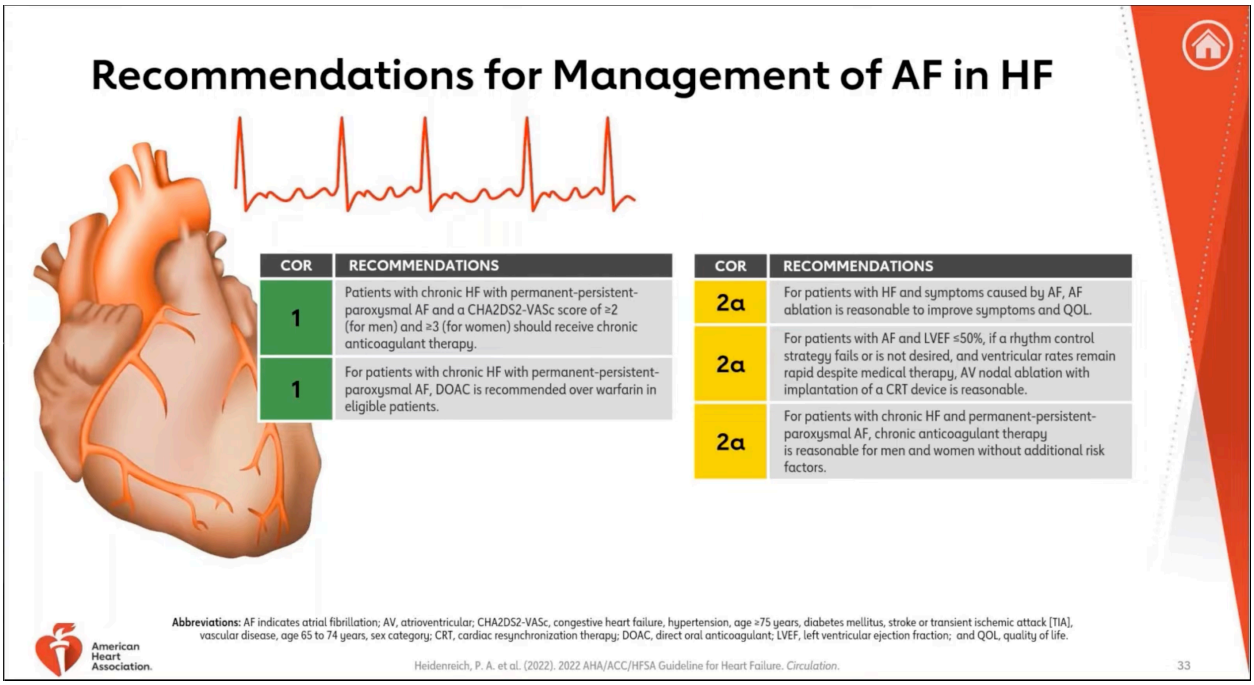
Management of Hypertension

- **Recommendation:** In patients with HFrEF and hypertension, up-titration of GDMT to the maximally tolerated target dose is recommended (**Class 1**). This reinforces that the same medications used to treat HFrEF—such as ACE inhibitors, ARBs, ARNIs, and beta-blockers—are also effective for managing hypertension.

Management of Diabetes

- **Recommendation:** In patients with heart failure and type 2 diabetes, the use of **SGLT2 inhibitors is recommended (Class 1)** for the management of hyperglycemia and to reduce heart failure-related morbidity and mortality.

This highlights the dual benefit of SGLT2 inhibitors, making them a top-tier choice for these patients.



Recommendations for Management of AF in HF

This slide focuses on the management of atrial fibrillation (AF) in patients with heart failure (HF), a very common and clinically important comorbidity. AF and HF often coexist and worsen each other, so a clear management strategy is crucial.

Let's look at the recommendations, broken down by Class of Recommendation (COR).

Class 1 Recommendations

These are the core, evidence-based recommendations that should be followed.

- **Anticoagulation for Stroke Prevention:** For patients with chronic HF who have permanent or persistent paroxysmal AF and a **CHA_2DS_2-VASc score of ≥2 for men and ≥3 for women**, chronic anticoagulant therapy is a **Class 1** recommendation. This is the standard of care to prevent a cardioembolic stroke. * **DOACs over Warfarin:** For eligible patients, a **direct oral anticoagulant (DOAC)** is recommended over warfarin. This is another **Class 1** recommendation, as DOACs have been shown to be at least as effective as

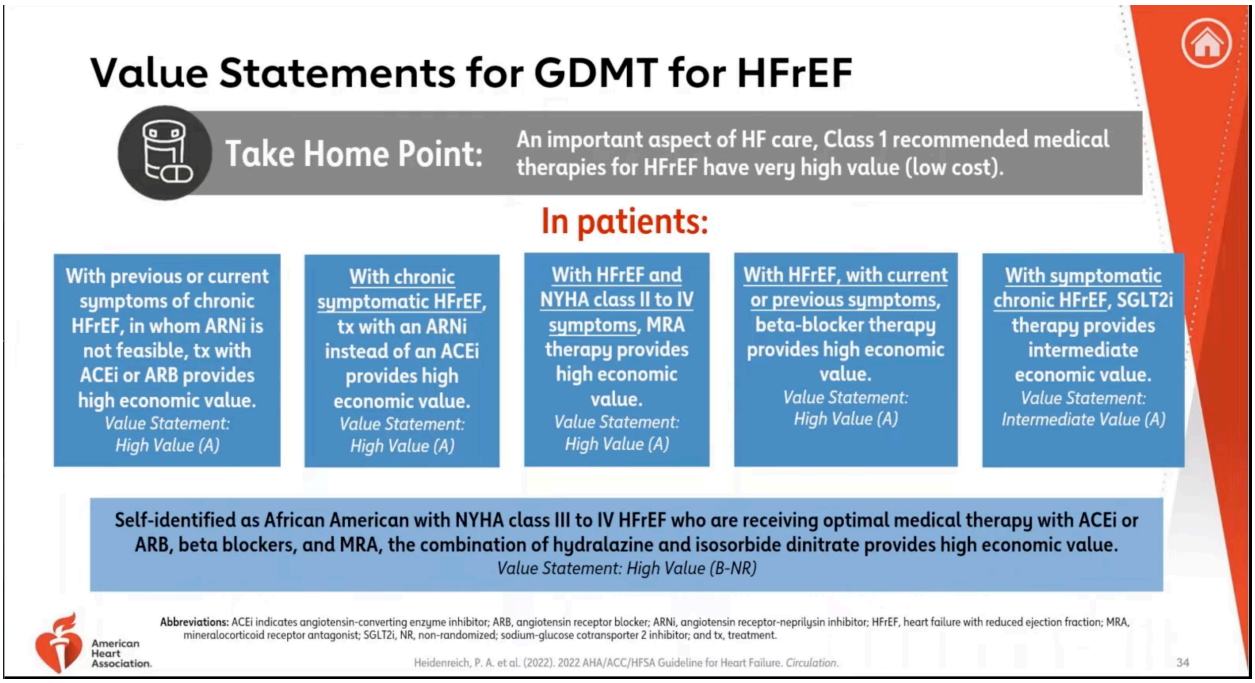
warfarin at preventing stroke, with a lower risk of intracranial hemorrhage, and they do not require frequent INR monitoring.

Class 2a Recommendations

These are interventions that are considered reasonable and have supporting evidence.

- **AF Ablation for Symptoms:** For patients whose HF symptoms are caused by AF, **AF ablation is reasonable to improve symptoms and quality of life**. This is an effective strategy for selected patients whose heart failure is exacerbated by the arrhythmia.
- **AV Nodal Ablation and CRT Implantation:** In patients with an LVEF <50% where a rhythm control strategy fails or is not desired, and ventricular rates remain rapid despite medical therapy, **AV nodal ablation with implantation of a CRT device is reasonable**. This is a last-resort strategy for rate control, where you essentially ablate the AV node to create a heart block and then use a biventricular pacemaker to pace the ventricles in a coordinated fashion, which can improve cardiac function.
- **Anticoagulation for Isolated AF:** For patients with chronic HF and permanent/persistent paroxysmal AF, chronic anticoagulant therapy is reasonable for men and women without additional risk factors. The slide is less clear on the exact CHA_2DS_2-VASc score here, but the takeaway is that even with lower-risk AF, anticoagulation is often considered reasonable in the context of heart failure.

This slide provides a concise but comprehensive overview of how to manage AF in the context of heart failure, prioritizing anticoagulation for stroke prevention and offering other strategies to improve symptoms and ventricular function.



Value Statements for GDMT for HFrEF

This slide shifts focus to the economic value of Guideline-Directed Medical Therapy (GDMT) for heart failure with reduced ejection fraction (HFrEF). The key "Take Home Point" is that the **Class 1 recommended medical therapies for HFrEF have very high value, often at a low cost**. This is a crucial message in today's healthcare environment, emphasizing that these evidence-based therapies are both clinically effective and economically sound.

Let's break down the value statements for different patient populations.

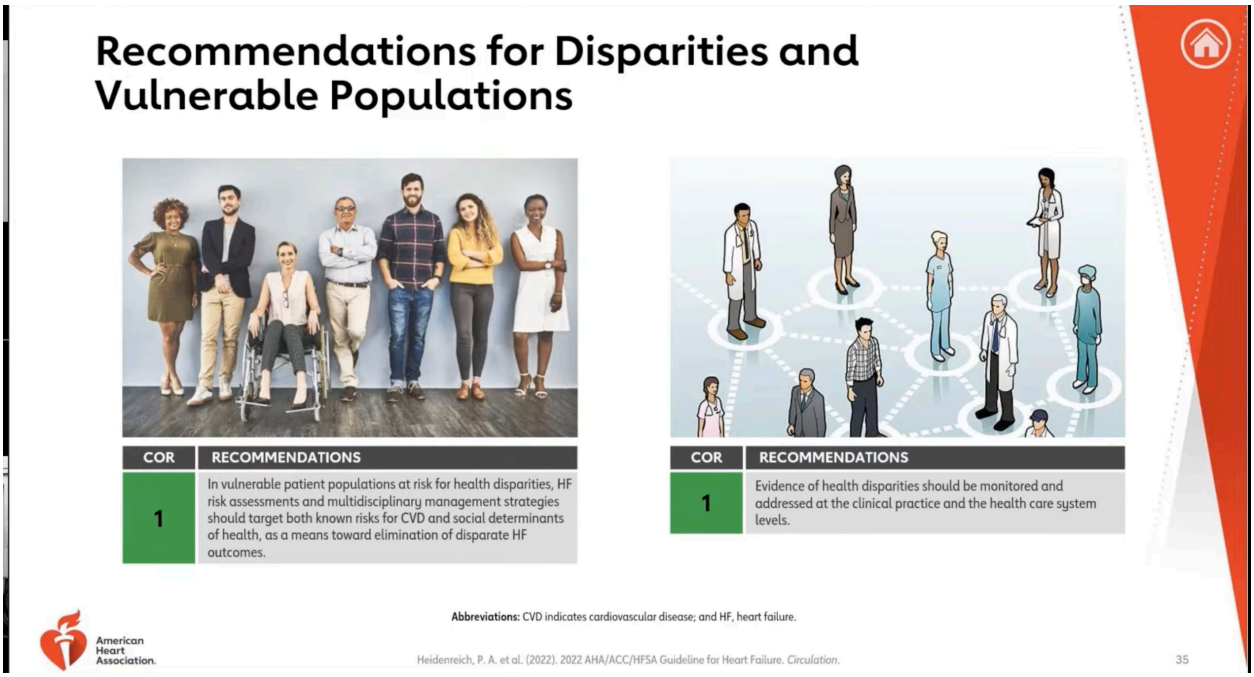
- **Patients with previous or current symptoms of chronic HFrEF, in whom ARNI is not feasible, treatment with an ACE inhibitor or ARB provides high economic value.** This is the classic, foundational therapy for heart failure. ACE inhibitors and ARBs are now available as generics and are highly effective, making them an economically valuable choice when an ARNI isn't an option due to cost or other factors.
- **Patients with chronic symptomatic HFrEF, treatment with an ARNI instead of an ACE inhibitor provides high economic value.** This is a more modern recommendation. While more expensive, the clinical benefits of ARNIs in reducing morbidity and mortality are significant enough to provide a high economic value, as they prevent costly hospitalizations and prolong life.

- **Patients with HFrEF and NYHA Class II to IV symptoms, MRA therapy provides high economic value.** Mineralocorticoid receptor antagonists, like spironolactone, are relatively inexpensive generics and are a cornerstone of GDMT. Their proven benefit in reducing mortality and hospitalizations makes them a highly cost-effective intervention.
- **Patients with HFrEF, with current or previous symptoms, beta-blocker therapy provides high economic value.** Like ACE inhibitors, beta-blockers are another pillar of GDMT. They are also widely available as generics and provide substantial clinical benefit, leading to a high economic value.
- **With symptomatic chronic HFrEF, SGLT2 inhibitor therapy provides intermediate economic value.** This is an important distinction. While SGLT2 inhibitors are now a Class 1 recommendation and provide significant clinical benefit, they are newer and still under patent, making them more expensive. Therefore, their value is currently considered "intermediate" from an economic perspective, although their clinical value is unquestionable.

The final statement at the bottom addresses a specific patient population:

- **Self-identified as African American with NYHA class III to IV HFrEF who are receiving optimal medical therapy with ACEi or ARB, beta-blockers, and MRA, the combination of hydralazine and isosorbide dinitrate provides high economic value.** This is a very specific recommendation derived from the A-HeFT trial, which showed a significant survival benefit for this medication combination in this particular patient group. The medications themselves are generics, making this a highly cost-effective therapy for this specific demographic.

This slide provides a great summary of why these therapies are not just clinically indicated but also financially prudent, a concept that is increasingly important in modern medicine.



Recommendations for Disparities and Vulnerable Populations

This slide is a crucial and modern addition to heart failure guidelines, focusing on health disparities and vulnerable populations. It emphasizes that providing high-quality care isn't just about managing the disease itself but also about addressing the systemic factors that influence patient outcomes.

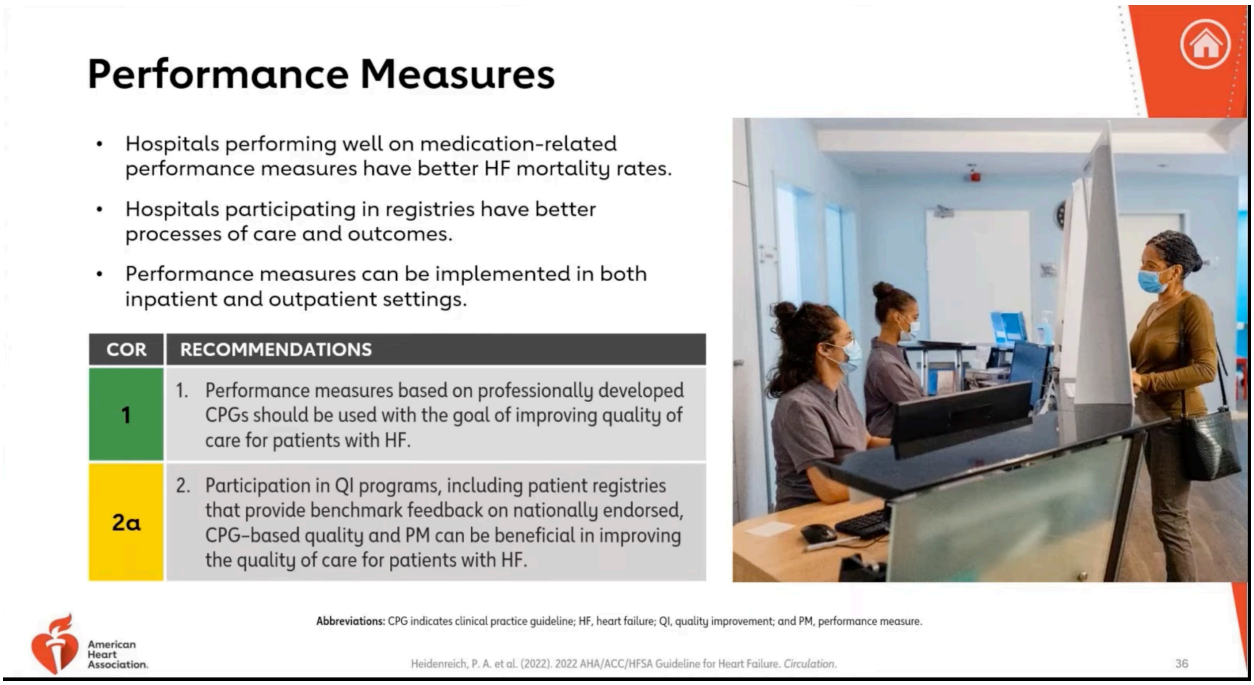
Core Recommendations

There are two key Class 1 recommendations here:

1. **Addressing Risk and Social Determinants:** For vulnerable patient populations at risk for health disparities, heart failure risk assessments and multidisciplinary management strategies should **target both known risks for cardiovascular disease and social determinants of health (SDOH)**. The goal is to eliminate disparate heart failure outcomes.
    - This means our assessments must go beyond traditional risk factors like hypertension or diabetes. We also need to consider things like a patient's access to healthy food, their transportation to appointments, their housing stability, and their health literacy. A multidisciplinary team, which might include social workers, dietitians, and community health workers, is essential to address these complex needs.

2. **Monitoring Health Disparities:** The second recommendation is that evidence of health disparities should be **monitored and addressed at both the clinical practice and the healthcare system levels**.
    - This pushes the responsibility beyond individual clinicians to the entire healthcare system. It means hospitals and clinics should be tracking outcomes based on demographics like race, ethnicity, and socioeconomic status. By identifying where disparities exist, they can implement system-wide changes to address them. For example, a hospital might find that readmission rates are higher in a certain zip code and then implement a targeted program to provide extra support for patients in that area.

      This slide is a powerful reminder that excellent medical care is a mix of clinical expertise and a deep understanding of the patient's individual context, including the social and economic factors that shape their health.



Performance Measures

This final slide discusses the importance of **performance measures** in improving the quality of heart failure care at an institutional level. The main point is that hospitals that actively monitor and improve their performance on heart failure metrics have better patient outcomes.

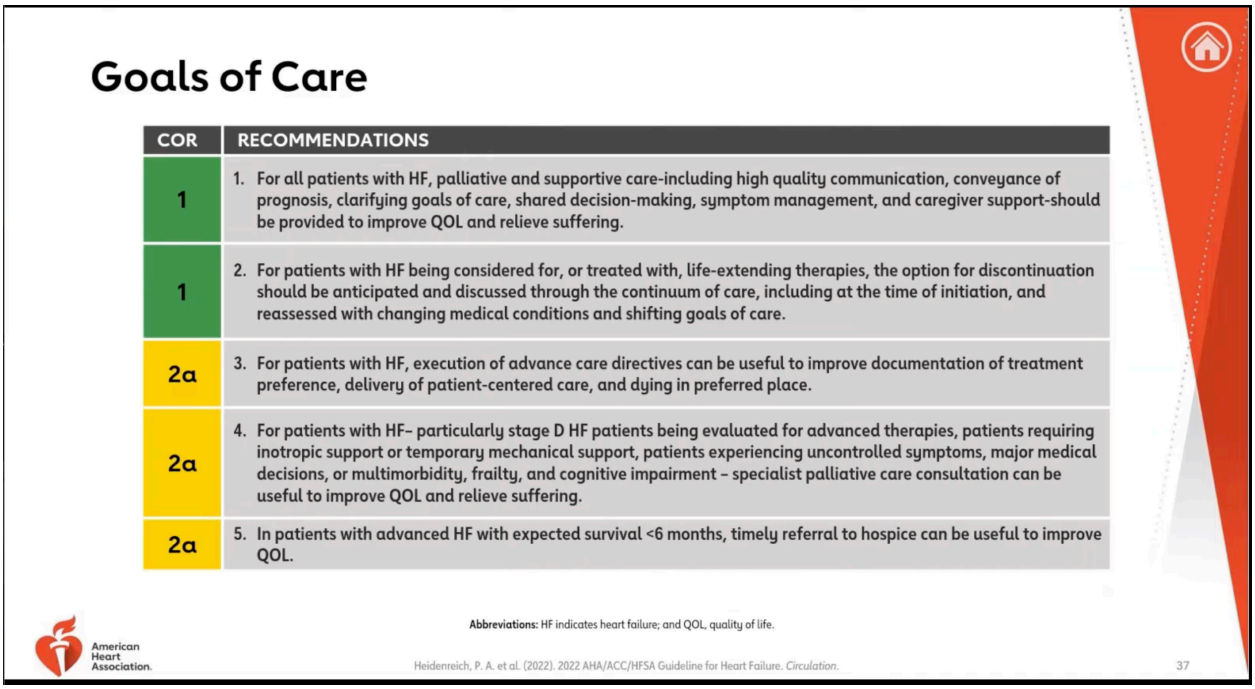
Key Takeaways

- Hospitals that perform well on medication-related performance measures have better heart failure mortality rates. This highlights the direct link between a hospital's adherence to evidence-based guidelines and patient survival.
- Hospitals that participate in registries, such as the American Heart Association's Get With The Guidelines, tend to have better processes of care and outcomes. These registries allow hospitals to benchmark their performance against others and identify areas for improvement.
- Performance measures are not just for the inpatient setting; they can be implemented in both inpatient and outpatient settings to ensure continuous quality improvement.

Recommendations

- **Class 1 Recommendation: Performance measures based on professionally developed clinical practice guidelines (CPGs)** should be used with the goal of improving the quality of care for patients with heart failure. These measures act as a checklist to ensure patients are receiving the most effective, evidence-based treatments.
- **Class 2a Recommendation: Participation in quality improvement (QI) programs**, including patient registries, that provide benchmark feedback on nationally endorsed, CPG-based quality and performance measures can be beneficial in improving the quality of care for patients with heart failure. This is about using data to drive continuous improvement, a cornerstone of modern healthcare quality.

In essence, this slide closes the loop by showing that applying the guidelines we've been discussing—from decongestion to GDMT—should be tracked and measured institutionally to ensure the best possible care for all heart failure patients.



Goals of Care

This final slide addresses a crucial and often overlooked aspect of heart failure management: establishing **goals of care**. This goes beyond medical treatments and focuses on improving a patient's quality of life (QOL) and relieving suffering, especially as their disease progresses.

Class 1 Recommendations

These are fundamental practices for all heart failure patients.

- **Palliative and Supportive Care:** For **all patients with heart failure**, it's a **Class 1 recommendation** to provide palliative and supportive care. This includes high-quality communication, conveying a clear prognosis, clarifying their goals of care, engaging in shared decision-making, and actively managing their symptoms. Importantly, this also includes providing support for the patient's caregivers. Palliative care is not just for end-of-life; it should be integrated from the time of diagnosis.
- **Discussing Discontinuation of Therapy:** For patients being considered for, or treated with, life-extending therapies, the option for **discontinuation should be anticipated and discussed throughout the continuum of care**. This is a

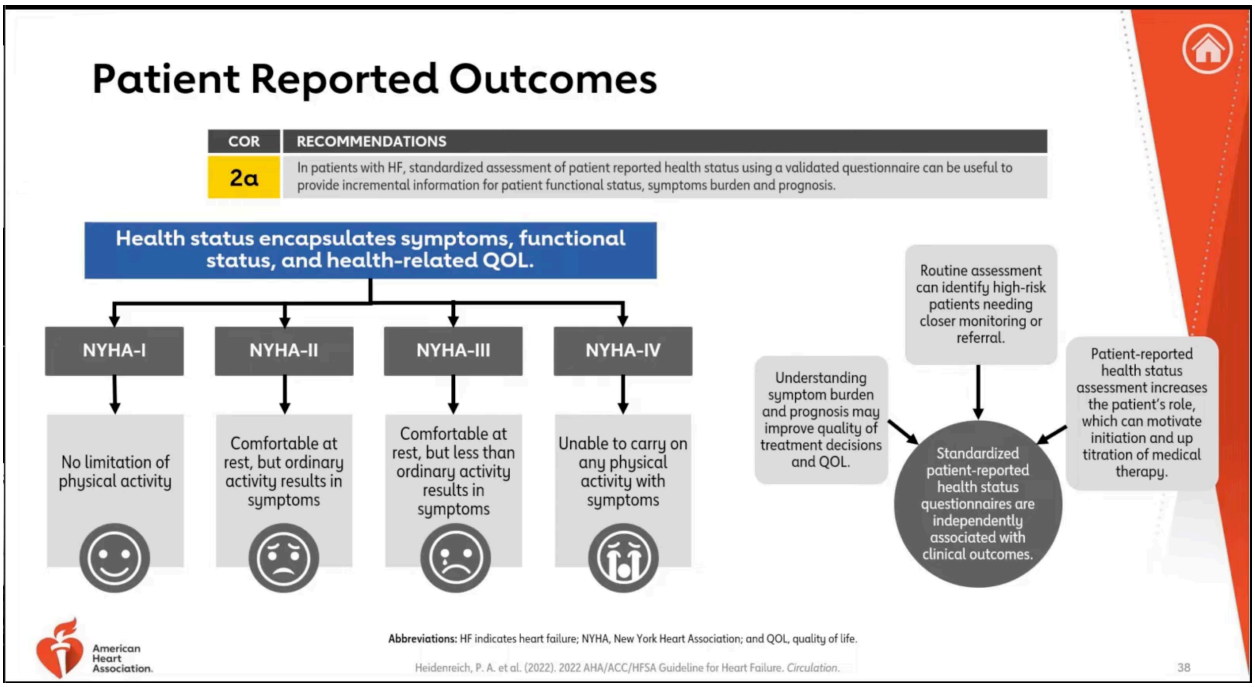
Class 1 recommendation. It's important to have these conversations early and revisit them as the patient's medical condition changes and their goals shift.

Class 2a Recommendations

These are specific situations where a goals-of-care approach is particularly beneficial.

- **Advance Directives:** For all patients with heart failure, the **execution of advance care directives** can be useful to improve the documentation of treatment preferences, deliver patient-centered care, and facilitate dying in their preferred place.
- **Palliative Care Consultation:** For specific, high-risk patients—particularly those in **Stage D heart failure** being evaluated for advanced therapies (like LVADs or transplants), those requiring inotropic support, or those with significant comorbidities, frailty, or cognitive impairment—a **specialist palliative care consultation** can be useful to improve QOL and relieve suffering.
- **Hospice Referral:** In patients with **advanced heart failure and an expected survival of less than 6 months**, a **timely referral to hospice** can be useful to improve their quality of life. This is about ensuring they receive comfort-focused care and support in the final months of their life.

This slide provides a comprehensive framework for integrating compassionate, patient-centered care into the medical management of heart failure. It reminds us that our role is not just to extend life but to ensure the life our patients have is of the highest possible quality.



Patient Reported Outcomes

This final slide discusses the importance of incorporating **Patient Reported Outcomes (PROs)** into the management of heart failure. The core idea is that we should be asking patients directly about their symptoms and quality of life, not just relying on objective clinical data.

Key Recommendation

- The main recommendation, a **Class 2a**, states that in patients with heart failure, a standardized assessment of patient-reported health status using a validated questionnaire can be useful. This provides incremental information about their functional status, symptom burden, and prognosis. This moves beyond just looking at ejection fraction or BNP levels and focuses on what the patient is actually experiencing.

The NYHA Functional Classification

The slide highlights the **New York Heart Association (NYHA) functional classification** as a primary way to assess a patient's self-reported functional status. This is a simple but powerful tool that we use every day.

- **NYHA-I:** The patient has no limitation of physical activity.
- **NYHA-II:** The patient is comfortable at rest, but ordinary activity results in symptoms like dyspnea or fatigue.
- **NYHA-III:** The patient is comfortable at rest, but less than ordinary activity results in symptoms.
- **NYHA-IV:** The patient is unable to carry on any physical activity without symptoms.

This classification directly reflects the patient's perspective on their functional limitations.

The Importance of PROs

The arrows on the right side of the slide explain why these patient-reported measures are so valuable:

- **Routine assessment** can identify high-risk patients who need closer monitoring or referral.
- **Understanding symptom burden and prognosis** helps guide our treatment decisions and ultimately improve a patient's quality of life.
- **Patient-reported health status assessment increases the patient's role** in their own care. When a patient feels heard, it can motivate them to better adhere to their medications and medical therapy.
- Finally, the slide makes the critical point that standardized PROs are **independently associated with clinical outcomes**. This means that a patient's own report of how they are feeling is a powerful predictor of their future.

In summary, this slide encourages us to look at the whole picture—combining our clinical findings with the patient's subjective experience—to provide the most comprehensive and effective heart failure care.

Evidence Gaps and Future Research Directions

This final slide provides a forward-looking overview of the current gaps in our knowledge of heart failure and highlights important areas for future research. It's a good way to cap off our discussion by recognizing that heart failure is a dynamic field with many unanswered questions.

The slide is divided into several categories of common issues that need to be addressed in future clinical research.

Top Row:

- **Definitions:** There is still a need for a more precise and consistent way to define cardiomyopathies, myocardial injury, and even the ranges for ejection fraction, particularly for patients with HFpEF and borderline EFs.
- **Screening:** Research is needed to determine the cost-effectiveness of screening for heart failure and to better predict high-risk patients based on their comorbidities.
- **Diagnostics & Monitoring:** Future studies should focus on treatment based on the underlying etiology, not just the symptoms, and on how to use novel biomarkers to optimize therapy.

- **Non-medical Strategies:** We need more data on the efficacy and safety of interventions like dietary changes and cardiac rehabilitation.
- **Medical Therapies:** The slide points to a more comprehensive list in the guideline document, but the general idea is that we need to continue to research new pharmacologic therapies.

Bottom Row:

- **Device Management and Advanced Therapies:** There are still questions about the optimal timing and selection for invasive therapies, the best interventional approaches for tachyarrhythmias, and the safety and efficacy of novel approaches like nerve stimulation.
- **Clinical Outcomes:** Future research should focus on the impact of therapy on **patient-reported outcomes**, a concept we just discussed. We also need to address how to generalize trial findings to patients not typically represented in those trials, such as those with significant comorbidities.
- **Systems of Care and SDOH:** This is a major area for future work. We need better models for multidisciplinary care, effective strategies to eliminate health disparities, and a better understanding of how to integrate palliative care.
- **Comorbidities:** This is a vast field. We need more research on managing common comorbidities like atrial fibrillation, valvular heart disease, and obesity in the context of heart failure, as well as on nutritional management and care for patients with chronic kidney disease.
- **Future/Novel Strategies:** This is a space for innovation, including the development of new pharmacologic and device therapies, and the exploration of telemedicine and wearable technologies to monitor and manage heart failure patients in real-time.

This slide really drives home the message that while we have come a long way in managing heart failure, there is still much to learn.

Top 10 Things to Know

Top 10 Take Home Messages

1. Guideline-directed medical therapy (GDMT) for heart failure (HF) with reduced ejection fraction (HFrEF) now includes 4 medication classes which include sodium-glucose cotransporter-2 inhibitors (SGLT2i).

Top 10 Take Home Messages

2. SGLT2 inhibitors have a 2a recommendation in heart failure with mildly reduced ejection fraction (HFmrEF). Weaker recommendations (2b) are made for ARNi, ACEi, ARB, MRA and beta blockers in this population.

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Top 10 Take Home Messages

3. New recommendations for HFpEF are made for SGLT2 inhibitors (2a) , MRAs (2b) and ARNi (2b). Several prior recommendations have been renewed including treatment of hypertension (1), treatment of atrial fibrillation (2a), use of ARBs (2b) avoidance of routine use of nitrates or phosphodiesterase-5 inhibitors (3-no Benefit).

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Top 10 Take Home Messages

4. Improved LVEF is used to refer to those patients with a previous HFrEF who now have an LVEF > 40%. These patients should continue their HFrEF treatment.

45

Top 10 Take Home Messages

5. Value statements were created for select recommendations where high-quality cost-effectiveness studies of the intervention have been published.

Top 10 Take Home Messages

6. Amyloid heart disease has new recommendations for treatment including screening for serum and urine monoclonal light chains, bone scintigraphy, genetic sequencing, tetramer stabilizer therapy, and anticoagulation.

Top 10 Take Home Messages

7. Evidence supporting increased filling pressures is important for the diagnosis of HF if the LVEF is >40%. Evidence for increased filling pressures can be obtained from non-invasive (e.g., natriuretic peptide, diastolic function on imaging) or invasive testing (e.g., hemodynamic measurement).

Top 10 Take Home Messages

8. Patients with advanced HF who wish to prolong survival should be referred to a team specializing in HF. A heart failure specialty team reviews HF management, assesses suitability for advanced HF therapies and uses palliative care including palliative inotropes where consistent with the patient's goals of care.

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Top 10 Take Home Messages

9. Primary prevention is important for those at risk for HF (Stage A) or pre-HF (Stage B). Stages of HF were revised to emphasize the new terminologies of "at risk" for HF for Stage A and Pre-HF for Stage B.

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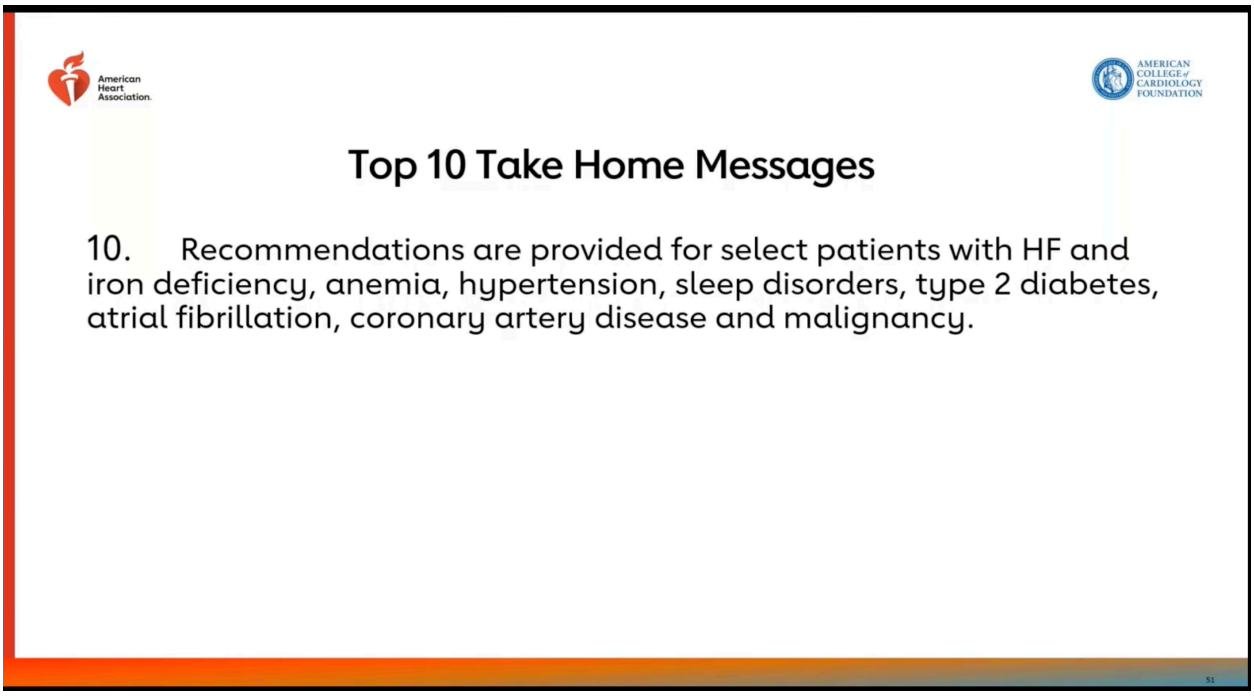

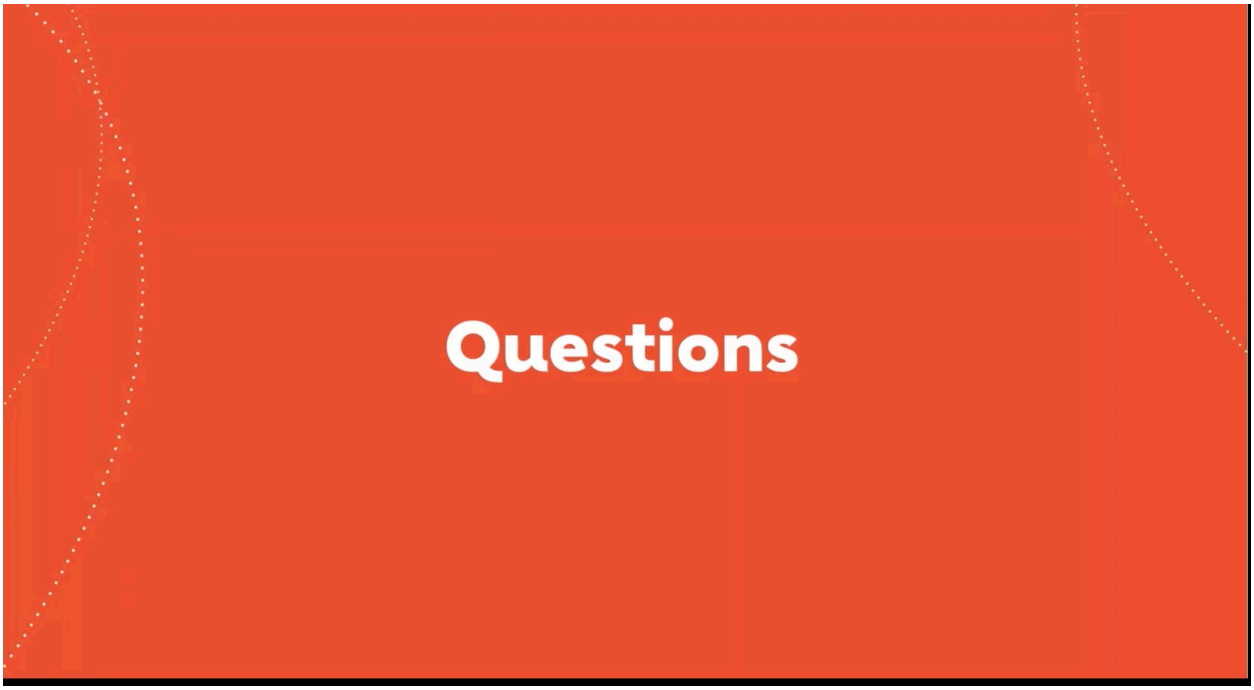

type 1 diabetes not enough data for sglt2 inh

moderate increase in genital and fungal infections

implement hf - 30 days surveillance after hospitlization

below 40 sglt2 strong evidence

41-49 moderate evidence

strategies to increase mra usage

- fear of hyperkalemia, strategies to monitor potassium levels
- importance of multidisciplinary team

is one mra better than another

- dont have head to head trials
- spironloactone or eplerenone

transform hf results

changes in recommendations to advanced therapies

- no RCT for heart transplant
- delicate concern of harm
- studies on mechanical cirulatory support
- life with mechanical circulatory support is not easy