Heart Failure Pathway

There are approximately 6.2 million adults living in the United States with heart failure (HF). The number of people with HF is expected to rise nearly 50 percent in the next decade. Patients will be older, sicker and have greater needs. And the management of HF is becoming increasingly complex. Fortunately, there is unequivocal evidence that guideline-directed therapy improves HF outcomes, decreases hospitalizations, and increases survival.

The best way to improve the outcomes for people living with HF is to use this heart failure care pathway to increase the consistent use of guideline-directed best practice care throughout the patient journey by all members of the HF team.

Heart Failure Goals

The Sutter Health heart failure dashboard includes measures to ensure we are improving outcomes for patients living with this condition. The measures include the following:

50%
increase in the number of HF patients by next decade

- ✓ **Prevalence of HF and its Complications**
- ✓ **Symptom Scores & Quality of Life for HF Patients** (based on the Kansas City Cardiomyopathy Questionnaire)
- ✓ **Emergency Department use by HF Patients**
- ✓ **Hospital Admissions of Patients Living with HF**
- ✓ **Discharge to Home after HF hospitalizations**
- ✓ **30- and 90-day Readmissions of HF Patients**
- ✓ **HF Mortality**

Heart Failure Diagnosis and Documentation

- Ejection fraction (EF) is the most important characteristic to categorize and document HF.

	Categories of HF	
EF (%)	**Acronym**	**Name**
EF ≤ 40%	HFrEF	Heart Failure with reduced Ejection Fraction
EF 41-49%	HFmrEF	Heart Failure with mildly reduced (midrange) Ejection Fraction
EF ≥ 50%	HFpEF	Heart Failure with preserved Ejection Fraction
EF was previously ≤ 40% and is now > 40%		Heart Failure with improved (recovered) Ejection Fraction

- In general, **document EF ≤ 40% (HFrEF) as ICD10 code I50.2** (i.e. "systolic HF"). See the HF guideline for full detail.

Heart Failure Stage and Class

- Use stage and class together to describe the progression and symptoms of patients with HF
- Patients with previous or current symptoms of HF are in Stage C or D (by definition patients with Stage A & B have had no past and no current symptoms of HF).
- Once a patient reaches a stage of HF they do not move back (ie once stage C always at least stage C) but patients move back and forth between classes based on their current symptoms.

Stage of HF	Functional Class of HF
A At high risk for HF but without structural heart disease or symptoms of HF	None
B Structural heart disease but without signs or symptoms of HF	**I** No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
C Structural heart disease with prior or current symptoms of HF	**I** No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
	II Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
	III Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
	IV Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.
D Refractory HF requiring specialized interventions	**IV** Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.

Self-monitoring of Heart Failure

- Patients should self-monitor their status if they have had previous symptoms of congestion or hospitalization
  - Fatigue and exercise intolerance
  - Respiratory symptom (SOB, orthopnea, # of pillows)
  - Edema
- Home daily weights

  Patients should contact provider or care team if

  ≥ 3 lbs. in 1-3 days or

  ≥ 5 lbs. in a week

  Note: *Individualize the exact amount based on patient characteristics and baseline weight*

  Note: *Weigh daily at same time with same or no clothing. Determine baseline ("dry") weight during period that patient is clinically stable.*

Lifestyle Management of Heart Failure

- Encourage heart-healthy eating and weight management
- Increase physical activity and refer to Cardiac Rehabilitation if patient qualifies
- Consider limits to dietary sodium – such as < 2000 mg/day
- Consider limits to fluid intake if needed – such as < 2 liters/day
- Initiate regular, ongoing and repeat discussions about advance care planning
- Receive all recommended immunizations including annual flu shots
- Treat tobacco use
- Treat drug abuse (especially cocaine and methamphetamines, which cause cardiomyopathy and HF)
- Avoid excess alcohol use
- Avoid cardiotoxic agents
- Address frailty and social determinants of health
- Screen for and treat depression and anxiety
- Use CPAP if sleep apnea

Heart Failure and Related Sutter Health Guidelines

See the Sutter Health Heart Failure Guideline and Medication Tables for detailed information about managing HF and for a list of the acronyms and abbreviations used in this pathway.

- Sutter Health Heart Failure Guideline
- Sutter Health Hypertension Guideline

Heart Failure Patient Educational Materials

- Sutter Health Heart Failure Handouts
- Sutter Health 2018 HF booklet Sutter Health HF Booklet
- Sutter Health lower literacy HF booklet Sutter HF Picture Booklet
- AHA HF resources AHA Resources
- Heart Failure Society of America Education Modules HFSA Handouts
- American Heart Association Symptom Tracker AHA Symptom Tracker
- Additional resources: Sutter Health Hypertension Booklet and Sutter Health Diabetes Booklet

The HF pathway is intended for the care of adults with HF. It is not intended for pregnant patients, children or adolescents. It is intended to help clinicians, educators, case managers and patients make decisions according to standard clinical practice and to improve the care and management of patients with HF at Sutter Health. It should not replace individual clinical judgment nor specialty consultation when indicated. The diagnosis of HF and all clinical decisions should be made within the context of the specific situation for each patient, including current health, medications, risk of treatment side effects, quality of life, life expectancy, and patient preference.

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21-SYSCOM-0018104

Diagnosis and Risk Reduction

Diagnosis and Assessment

- Obtain an echocardiogram at diagnosis and after change in status. In general, repeat echo at least every three years to reassess EF
- Add an accurate ICD10 to the problem list. Note: HFrEF is documented as ICD10 I50.2x (or I50.4x) "systolic" HF
- Refer to cardiology at diagnosis to evaluate for the cause of HF and individualize ongoing cardiology care
- Check BNP at diagnosis, during exacerbations and as indicated
- Check Cr, K, and Na baseline and after medication and status changes

Risk Reduction

- Cardiovascular Risk Reduction:
  - Treat to BP < 130/80 (individualize targets per the AHA)
  - Treat diabetes with SGLT2 inhibitors; target A1C < 8.0 (individualize targets were the ADA).
  - Use statins when indicated
- Provide appropriate influenza, pneumococcal and COVID vaccines
- Provide smoking, alcohol and drug counseling
- Address frailty and social determinants of health
- Screen and treat depression and anxiety

Self-Management

- Educate patient and family using patient-centric, health literate strategies at diagnosis. Repeat at touch points.
- See the list of heart failure materials on the first page

Advanced Care and Planning

- Discuss and document advance care directives and care goals early in the course of condition. Repeat the conversation frequently.
- Fill out the ePOLST when appropriate.

Guideline Directed Therapy

Guideline Directed Medical Therapy (GDMT)

Guideline Directed Medical Therapy (GDMT) is recommended in patients with HFrEF and current or prior symptoms to preserve cardiac function, control symptoms, prolong life, decrease admissions and readmissions, and prevent death.

- Treat patients with HFrEF with all possible classes of GDMT – includes using the following core classes of medications.
  - Renin-Angiotensin Medications (ACE inhibitors, ARBs or ARNis)
  - Beta Blockers (use carvedilol, metoprolol succinate SR or bisoprolol)
  - Aldosterone receptor antagonists
  - SGLT2 Inhibitors
  - Hydralazine and isosorbide dinitrate if the patient is self-identified Black and/or can't tolerate ACE inhibitors/ARBs/ARNis)

Helpful Hints

- Begin GDMT immediately after the HFrEF diagnosis. Aim to achieve optimal GDMT as rapidly as tolerated (within 3 months or sooner after initial diagnosis).
- Titrate GDMT to target dose (or maximally tolerated doses) to achieve the full benefits even in patients who are stable or who have improved symptoms and EF.
- After initial diagnosis may start with either ACE inhibitor/ARB/ARNi or beta blocker first based on below:
  - Initiate ACE inhibitor/ARB/ARNi first if the patient is congested at the time of initiation (often prescribed along with diuretic if needed). Note that this is a common situation.
  - Initiate beta blockers first if the patient does not have signs or symptoms of congestion at the time of initiation, does not have a slow HR (has a HR > 60) and does not have hypotension.
- Start GDMT at low doses and titrate every two weeks. Offer frequent visits, education and phone contact.
- Document medication tolerance details in EPIC so all are aware.
- If symptomatic hypotension with GDMT, adjust diuretics and consider separating the timing from other medications that could also lower BP.
- If patient cannot tolerate all GDMT, try to optimize fluid status, adjust other medications, and/or refer to a HF specialist to prevent reducing doses or stopping GDMT medications.
- If needed, using smaller than recommended doses of GDMT is better than stopping.
- Once stable, most patients should be followed every 3-6 months.
- In patients with improved EF (EF improves to > 40% after previously reduced < 40%) generally should stay on GDMT in the absence of a previously defined and now resolved cause of the low EF.

Treatment of Congestion

- Have a high index of suspicion for HF exacerbation when a HF patient has shortness of breath, edema or other signs of congestion
- Promptly adjust diuretic dose when exacerbation (monitor labs, weight and BP)
- Consider IV diuretics in infusion centers to avoid hospitalization if able

Cardiac Rehab

- Refer to Cardiac Rehab if key indications are met: LVEF ≤ 35% NYHA class II to IV symptoms despite being on optimal GDMT for ≥ six weeks and who have not had recent (within last six weeks) or planned (within next six months) major cardiovascular hospitalizations or procedures.

Referrals and Advanced Care

Heart Failure Specialist/Clinic

- Advanced consultation about HF etiology
- Review current and potential therapies, HF disease trajectory and prognosis, patient preferences, and advance care planning.
- Assistance with choice of medications (including replacement of ACEI or ARB therapy with ARNi, consideration of SGLT2 inhibitor use), management of side effects of medications (such as hypotension, bradycardia, hyponatremia, or renal dysfunction), and evaluation for alternate treatment options.
- Treatment of Stage D HF or difficult to manage HF.
- Potential evaluation for a clinical trial.
- If meet one or more of **I NEED HELP** criteria below
  - **I** **IV Inotropes:** Requirement of IV inotropes, either chronic or within the past 12 months.
  - **N** **NYCA Class:** Persistent NYHA class III-IV symptoms, fatigue with activities of daily living, six-minute walk distance <300 meters, or persistently elevated natriuretic peptides (BNP >500 pg/mL or NT-proBNP >1500 pg/mL in ambulatory, non-decompensated patients)
  - **E** **Ejection Fraction:** < 35% despite GDMT for > 3 months for consideration of device therapy in those patients without prior placement of ICD or CRT unless device therapy is contraindicated.
  - **E** **End Organ Dysfunction:** Worsening renal (Cr > 1.8 mg/dL or BUN > 43 mg/dL) or hepatic function, persistent hyponatremia (Na < 134Eq/L), cachexia (loss of 5% or more body weight in the previous 12 months), and/or worsening right HF with secondary pulmonary hypertension.
  - **D** **Defibrillator shocks:** Onset of AF or ventricular arrhythmias, or ICD shocks.
  - **H** **Hospitalization:** Two or more emergency department visits or hospitalizations for worsening HF in prior 12 months of high mortality risk using validated risk model.
  - **E** **Edema:** Clinical deterioration as indicated by worsening edema, Escalating Diuretic requirement, increasing BNP or NT-proBNP levels, worsening cardiopulmonary exercise testing, decompensated invasive cardiac hemodynamics, or evidence of progressive LV dilation or decrease in the LVEF on imaging.
  - **L** **Low Systolic BP:** SBP ≤ 100 mm Hg or symptomatic hypotension or elevated heart rate (>100 bpm)
  - **P** **Progressive Intolerance GDMT:** Unable to tolerate target-dose concordant GDMT, or need to down-titrate GDMT due to fatigue, hypotension, or renal dysfunction.

Device and Advanced Therapy

Consider device therapy if indications met (improves survival and reduces sudden cardiac death)

- Implantable Cardioverter Defibrillator (ICD)
- Cardiac Resynchronization Therapy (CRT)
- Advanced Therapies when appropriate (CardioMEMS™, IV inotropes, left ventricular assist device (LVAD), cardiac transplant, etc.)

Palliative Care

- Refer patients who meet criteria to AIM/Palliative Care if
  - Persistent HF symptoms such as dyspnea, limitations of physical activity, fatigue, edema, palpitations, angina, or other (i.e. NYHA class III-IV), or
  - Not able to optimize ideal guideline-directed medical treatment or advanced treatment options (VAD or transplant for example) due to intolerance or contraindication or other individualized reason, or
  - High acuity or quantity of comorbidities (such as diabetes, COPD, etc.), or
  - Overall life expectancy of patient is less than 12 months

  Note: Order Palliative Care along with specialized cardiology care whenever either are appropriate for the patient. They are not mutually exclusive. Patients benefit from both.
- Refer patients to Hospice if the patient has less than 6 months to live

Acute and Care Management

Hospital Care

- Ensure that congestion is resolved and the patient is stable on oral medications before discharge
- Optimize GDMT during hospitalization
- Consider advanced therapies if persistent symptoms
- Utilize Heart Failure Order Sets

Discharge Care

- Discharge patients to home whenever safely possible. Consider home health.
- Do pre-discharge medication reconciliation and fill new medications when able
- Provide targeted education about self-care and emergency care before discharge (using stop light tools)
- Ensure hand-off team receives discharge summary including: longitudnal care plan, the most recent EF and BNP results, a plan for diuretic dose and rescue dosing, a plan for GDMT optimization, and pending orders
- Follow-up on all pending hospital and ED labs and tests after discharge

Care Management

- Provide an outreach follow-up call within 72 hours after discharge and an office visit within 7 days after discharge
- Do post-discharge medication reconciliation and plan to add and titrate medications to reach target dose of each class of GDMT
- Track discharge from SNF and home health for outreach to patients after they are discharged from SNF and home health for support
- Identify and quickly manage persistent symptoms and exacerbations
- Consider home tele-monitoring for patients at risk for hospitalizations (such as wireless scales/wireless BP cuffs)

Metrics

Diagnosis and Risk Reduction Dashboard Metrics

- BP Control
- A1C Control
- Statin Use Rates
- Pneumonia and Flu Rates
- Education Rates
- Advance Care Directive and ePOLST Rates

Guideline Directed Therapy Metrics

- GDMT Medication Utilization
- Cardiac Rehab Utilization

Referrals and Advanced Care Metrics

- HF Specialist Referral Rates
- Device Rates
- AIM, Palliative Care and Hospice Rates

Hospital and Post-Acute Care Metrics

- HF Inpatient Order Set Use Rates
- Acute and Ambulatory Care Management Engagement Rate
- Home Health and SNF Rates

Heart Failure Medications

Following are the most common classes and brands of HF medications including key considerations in terms of class, name, generic status, dose and titration, general notes, monitoring. This is not meant to be a comprehensive inclusion of all information about each medication. In particular drug-drug interactions are not included in this table. Information for this table was mostly obtained from Lexicomp and the ACC and AHA HF Guidelines. Please refer to the HF guidelines, references, each medications' package insert, and electronic health record prescribing details and alerts for full Information.

Refer to HF specialist if patient unable to tolerate target dose guideline-directed medications or need to down-titrate GDMT due to fatigue, hypotension, or renal dysfunction (see **I NEED HELP** algorithm).

Beta Blockers

Generic Name (Brand)	Initial Daily Dose	Target Doses
Metoprolol Succinate Extended Release (Toprol XL)	12.5 mg-25 mg daily	200 mg daily
Carvedilol (Coreg)	3.125 mg BID	25 mg BID
Bisoprolol *(not commonly used)*	1.25 mg daily (Note: smallest tab is 5 mg)	10 mg daily

AHA Class 1 Indications:

- The beta blockers bisoprolol, carvedilol, and metoprolol succinate extended release reduce morbidity and mortality for patients with current or prior symptoms of HFrEF(Class I, LOE A) 4

General Notes:

- Only use GDMT-recommended beta blocker (bisoprolol, carvedilol, or metoprolol succinate ER)
  - Use metoprolol succinate ER (studies provide evidence of benefit). Do not use metoprolol tartrate (no evidence of benefit).
  - Generally, use carvedilol instead of carvedilol CR/ER due to cost and ease of titration.
- Initiate beta blockers at a low dose, followed by gradual increments every 1-2 weeks in dose if previous doses have been well tolerated, until target dose achieved. Note – may cause transient worsening of HF symptoms (dyspnea, fatigue, or dizziness).
- Ensure patients euvolemic (have no evidence of congestion), have HR > 60 and not hypotension, before starting beta blockers.
- Do not start if the patient is unstable due to HF symptoms. Use diuretic first to control HF symptoms as needed before starting beta blocker.
- Carvedilol (both alpha- and beta- effects) is more potent for BP lowering compared to metoprolol or bisoprolol (since both are more beta-selective esp. at lower doses). This fact can be helpful in some clinical circumstances, examples below:
  - If BP too low on carvedilol, may consider switching to metoprolol succinate ER.
  - If BP too high on metoprolol succinate ER, may consider switching to carvedilol (or increasing ACE/ARB/ARNi if not at target dose).
- If a patient has significant asthma/bronchospastic disease, may prefer metoprolol succinate ER or bisoprolol.
- Do not withdraw beta blocker abruptly.

Angiotensin-Converting Enzyme (ACE) Inhibitors

Generic Name (Brand)	Initial Daily Dose	Target Doses
Single daily dosing (more preferred)		
Lisinopril (Prinivil, Zestril®)	2.5-5 mg daily	20-40 mg daily
Benazapril (Lotensin®)	5 mg BID or 10 mg daily	20 mg BID or 40 mg daily
Ramipril (Altace®)	1.25 mg to 5 mg daily	10 mg daily
Multiple daily dosing (less preferred)		
Enalapril (Vasotec®)	2.5 mg BID	10-20 mg BID

Angiotensin II Receptor Blockers (ARB)

Name (Brand)	Initial Daily Dose	Target Dose
Losartan (Cozaar®)	25-50 mg daily	150 mg daily
Valsartan (Diovan®)	40 mg BID	160 mg BID
Candesartan (Atacand®)	4-8 mg QD	32 mg QD

Angiotensin Receptor-Neprilysin Inhibitors (ARNi)

Name (Brand)	Initial Daily Dose	Maximum Total Daily Dose
Sacubiril/valsartan (Enresto®)	49/51 mg BID (therapy may be initiated at 24/26 mg BID as per below)	97/ 103 mg BID

AHA Class 1 Indications:

- ACE inhibitors (Class I LOE: A) ARBs (Class I LOE: A) or ARNi (Class I LOE: B-R) reduce morbidity and mortality in patients with HFrEF
- Consider using an ARNi (instead of an ACE or ARB) when able and appropriate, including in the situations below:
  - At initiation of this class (instead of ACE/ARB) if patient is having HF symptoms at the time of initiation
  - As a replacement for ACE inhibitor or ARB if a patient develops persistent symptoms of HF symptoms.

General Notes:

- ACE is considered a class effect (any ACE inhibitor likely has benefit)
- ARBs benefit are based on the individual medication (so only use one of the ARBs noted above – candesartan, losartan, valsartan)
- Monitor for supplemental and/or dietary potassium.
- Titrate to target doses that has proven mortality benefit in clinical trials.
- Start a low dose and titrate every 1-2 weeks until at target dose.
- May see a slight rise in Cr (0.1-0.3 or < 30%) which is to be expected and not a reason alone to stop the medication.
- Consider modify treatment if persistent hyperkalemia or Cr increases > 30% (such as adjust dose or treat hyperkalemia).
- Patients with a history of angioedema with an ACE inhibitor can receive an ARB beginning 6 weeks after ACE inhibitor discontinued. Do not use if history of angioedema with ARBs.
- Monitor BP, K, Cr (at baseline, 1-2 weeks after initiation, after each dose change, and annually).

Note: ARNi generally lowers BP more than either ACE inhibitors or ARB.

Heart Failure Medications, *cont.*

Aldosterone Receptor Antagonists

Name (Brand)	Initial Daily Dose (only if K+ <5 mEq/L)	Target Dose
Spironolactone		
eGFR > 50	12.5-25 mg daily	25-50 mg daily
eGFR: 30-50	12.5 mg daily-QOD	12.5-25 mg daily
Eplerenone		
eGFR ≥ 50	25 mg daily	50 mg daily
eGFR: 30-50	25 mg QOD	25 mg daily

AHA Class 1 Indications:

- Aldosterone receptor antagonists reduce morbidity and mortality in patients with HFrEF(Class I, LOE A) 4

General Notes:

- Do not start in patients if eGFR <30, Cr >2.5 in men/Cr >2 in women, or with K >5.0.
- Titrate to target doses that showed mortality benefit.
- Start a low dose and titrate every 2 weeks until target dose.
- Check K & Cr: before initiation, 3-7 days after initiation and dose changes, and annually
- After dose initiation if K increases significantly or is > 5.5 or has worsening renal function, hold until K <5.0 mEq/L. Consider restarting reduced dose after confirming resolution of hyperkalemia/renal insufficiency for at least 72 hours.
- Use caution with K supplements, other K sparing diuretics or significant renal dysfunction. Closely monitor need for K supplement. Avoid high K diet.
- Instruct patient to hold dose during episode of diarrhea or dehydration or if loop diuretic therapy is interrupted.
- Greater incidence of gynecomastia or breast pain (10% in RALES study) and impotence with spironolactone than with eplerenone.

Sodium-glucose Cotransporter-2 (SGLT2) Inhibitors

Name (Brand)	Initial Daily Dose	Target Dose
Dapagliflozin (Farxiga®) (Sutter preferred product)	5 mg daily	10 mg daily
Empagliflozin (Jardiance®)	10 mg daily	25 mg daily

Note: There is no evidence that Canagliflozin has the same benefit in HF

Indication:

- Use SGLT2 inhibitors in HFrEF patients both with and without type 2 diabetes to improve HF outcomes, hospitalizations, and mortality. [21]

General Notes:

- Achieving target or maximally tolerated doses of other drugs is not necessary before adding SGLT2 inhibitors.
- Correct volume depletion prior to initiation and monitor for signs and symptoms of volume depletion (e.g., B.P., renal function, weight loss, lightheadedness) during treatment. Adjust other diuretics as needed.
- Promotes weight loss.
- If the patient is currently on other anti-diabetes medications, monitor blood glucose levels when starting SGLT2s and then as indicated. Coordinate care with the current provider managing the diabetes (primary care provider or Endo) to minimize the risk of hypoglycemia.
- Impaired Renal Function
  - For Dapagliflozin eGFR >25 before initiation (however note patients previously on Dapagliflozin whose eGFR drops below 25 may continue 10 mg once daily).
  - For Empagliflozin eGFR > 20 before initiation (however note patients previously on Empagliflozin whose eGFR drops below 20 may continue 10 mg once daily).
- Check Cr & K before initiation, periodically during treatment, and annually.

Vasodilators

Name (Brand)	Initial Daily Dose	Maximum Total Daily Dose
Hydralazine	25 mg TID	75 mg TID
Isosorbide dinitrate	20 mg TID or QD	40 mg TID
Fixed-dose combination isosorbide dinitrate/ hydralazine	20 mg/37.5 mg (1 tab) TID	2 tabs TID

AHA Class 1 Indications:

- Hydralazine and isosorbide dinitrate combination reduces morbidity and mortality in African Americans patients with NYHA class III–IV HFrEF receiving optimal GDMT (Class IIa LOE: B) 4

General Notes:

- Use if self-identified black (African American) HFrEF patients with current HF or HTN symptoms while receiving optimal therapy with ACE inhibitors/ARBs/ARNi, beta blockers and aldosterone receptor blockers (and plus or minus SGLT2s as well).
- HFrEF patients who can't take ACE/ARB/ARNi because of drug intolerance, elevated Cr, angioedema or other reasons. (Note: patients' needs might vary over time based on renal function). (Class IIa LoE: B) 4

Note: Isosorbide mononitrate is not recommended by the ACC/ AHA/HFSA guideline.

Diuretics

Generic Name (Brand)	Initial Daily Dose	Maximum Total Daily Dose	Duration of Action
Loop Diuretic			
Furosemide (Lasix®)	20-40 mg daily-BID	600 mg	6-8 hours
Bumetanide (Bumex®)	0.5-1.0 mg daily-BID	10 mg	4-6 hours
Torsemide (Demadex®)	10-20 mg daily	200 mg	12-16 hours
Ethacrynic acid (Edecrin®) *(if severe Sulfa allergy – rarely used)*	50 mg daily	400 mg	12 hours
Thiazide Diuretic			
Metolazone	2.5 mg daily	20 mg	12-24 hours
Hydrochlorothiazide	25 mg daily-BID	200 mg	6-12 hours
Chlorthalidone	12.5-25 mg daily	100 mg	24-72 hours

AHA Class 1 Indications:

- Diuretics improve symptoms patients with HFrEF who have evidence of fluid retention.(Class I LOE C) 4

General Notes:

- Loop diuretics are generally the preferred diuretics in patients with fluid retention.
- Have a high index of suspicion for HF exacerbation when a patient has SOB, edema, weight gain or other signs of congestion. (Note: respiratory symptoms (cough and/or SOB) should be considered HF related until proven otherwise even in the absence of weight gain or edema).
- Order Cr, K and NA before initiation, 3-7 days after initiation and each dose change, and annually. May need to consider K supplementation when patient is taking loop diuretics.
- If signs of fluid overload, start furosimide 20 mg and adjust based on symptoms, weight change and kidney function (individualize based on patient characteristics, baseline dose, and response).
- Consider increase diuretic by 50-100% for 3 days when evidence of exacerbation. Check Cr and K after 3-7 days. Consider an order for this adjustment available for use by the extended care team. Consider providing contingency instructions about adjusting diuretics.
- Usually start with furosemide . If the patient does not have adequate response on high dose (80 mg BID), then use the alternative loop diuretic (either bumetanide or torsemide) which have higher bioavailability.
- May consider adding a second (thiazide) diuretic for synergy.
- Consider IV diuretics in infusion centers to avoid hospitalization if able.