



Heart Failure

Purpose

To identify and promote the most important contributors to improved clinical outcomes for adult heart failure in the primary care and hospital settings.

Key Recommendations

- Detection and treatment of risk factors such as hypertension, diabetes, coronary artery disease, dyslipidemia, obesity, smoking and ETOH abuse are critical components to address prevention of heart failure.
- Evaluation of left ventricular function (and ejection fraction) is essential to differentiate heart failure with systolic left ventricular dysfunction or heart failure with preserved left ventricular function.
- For heart failure patients with hypertension, treat to <140/90 mm Hg for ages <60 and <150/90 mm Hg for ages ≥60 with no diabetes and no kidney disease.
- Use of ACE inhibitors, ARBs, beta-blockers, aldosterone blockers is critical to improving symptoms and/or prognosis. Digitalis and diuretics are important to improving symptoms.
- Optimal dosing of ACE inhibitors and beta-blockers is critical to improvements in ejection fraction and mortality; inadequate doses limit potential benefits.
- Palliative care to address symptoms should be provided concurrently with comprehensive heart failure care.

Quality Measures Commonly Used by National Organizations

- ACE Inhibitor or ARB Therapy for Left Ventricular Systolic Dysfunction: Percentage of patients aged 18 years and older with a diagnosis of heart failure with a current or prior left ventricular ejection fraction <40% who were prescribed ACE inhibitor or ARB therapy either within a 12 month period when seen in the outpatient setting OR at each hospital discharge. (PQRS, Meaningful Use)
- Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction: Percentage of patients aged 18 years and older with a diagnosis of heart failure with a current or prior left ventricular ejection fraction < 40% who were prescribed beta-blocker therapy either within a 12 month period when seen in the outpatient setting OR at each hospital discharge. (PQRS, Meaningful Use, ACO)
- Documentation of Current Medications in the Medical Record: Percentage of visits for patients aged 18 years and older for which the eligible professional attests to documenting a list of current medications using all immediate resources available on the date of the encounter. This list must include ALL known prescriptions, over-the-counters, herbals, and vitamin/mineral/dietary (nutritional) supplements AND must contain the medications' name, dosage, frequency and route of administration. (PQRS, Meaningful Use, ACO)
- Functional status assessment for complex chronic conditions: Percentage of patients aged 65 years and older with heart failure who completed initial and follow-up patient-reported functional status assessments. (Meaningful Use)
- Care Plan: Percentage of patients aged 65 years and older who have an advance care plan or surrogate decision maker documented in the medical record or documentation in the medical record that an advance care plan was discussed but the patient did not wish or was not able to name a surrogate decision maker or provide an advance care plan.(PQRS)

High Risk Populations/Disparities

- In the Medicare-eligible population (>65 years of age), heart failure (HF) prevalence increased from 90 to 121 per 1000 beneficiaries from 1994 to 2003. HF_rEF and HF_pEF each make up about half of the overall HF burden. One in 5 Americans will be >65 years of age by 2050. Because HF prevalence is highest in this group, the number of Americans with HF is expected to significantly worsen in the future.¹
- Behavior risks for cancer, heart disease and stroke include excess body weight, lack of physical activity, poor nutrition and smoking. The table below shows the percentage of Monroe County residents with these risks and the disparities.²

Risk Behaviors, Adults Ages 18+, 2012 (% of population)	Monroe County	City	Suburbs	African American	Latino	White
Obese	30	36*	27	38**	41**	27
No physical activity in the past month	16	25*	13	30**	26**	13
Consume 1+ sodas/sugar sweetened beverages per day	23	30*	21	46**	23	20
Consume fruit less than 1 time per day past month	28	33*	26	36**	42**	26
Consume vegetables less than 1 time per day past month	20	30*	16	39**	31**	16
Currently Smoke	16	25*	13	23**	18	15

*Statistical significance $p < 0.05$, City compared to Suburbs. ** Statistical significance $p < 0.05$ African American and Latino compared to White.

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Evaluation and Treatment for Heart Failure Patients

(See page 7 in Guideline for information specific to HF patients with preserved systolic function.)

Evaluation						
History: Thorough assessment of functional status and activities of daily living Physical: Thorough assessment of volume state Initial 12 Lead EKG		Initial Lab Tests: CBC, UA, Electrolytes, BUN, Creatinine, Calcium, TSH, Liver Function Test, Glucose, Lipid Profile Serial Monitoring: Weight, electrolytes, renal function			2D Doppler Echocardiogram Chest X-Ray: PA + LAT Evaluate For Ischemia: Cardiac cath & angio: if angina present or revascularization is considered	
Treatment						
Classification (see page 7 for details)	ACC/AHA HF Stage	A*	B	C		D
	NYHA Functional Class	None	I	II	III	IV
Medications	ACE Inhibitor	For patients with diabetes, atherosclerosis. Consider for HTN or multiple risk factors	For all patients (Use of ACE inhibitors for patients with LVEF <40% is often used as a performance measure) Lack of evidence for ACE and ARB combination therapy			
	ARB	If ACE intolerant. Lack of evidence for ACE and ARB combination therapy				
	Hydralazine/Long-Acting Nitrate		If ACE or ARB intolerant; or in addition to standard triple therapy (in black patients) Standard triple therapy is ACEi or ARB, Beta Blocker, and Aldosterone Antagonist			
	Beta Blocker^a	In all patients				
	Digitalis		Consider for symptom relief or rate control—Target dig. level <1.0. If prescribed monitor dig. level, especially in the elderly			
	Aldosterone Antagonists	Consider in diabetics who are post-MI with EF<40%. Consider in other patients who also have evidence of CHF-(rales, abnormal CXR or S3) ^b	If Class II - IV symptoms, for patients with preserved renal function and normal potassium concentration ^c in non-diabetics with EF<35%			
	Nitrates Alone or with Hydralazine		Consider on top of ACE inhibitor, beta blocker, diuretic ^d			
	Diuretics		Current or recurring fluid retention			
	Anticoagulants	If AFib or previous thromboembolic event				
	Influenza and Pneumococcal Vaccine	In all patients				
	Avoid Drugs that Potentiate HF		In all patients (Drugs such as, but not limited to: NSAID, Glitzone, Enbrel)			
Additional Treatment Considerations	Hypertension	Control to guideline goals (<140/90 mm HG for ages <60; <150/90 for ages ≥ 60 mm HG with no diabetes and no kidney disease)				
	Atrial Fibrillation	Control rate; oral anticoagulant				
	Weight Loss	Recommended if BMI >25				
	Exercise	To tolerance, consider cardiac rehab to improve functional capacity				
	Education - including caregiver(s)	Disease process	Disease process, medications, signs to react to, daily weights, signs and symptoms of depression			
	Restrict salt & excess fluids	In all patients to appropriate levels				
	Cardiotoxins	Avoidance of smoking, alcohol consumption, and illicit drug use				
	Advance Care Directives	For all patients				
Referrals	Case/Disease Mgmt	Monitor daily weights and close symptom surveillance (consider referral for nurse case mgmt)				
	Telehealth Monitoring	Consider use of telehealth monitoring services for selected patients				
	Cardiovascular Specialist	Consider to evaluate & treat as indicated	Consider to evaluate and optimize medical therapy; coronary revascularization; valve replacement/repair; implantable defibrillator; biventricular pacing			
	Palliative Care		Transplant; Mechanical circulatory support			
	Palliative Care		As appropriate for symptom management			

a. Beta Blockers recommended for use with heart failure: carvedilol, metoprolol succinate, bisoprolol; b. EPHEUS study on eplerenone; c. Serum K+ and GFR should be monitored periodically; d. Nitrates with Hydralazine recommended in addition to standard therapy for all African-Americans with heart failure. *No symptoms of heart failure, no structural heart disease

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Heart Failure



Medications

Common Drug Therapy For Use in Patients with HF with Low Ejection Fraction*		
Drug	Starting Daily Dose(s)	Maximum or Target Daily Dose(s)
Angiotensin Converting Enzyme Inhibitors (ACE)		
captopril	6.25 mg 3 times daily	50 mg 3 times daily
enalapril	2.5 mg twice daily	10 to 20 mg twice daily
fosinopril	5 to 10 mg once daily	40 mg daily
lisinopril	2.5 to 5 mg once daily	20 to 40 mg daily
perindopril	2 mg daily	8 to 16 mg daily
quinapril	5 mg twice daily	20 mg twice daily
ramipril	1.25 to 2.5 mg daily	10 mg daily
trandolapril	1 mg daily	4 mg daily
Angiotensin Receptor Blockers (ARB)		
candesartan	4 to 8 mg daily	32 mg daily
losartan	25 to 50 mg daily	50 to 100 mg daily
valsartan	20 to 40 mg twice daily	160 mg twice daily
Aldosterone Antagonists		
spironolactone	12.5 to 25 mg daily	25 mg once or twice daily
eplerenone	25 mg daily	50 mg daily
Beta Blockers		
bisoprolol	1.25 mg daily	10 mg daily
carvedilol	3.125 mg twice daily	25 mg twice, 50 mg twice daily for patients >85 kg
carvedilol CR	10 mg daily	80 mg daily
metoprolol succinate extended release	12.5 to 25 mg daily	200 mg daily
Hydralazine and Isosorbide Dinitrate		
Fixed-Dose Combination	37.5 mg hydralazine/20 mg isosorbide dinitrate three times daily	75 mg hydralazine/40 mg isosorbide dinitrate three times daily
hydralazine and isosorbide dinitrate	<ul style="list-style-type: none"> hydralazine: 25 to 50 mg three or four times daily isosorbide dinitrate: 20 to 30 mg three or four times daily 	<ul style="list-style-type: none"> hydralazine: 300 mg daily in divided doses isosorbide dinitrate: 120 mg daily in divided doses

General Approach to Titrating Medicine**

- Blood pressure and pulse should be reviewed prior to each dose adjustment
- Aim to achieve recommended target dose of heart failure medications. However, if a patient is unable to tolerate the target dose, continue at the maximum tolerated dose as this may still be beneficial
- Start at a low dose and progressively increase to the recommended target dose or to the maximum tolerated dose
- Intervals between titration vary from 1 to 4 weeks, depending on the patient and medication. Generally increase by doubling the dose every 2 weeks
- Generally only titrate one medicine at a time however, patients do not have to be maximised on ACEI or ARB before initiating a BB
- Where adverse effects arise consider whether these are likely to be transient (such as dizziness) in which case it is prudent to reattempt an increase in dose at a later stage
- Optimization of medications may take a longer time to achieve in some patients
- Patients over 75 years old with co-morbidities are more likely to experience adverse effects
- Diuretics, such as furosemide, may be used in a flexible manner to achieve the minimum effective dose
- Ensure that clinicians involved with a patient's exercise program are aware of titration as this may impact exercise regime.

*Table adapted from Yancy CW, Jessup M, Bozkurt B, et al; American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. *Circulation*. 2013;128(16):e240-e327. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23741058?dopt=Abstract>

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Pharmacokinetics of the Loop Diuretics*

Property	Furosemide	Bumetanide	Torsemide
Bioavailability (%)	10 - 100 (average = 50)	80 - 100	80 - 100
Affected by food	yes	yes	no
Metabolism	50% renal conjugation	50% hepatic	80% hepatic
Half-life (h)			
normal	1.5 - 2	1	3 - 4
renal dysfunction	2.8	1.6	4 - 5
hepatic dysfunction	2.5	2.3	8
heart failure	2.7	1.3	6
Onset (min)			
oral	30 - 60	30 - 60	30 - 60
intravenous	5	2-3	unavailable

Emerging Drug Therapies/Devices

<u>ivabradine (Corlanor®)</u>	The U.S. Food and Drug Administration (FDA) approved ivabradine (Corlanor®), in April 2015, to reduce hospitalization from worsening heart failure. The role is still being determined. However, in the <u>SHIFT study</u> , ivabradine is indicated in chronic heart failure with systolic dysfunction in patients with NYHA II to IV class sinus rhythm heart rate ≥70 bpm in combination with standard therapy including β-blocker therapy or when β-blocker therapy is contraindicated or not tolerated, for heart rate reduction.
<u>sacubitril/valsartan (Entresto™)</u>	The FDA approved sacubitril/valsartan (Entresto™), previously known as LCZ696, in July 2015. An angiotensin receptor-neprilysin inhibitor consisting of valsartan and sacubitril. Taken twice-a-day for the treatment of heart failure with reduced ejection fraction.
<u>CardioMEMS Champion™ Heart Failure Monitoring System</u>	An FDA approved implantable pulmonary artery (PA) sensor device indicated for wirelessly measuring & monitoring PA pressure and heart rate in NYHA class III patients who have been hospitalized for heart failure in the previous year; hemodynamic data is used for heart failure management. Clinically proven to reduce heart failure hospitalizations by 37% in the <u>Champion clinical trial</u> .

*Reprinted with permission: Wargo KA, Banta, WM. A Comprehensive Review of the Loop Diuretics: Should Furosemide be First Line? Ann Pharmacother 2009; 43:1836-47. Available from: http://www.researchgate.net/publication/38024813_A_comprehensive_review_of_the_loop_diuretics_should_furosemide_be_first_line

Heart Failure

Palliative Care in Heart Failure

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
	Initial symptoms of HF develop and HF treatment is initiated	Plateau of variable length reached with initial medical management, or following mechanical support or heart transplant	Functional status declines with variable slope; intermittent exacerbations of HF that respond to rescue efforts	Stage D HF, with refractory symptoms & limited function	End of life
NYHA Functional Class - ACC/AHA Stage	II-III - C	II-IV - C/D	IIB - C	IV - C/D	IV - C/D
Decision-making	-Preferences for CPR/defibrillator -Durable power of attorney for health care or proxy	-Defibrillator for primary prevention of SCD? -Durable power of attorney for health care or proxy decision-maker -General goals for care, preferences for unacceptable health states	-Urgent care decisions using doctor's best judgment or clear patient preferences -Are advanced or invasive therapies indicated? -Are advanced therapies consistent with patient preferences?	-Candidate for transplant or destination VAD? -Is palliative care appropriate? -Does patient benefit from inotrope infusion? -Review preferences for CPR/defibrillator	-Clarify goals of care -Site of care (hospital, home, other) -Health care delivery (hospice, other provider) -How to manage death (review CPR decision, review ICD & other devices; if appropriate, plan deactivation)
Supportive care A. Communication	-Understand patient concerns & fears -Identify life-limiting nature of HF -Elicit preferences for care in emergencies or sudden death & for information & role in decision-making -Elicit symptoms and assess QOL	-Elicit symptoms & assess QOL -Re-evaluate resuscitation preferences for care in emergencies -Set goals for care -Identify coping strategies -Re-educate about sodium, weight, & volume status	-Elicit symptoms & QOL -Elicit values & re-evaluate preferences -Identify present status & likely course(s) -Re-evaluate goals of care -Re-educate about sodium, weight, & volume status, medication compliance	-Elicit symptoms -Acknowledge present status -Elicit preferences & reset goals of care -Identify worries -Review appropriate care options & likely course with each -Explore suitability & preferences about surgery or devices	-Elicit desired symptom relief & identify medication for symptom goals -Assistance with delivery of care -Preferences for end-of-life care, site of care, family needs, & capabilities -Plan after death (care of the body, notifications, memorials, burial)
B. Education	-Patient & family self management (sodium, weight & volume) -Diet, exercise -HF course including sudden death & options for management	-What to do in an emergency -Review self-management	-Review self-management -Review what to do in an emergency -Symptom management -Eliminate NSAIDs	-Optimal management for given care approach - Interventions for deterioration in status -What to do in an emergency	-Likely course & plans for management of events -Symptom management -What to do for worsened or change in status -What to do when death is near & at the time of death
C. Psychosocial & spiritual issues	-Coping with illness -Insurance & financial resources -Insurance & financial resources regarding medications & loss of income -Emotional & spiritual support	-Roles & coping for patient & family -Emotional support -Spiritual support -Social interaction -Evaluate both patient & family anxiety, distress, depression, impaired cognition	-Family stresses & resources -Re-evaluate patient & family needs -Caregiver education & assistance with care -Evaluate cognition & initiate compensation	-Insurance coverage -Re-evaluate stresses, needs, & support patient & family -Address spiritual & existential needs - Support coping with dying	-For both patient & family: -Address anxiety, distress, depression -Address spiritual & existential needs, concerns regarding dying -Anticipatory grief support -Assist in care provision -Post-death bereavement
D. Symptom management	- HF medications for dyspnea -Exercise/endurance training for fatigue -Antidepressant for depression (check Na_ with SSRIs) -Local treatment &/or opioids for pain	-Identify new or worsened symptoms -CPAP/O2 for sleep-disordered breathing -Exercise program (lower extremity strengthening) -Local treatment &/or opioids for pain -SSRI or tricyclic or stimulant for depression	-Oxygen for dyspnea; consider opioids for acute relief of dyspnea -Lower extremity strengthening for dyspnea/fatigue -CPAP/O2 for sleep-disordered breathing -Local treatment &/or opioids for pain -SSRI or tricyclic or stimulant for depression	-Oxygen for dyspnea -Opioids for dyspnea - Lower extremity & inspiratory strengthening -CPAP/O2 for sleep-disordered breathing - Local treatment &/or opioids for pain -Benzodiazepines/counseling for anxiety -Stimulant for depression	-Opioids for dyspnea & pain -Oxygen for dyspnea -Stimulants for fatigue -Benzodiazepines/ counseling for anxiety -Lower extremity strengthening for fatigue & dyspnea -CPAP/O2 for sleep-disordered breathing -Stimulant for depression

CPAP- continuous positive airway pressure; CPR- cardiopulmonary resuscitation; CRT- cardiac resynchronization therapy; CRT/D- cardiac resynchronization therapy defibrillator; EF- ejection fraction; HF - heart failure; ICD - implantable cardioverter-defibrillator; LVAD - left ventricular assist device; LVEF - left ventricular ejection fraction; LVSD - left ventricular systolic dysfunction; NSAID - nonsteroidal anti-inflammatory drug; NYHA - New York Heart Association; QOL - quality of life; SCD - sudden cardiac death; SSRI - selective serotonin reuptake inhibitor; VAD - ventricular assist device.

* Reprinted with permission from author and JACC: Goodlin SJ. Palliative Care in Congestive Heart Failure. JACC Vol. 54, No. 5, 2009:386-96.

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Strategies for Inpatient Care

Sample Discharge Checklist for Heart Failure Patients (in-patient use only)

Discharge Date: _____

Completed by: _____

Place pt label sticker here

NA = Not applicable or not indicated, CI = Contraindication documented

Complete all Boxes for Each Indicator	Yes	No	Reason Not Done/ Contraindications
Stable diuretic regimen for last 24 hours			
Off inotropes for >48 hours			
At or within 1-2% of dry weight • DRY WEIGHT is: _____			
≥30% reduction in NT-proBNP compared to admission			
Plan for change in diuretic regimen based on condition, weight loss or gain is documented			
Document use or contraindication: 1. Beta Blocker (metoprolol, carvedilol or Bisoprolol) 2. ACEi/ARB started if appropriate or document why not (LVEF <40) 3. Aldosterone Antagonist (<i>inclusionary criteria</i> : ejection fraction ≤35%; <i>exclusionary criteria</i> : K >5.0 or creatinine >2.5 mg/dL in men or >2.0 in women; medical hx of dialysis; undergo dialysis or ultrafiltration on this admission)			<input type="checkbox"/> NA <input type="checkbox"/> CI <input type="checkbox"/> NA <input type="checkbox"/> CI <input type="checkbox"/> NA <input type="checkbox"/> CI
Ejection Fraction Documented? • EF within past 6 months is: _____ %			
Medication reconciliation completed and discharge medication list provided to patient/family			
Resuscitation status any other pertinent end-of-life issues including assessing appropriateness for hospice and/or palliative care.			
Discharge appointments MADE (PCP, Consultations and HF Clinic)			
Discharge summary completed prior to discharge (e.g., presenting problem, key findings and test results, brief hospital course, final primary and secondary diagnoses, follow-up plans).			
Patient and family education with teach back (e.g., understanding of diet, weight and activity goals; education regarding signs and symptoms of heart failure, and response to such signs/symptoms)			
Notify PCP/SNF of any aberrant issues during hospitalization. (HANDOFF)			

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Classification of Heart Failure Comparison between ACC/AHA HF Stage and NYHA Function Class

ACC/AHA HF Stage		NYHA Functional Class	
A	At high risk for heart failure but without structural heart disease or symptoms of heart failure (e.g., patients with hypertension or coronary artery disease)	None	
B	Structural heart disease but without symptoms of heart failure	I	Asymptomatic
C	Structural heart disease with prior or current symptoms of heart failure	II	Symptomatic with moderate exertion
		III	Symptomatic with minimal exertion
		IV	Symptomatic at rest
D	Refractory heart failure requiring specialized interventions		

Heart Failure with Preserved Systolic Function

Heart failure with preserved systolic function (HFPSF) or “diastolic heart failure” should be differentiated from the presence of “diastolic dysfunction” alone. By definition, HFPSF is a condition with classic findings of congestive failure, with abnormal diastolic and normal systolic function at rest (i.e., normal LV ejection fraction). There are unfortunately limited evidence-based treatment recommendations for HFPSF at the present time. The beneficial class effects of medications used in systolic heart failure have not been proven in diastolic heart failure. The appropriate diagnosis and treatment of underlying diseases that may be causative or contributing to HFPSF is important (e.g., HTN/LVH, CAD/ischemia).

General principles of treatment include:

- Evaluate and treat hypertension with appropriate medications as per recommendations from the *Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*. See [Community-wide Guideline for Management of Hypertension](#).
- Rate control is important, particularly in AF. Consider restoration of sinus rhythm in AF patients when appropriate.
- Evaluate for ischemic heart disease and consider coronary revascularization if appropriate.
- Utilize diuretics for control of volume overload (pulmonary congestion, peripheral edema).
- Counseling on low sodium diet is also appropriate in HFPSF patients.

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Resources for Physicians

American Heart Association

The American Heart Association is a national voluntary health agency to help reduce disability and death from cardiovascular diseases and stroke.

- [Get With The Guidelines®](#)- An in-hospital program for improving care by promoting consistent adherence to the latest scientific treatment guidelines
- [CV Risk Calculator](#) - a companion tool to the [2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk](#) (Available as a downloadable spreadsheet, free Smartphone apps or launch web version.)

Heart Failure Society of America

- [Educational Modules](#) - designed to help patients and their loved ones, and individuals at risk to communicate better with their physician. Limited number available at no cost.

Resources for Patients

American Heart Association

The American Heart Association is a national voluntary health agency to help reduce disability and death from cardiovascular diseases and stroke. Provides online tools and resources, e-newsletters, and interactive library.

Centers for Disease Control and Prevention

Provides educational fact sheets and podcasts

Heart Failure Society of America

Provides educational modules, fact sheets, quick tips, health literacy FAQs

Medline Plus

A service of the U.S. National Library of Medicine, National Institutes of Health. Provides online information about heart failure.

Million Hearts®

An initiative of the Department of Health and Human Services to prevent 1 million heart attacks and strokes by 2017; co-led by CDC and the Centers for Medicare & Medicaid Services. The initiative brings together communities, health care professionals, health systems, nonprofit organizations, federal agencies, and private-sector partners to improve care and empower Americans to make heart-healthy choices

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