CPG SERIES

CLINICAL PRACTICE GUIDELINE

PALTmed
POST-ACUTE AND LONG-TERM CARE MEDICAL ASSOCIATION

# HEART FAILURE

## in the Post-Acute and Long-Term Care Setting

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**Original Panel Members:**
**Jerry Johnson, MD, Chair**
Manju Beier, PharmD
Ellie Cohn, RN, MS, CRRN
Janet E. George, RN, Facilitator
Patrick W. Irvine, MD, CMD
Steven Levenson, MD, CMD
Tim Mislan, BSN, MS
Joyce Smith, RN
Ann Wells, RN
Danielle Dodman, MS,CCC-SLP

**Contributors to 2003 Update:**
**Larry Lawhorne, MD, CMD, CPG, Project Chair**
**Steven Levenson, MD, CMD, CPC, Chair**
Donna Brickley, RN
Lisa Cantrell, RN, C
Charles Cefalu, MD, MS
Woody Eisenberg, MD, FACP
Jesus Evangelista, MD, CMD
Joseph Gruber, RPh, FASCP, CGP
Susan M. Levy, MD, CMD
Betty MacLaughlin-Fransden, RN, NHA
Harlan Martin, RPh, CCP, FASCP
Geri Mendelson, RN, CNAA, MEd, NHA
Evvie F. Munley
Jonathan Musher, MD, CMD
Judith A. Passerini, CNHA, CAS, Fellow
Mary Pat Rapp, MSN, RN
Barbara Resnick, PhD, CRNP
William Simonson, PharmD, FASCP, CGP
John Voytas, MD

**Contributors to 2010 Update:**
**Hosam Kamel, MD, CMD, Chair**
**Charles Cefalu, MD, MS, Project Chair**
Wilbert S. Aronow, MD, FACC, FAHA, AGSF
Harold Bob, MD, CMD
Rebecca Boxer, MD
Terry Oshea, PharmD, CGP
Thomas Price, MD, CMD
William Smucker, MD, CMD
Krystal Thomas GNP, BC

**Contributors to 2015 Update:**
**Hosam K. Kamel, MD, MPH, CMD, Chair**
Sylvia Bennett, RN, BSN, CDONA/LTC
Huai Y. Cheng, MD$^{\Delta}$
Carol Hall, CNP
Renante Ignacio, MD, CMD$^{\Delta}$
Debra Kriner, RN
Nancy Losben, RPh, CCP, FASCP, CG
Mary Moretti, RN, BSN, Med
Arif Nazir, MD, CMD$^{\Delta}$
Nancy Overstreet, DNP, GNP-BC, CWOCN
Ann Riggs, MD$^{\Delta}$
Karen Shields, RD
William Smucker, MD, CMD$^{\Delta}$
Jeanne Wei, MD, PhD
Peter Winn, MD, CMD
Pamela Zanes, RN, BSN, EdM

$^{\Delta}$ Contributors to Recommendations

**Technical Writer:** Jennifer Holmes

**PALTmed Staff:**
Jacqueline Vance, RN, C. CDONA/LTC, CPG Project Manager, Director of Clinical Affairs
Mary Mulligan, RN, BSN, MA, CDONA/LTC, Senior Manager Clinical Affairs

# Preface

This clinical practice guideline (CPG) has been developed as a component of a project conducted by Post-Acute and Long-Term Care Medical Association (PALTmed), the national professional association of medical directors, attending physicians, and others practicing in the post-acute and long-term care (PA/LTC) continuum. This is one of a series of guidelines undertaken as part of PALTmed's mission to improve the quality of care delivered to patients in these settings.

Original guidelines are developed by interprofessional workgroups that consist of practitioners and others involved in patient care in PA/LTC facilities. These workgroups utilize systematic reviews, journal articles, and other information obtained through a thorough literature search to develop a concise, usable guideline tailored to the PA/LTC setting.

The guideline development and revision process is directed by PALTmed's Clinical Practice Guideline Steering Committee. Each year the Steering Committee reviews all PALTmed CPGs that are 3 years old and commissions a thorough literature review to determine whether the content of each guideline remains current. The PALTmed Clinical Practice Committee selects the existing guidelines to be revised, and new guidelines to be created, based on (1) the Steering Committee's recommendations, (2) data collected, (3) an assessment of the difficulty of development and relevance to the PALTmed membership, and (4) congruence with the PALTmed Strategic Plan. PALTmed's Board of Directors has final approval over this process.

## Purpose

PALTmed seeks to develop and revise guidelines that focus on specific concerns and common issues in the PA/LTC setting. Although other agencies, organizations, and associations have developed guidelines for conditions that occur in elderly and chronically ill individuals, many of these guidelines limit or omit considerations unique to the PA/LTC population, such as team-based care.

PALTmed guidelines emphasize key care processes and are created to be used in conjunction with facility-specific policies and procedures that guide staff and practitioner practices and performance. They are meant to be used in a manner appropriate to the population and practice of a particular facility. Guideline implementation may be affected by resources available in the facility, including staffing, and will require the involvement of all those in the facility who have a role in patient care.

PALTmed considers that PA/LTC facilities play a significant role in the lives of older adults and their families and considers optimal medical care and health promotion to be priorities in this setting.

PALTmed guidelines are not intended to offer an exhaustive review of the condition of interest. They focus instead on the practical management of the condition in the PA/LTC setting, stressing aspects of care that may differ significantly from or merit special emphasis when compared with community-based care for younger adults with the same condition.

## Audience

This guideline is intended for members of the interprofessional team in PA/LTC settings. Team members may include the medical director, attending physicians, director of nursing, advanced practice clinicians, nursing staff, consultant pharmacist, and other professionals such as therapists, social workers, dietitians, and nursing assistants who care for patients residing in PA/LTC facilities.

PALTmed CPGs address many functions, interventions, and tasks related to recognizing, assessing, treating, and monitoring various medical conditions and situations. They focus on process (what should be done) rather than on personnel (who should perform specific tasks). For example, a variety of health care professionals working in the PA/LTC setting, including nursing assistants, licensed nurses, dietitians, and social workers, may make and document observations (e.g., that a patient does not sleep at night, has become more withdrawn, or has a change in usual eating patterns). Only some of these professionals, however, may be qualified to determine the significance of those observations (e.g., the cause of sleeplessness or of a change in eating patterns). In contrast, practitioners may not be present to make observations but are trained to analyze the significance and causes of symptoms.

Thus, each facility should ensure that tasks are done correctly and by the appropriate interprofessional team members. It is important for observers to make and effectively document their observations; when interpretation of those observations is not within the scope of their training or practice, they should receive appropriate support from practitioners.

## Assumptions

Practice guidelines for the PA/LTC setting should be consistent with the fundamental goals of desirable practice in this setting. Operationally, this requirement means that the care team should systematically address (1) each patient's risk factors for multiple diseases and conditions; (2) the adverse consequences of these diseases and conditions on the patient's functioning and quality of life; and (3) the benefits and burdens of prescribed interventions.

When patients in the PA/LTC setting are at or near the end of life, care goals will shift from curative care, functional improvement, or physical stability to end-of-life/comfort care. PALTmed guidelines address this transition and provide suggestions for appropriate modification of the patient's care plan.

PA/LTC facilities care for a variety of individuals, including younger adults with chronic diseases and disabilities, short-stay patients needing post-acute care, and very old and frail individuals with multimorbidity. Patient-centered care means establishing individualized goals of care for each patient.

Thus, when a workup or treatment is suggested, it is crucial to consider whether such a step is appropriate for that individual. A workup may not be indicated if the patient has a terminal or end-stage condition (i.e., with a life expectancy of less than 6 months), if it would not change the management course, if the burden of the workup is greater than the potential benefit, or if the patient or his or her legally authorized representative would refuse treatment. It is important to carefully document in the patient's medical record the reasons for decisions not to treat or perform a workup or for choosing one treatment approach over another.

## How to Use These Guidelines

Each guideline includes a narrative portion that covers definition, recognition, assessment, treatment, and monitoring of the condition being addressed. **Recognition** identifies the presence of a risk or condition. **Assessment** clarifies the nature and causes of a condition or situation and identifying its impact on the individual. **Treatment** is the selection and provision of appropriate interventions for that individual. **Monitoring** is the review of the course of a condition or situation as a basis for deciding to continue, change, or discontinue interventions. Each guideline also includes an algorithm that summarizes the steps involved in addressing the condition or situation that is the focus of the guideline.

Each guideline now also includes recommendations. The system PALTmed has adopted for grading the recommendations in its CPGs is modified from the GRADE Working Group system, a framework for grading the quality of evidence and the strength of recommendations that can be applied across a wide range of interventions and contexts.

## Terminology

We recognize that people who reside in PA/LTC facilities are residents. Throughout these guidelines, however, we use the term **patient(s)** because we are addressing individuals within the context of treating a medical condition. When referring to pharmaceutical products, we avoid the use of brand names and refer to classes of drugs whenever possible.

A **nursing home/skilled nursing facility** (NF/SNF) is a place of care for people who require 24-hour nursing and rehabilitation for chronic medical conditions or impaired mental capacity and who have significant deficiencies in activities of daily living. The goal of care is to assist the individual in achieving his or her highest level of function and well-being. Both SNFs and NFs care for frail elderly patients and younger adults with physical disabilities (although pediatric and other specialized SNFs also exist). Many SNFs and NFs offer special care units (e.g., dialysis, ventilator units).

A **subacute/post-acute care unit** (sometimes called a "step-down" unit) is a facility in which care can be the bridge between an acute hospital stay and a return to a community home. It combines aspects of both the hospital and the SNF to reduce the cost of services while maintaining quality of care. This type of care requires frequent patient reassessment and review of the clinical course and treatment plan for a limited time period, until the patient's condition has stabilized or a predetermined treatment course is completed.

To be consistent with the terminology now used by the Institutes of Medicine (IOM), Centers for Medicare and Medicaid Services, Health Resources and Services Administration, and other agencies, we have adopted the term **interprofessional** in place of *interdisciplinary*. As defined by Hall and Weaver,[1] **interprofessional** means "a group of individuals from different disciplines working and communicating with each other [as] individuals." According to the IOM,[2] "members of an interprofessional team communicate and work together, as colleagues, to provide quality, individualized care for patients."

### References


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2. Greiner AC, Knebel E, eds. Health Professions Education: A Bridge to Quality. 2003. Institute of Medicine, Committee on the Health Professions Education Summit. Washington, DC: The National Academies Press. Available at http://www.iom.edu/Reports/2003/health-professions-education-a-bridge-to-quality.aspx. Accessed 8/19/2014.

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# HEART FAILURE

## in the Post-Acute and Long-Term Care Setting

### DEFINITION

Heart failure is a complex clinical syndrome that results from any structural or functional disorder that impairs the ability of the ventricles to fill with or eject blood at a rate commensurate with the body's needs.[1] In the presence of clinical signs and symptoms of volume overload, the term **congestive heart failure** (CHF) may be used to describe this syndrome, whereas in the absence of signs and symptoms of volume overload, the term **heart failure** should be used.

### INTRODUCTION

The above definition of heart failure is a simplified description of what happens to the patient with a failing heart. Heart failure is now understood to be a consequence of cardiac muscle remodeling, mediated by neurohormonal responses that involve activation of the renin-angiotensin-aldosterone system and increased sympathetic activity.

Heart failure is more prevalent among older people. About 10 per 1000 individuals aged over 65 will develop heart failure,[2] and an estimated 80% of patients hospitalized with heart failure are aged over 65.[3] Characteristically, patients with heart failure typically also have hypertension as well as other medical comorbidities, including chronic obstructive pulmonary disease, chronic kidney disease, hyponatremia, and hematologic abnormalities.[4-15] A relatively equal percentage of patients with acutely decompensated heart failure have impaired versus preserved left ventricular (LV) systolic function.[8,15,16] Clinically, patients with preserved systolic function (ejection fraction of greater than 50%) are older and are more likely to be female, to have significant hypertension, and to have less coronary artery disease. The overall morbidity and mortality for both patients with impaired systolic function and those with preserved systolic function is high.

The total cost of heart failure in the United States in 2012 was estimated to be $30.7 billion. This cost is projected to increase almost 127% to $69.7 billion by 2030.[2] This includes the cost of health care services, medications, and lost productivity. Most (80%) of the costs attributed to heart failure are related to hospitalization.[17] Among patients with heart failure in one large population study, hospitalizations were common after heart failure diagnosis, with 83% of patients hospitalized at least once and 43% hospitalized at least four times.[2] CHF is the primary diagnosis in more than 1.1 million hospitalizations annually.[2] Patients hospitalized for CHF decompensation are at high risk for all-cause rehospitalization, with a 1-month readmission rate of 25%[18] and a 1-year mortality rate of approximately 30%.[5,19] Heart failure is now targeted by the Hospital Readmissions Reduction Program, which requires the Centers for Medicare & Medicaid Services (CMS) to reduce payments to hospitals for excessive readmission rates.[20]

This document is intended to guide the recognition, assessment, and management of patients with heart failure in post-acute (PA) and long-term care (LTC) facilities. Such patients are more likely to be female, to be older than 80 years, to have multimorbidity, to be on multiple medications, and

to have been offered the opportunity to complete an advance health care directive. Furthermore, an observational analysis of Medicare beneficiaries aged 65 years and older showed that patients discharged to a LTC facility after hospitalization for heart failure were more likely to die or be rehospitalized than were patients discharged home.[21] Managing heart failure in these circumstances requires that the interprofessional team develop a plan of care that supports patient-centered goals that are both realistic and achievable while striving to provide optimal care to each patient. Potential goals may address the following:

- Improving the quality of life
- Increasing tolerance of activity and exercise
- Minimizing hospital readmissions or hospitalizations
- Preventing exacerbations
- Prolonging life to the extent possible and desired
- Providing palliative and hospice care
- Providing symptom relief

### Desired Outcomes That May Be Expected From Implementation of This Clinical Practice Guideline

Outcomes that may be expected from the implementation of this clinical practice guideline include the following:

- Improved recognition, assessment, treatment, and monitoring of heart failure in the PA/LTC setting
- Improved staff education and awareness of the symptoms of heart failure and recognition of worsening heart failure
- Greater goal-guided, individualized care of patients with heart failure
- More appropriate use of medications to treat heart failure
- Reductions in unnecessary laboratory tests or imaging studies
- Reductions in potentially avoidable rehospitalization or emergency department utilization for patients with heart failure
- Enhanced quality of life for patients with heart failure
- Improved patient and family engagement in, and satisfaction with heart failure care

## RECOGNITION

### STEP 1

**Identify individuals with a history of heart failure.** Most patients admitted to a PA/LTC facility with a history of heart failure will have an established diagnosis of heart failure and will have had an appropriate evaluation. The transfer summary and other referral data as well as the facility clinical record are helpful in identifying patients with a history of heart failure. Copies of all laboratory tests (Appendix 1); electrocardiogram, echocardiogram, and catheterization reports; cardiology consultation reports; and chest x-ray reports may be particularly useful when the patient is transferred from the hospital to the PA/LTC facility. Look for documentation that suggests or supports a diagnosis of coronary artery disease, diabetes, or hypertension. In addition, look for evidence of previous treatment of or hospitalization for heart failure. Other diagnoses to be aware of, which may indicate a history of heart failure, are idiopathic dilated cardiomyopathy, ischemic heart disease, hypertrophic cardiomyopathy, restrictive cardiomyopathy, and valvular heart disease.[22]

Compared with men, women when diagnosed with heart failure are usually older, are hypertensive, and have preserved systolic function with less coronary artery disease.[23] Women have a threefold

elevated risk for developing heart failure compared with men. In both men and women, diabetes is an independent risk factor for heart failure.[24]

The use of medication reconciliation to compare the medication regimen with the admission transfer and discharge orders can assist the prescriber and facility staff in identifying additional patients who may have heart failure when documentation is lacking in the summary or history. Medication reconciliation can also help to identify changes in the patient's cardiovascular medications. Medications to treat heart failure may have been added, doses adjusted, or chronic medications discontinued in the acute care setting. Further inquiry into potential errors of omission, duplicate therapy, or unnecessary medication may elucidate one of the factors contributing to an exacerbation of the patient's condition.[25] (Refer to PALTmed's guideline, *Transitions of Care in the Long-Term Care Continuum.*[a])

## STEP 2

**Identify individuals who currently have symptoms of heart failure.** Practitioners and nurses should evaluate newly admitted patients for symptoms (Table 1) and signs (Table 2) of heart failure and should document their findings. They should also be aware that recognition of CHF in the PA/LTC setting may be complicated by common comorbidities such as chronic obstructive pulmonary disease, other lung conditions, and venous insufficiency or chronic dependent edema or anginal equivalents. Pulse oximetry is a useful tool for nurses to complement their assessment. The presence of hypoxia can indicate the presence of pulmonary edema, which may be a manifestation of heart failure. The practitioner should perform a thorough history, which should identify the location, quality, quantity, severity, and duration of symptoms; the time course, date of previous diagnosis and work-up, and setting of the symptoms; associated factors that relieve or exacerbate the patient's current symptoms; and any previous treatments (including over-the-counter medications, home remedies, and complementary medicine practices) and the effects thereof.

Direct-care staff members also play an important role in helping to recognize worsening CHF and should be trained to recognize and report subtle differences in a patient's condition, such as:

- Patient's clothing (e.g., shoes, pants, socks) appears tight compared with previous week
- Patient has new or increasing bilateral lower-extremity swelling (unilateral swelling suggests a local venous obstruction)
- Patient has abdominal swelling or discomfort
- Patient has elevated blood pressure, increased pulse, or decreased pulse oximetry
- Patient appears lethargic or withdrawn
- Patient is less active or has increased fatigue
- Patient has increased difficulty breathing with or without exertion
- Patient has unexplained cough
- Patient has unexpected weight gain

Simple tools like the PALTmed *Know-It-All System*[b,c] or "A New Leaf" Tool (Table 3) can alert direct-care staff to some common heart failure exacerbation symptoms. Other tools that can alert staff to subtle changes in patient condition are listed in Appendix 2.

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[a] PALTmed. Transitions of Care in the Long-Term Care Continuum. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products.

[b] PALTmed. Know-It-All Before You Call – Data Collection System. Essential clinical data collection: A guide for nurses on reporting change of condition. Ordering information available at https://paltmed.org/products/know-it-alltm-you-call-data-collection-system-paltc-assisted-living-setting.

[c] PALTmed. Know-It-All When You're Called – Diagnosing System. Essential clinical data exchange: A guide for attending practitioners on change of condition. Ordering information available at https://paltmed.org/products/know-it-alltm-when-youre-called-diagnosing-system.

The importance of accurate weights cannot be stressed enough. Weighing should be performed consistently: at the same time of day, with patients wearing the same amount of clothing, and on the same scale. When possible, patients should be weighed in the morning before breakfast and after the first void. Many facilities assign bath days as weight days. If this is the practice, patients with a diagnosis of CHF will need to have an assigned time for weights that does not vary by the day of the week. Drainage bags such as colostomy bags and urinary drainage bags should be emptied before the patient is weighed. More importantly, the assignment of responsibility to a specific staff member for assessing a patient's change in weight and communicating the change to the treating practitioner is necessary to identify CHF early.

Although weights are the gold standard in assessing fluid retention, staff members may also note fluid retention (often in the lower extremities or other dependent areas such as the presacral area). This will require monitoring by staff members by use of a consistent method of measurement—either by measuring circumference or by assessing the degree of pitting edema. Patients who are bedbound, chairbound, or with decreased mobility should also be assessed for presacral edema. To assess for edema of both legs, apply very firm pressure to a dependent area for a minimum of 15 seconds, then quickly remove your finger. Use the following scale[26] to grade the edema:

**1+:** slight pitting, no visible distortion, disappears rapidly
**2+:** a somewhat deeper pit than in 1+, but again no readily detectable distortion, and the pit disappears in 10 to 15 seconds
**3+:** the pit is noticeably deep and may last more than a minute; the dependent extremity looks fuller and swollen
**4+:** the pit is very deep, lasts as long as 2 to 5 minutes, and the dependent extremity is grossly distorted

**TABLE 1**
**Symptoms That May Suggest Heart Failure**

- Abdominal distention
- Acute confusional state, delirium
- Anorexia
- Anxiety or restlessness
- Decline in functional status
- Decreased exercise tolerance
- Dizziness
- Dyspnea at rest
- Dyspnea on exertion
- Fatigue
- Orthopnea (sensation of breathlessness in a recumbent position, relieved by sitting or standing; sleeping on two or more pillows to relieve the sensation of breathlessness is suggestive of heart failure. In a patient with cognitive impairment or difficulty in using language, orthopnea may present as restlessness or agitation when supine)
- Paroxysmal nocturnal dyspnea (sensation of shortness of breath that awakens the patient, often after 1 or 2 hours of sleep, that is usually relieved in the upright position)
- Unexplained cough (typically a dry, nonproductive cough) or wheezing, especially at night

**TABLE 2**
**Signs That May Suggest Heart Failure**

- Ascites or increased abdominal girth
- Increased jugular venous pressure
- Lower limb edema not caused by venous insufficiency or obstruction (sacral edema must also be assessed with attention to patients with decreased mobility)
- Positive hepatojugular reflux
- Rales on lung exam
- Tachycardia, tachypnea, hypotension, or hypoxia
- Third heart sound (S3)
- Weight gain

**TABLE 3**
**A NEW LEAF: A Screening Tool for Direct Caregivers**

**A:** Acute agitation/anxiety

**N:** Nighttime shortness of breath or increase in nighttime urination
**E:** Edema in lower extremities
**W:** Weight gain (2 to 5 pounds per week)

**L:** Lightheadedness
**E:** Extreme shortness of breath when lying down
**A:** Abdominal symptoms (nausea, pain, decreased appetite, distension)
**F:** Fatigue

Source: Harrington, 2008[27]

**STEP 3**

**Evaluate the patient for the presence of risk factors for heart failure exacerbation.** These are listed in Table 4.

**TABLE 4**
**Common Risk Factors for Heart Failure Exacerbation**

- Anemia (severe anemia of new onset or rapidly progressive anemia)
- Arrhythmia (e.g., atrial fibrillation)
- Chronic obstructive pulmonary disease
- Coronary artery disease (angina or myocardial infarction)
- Fever
- Increased salt intake
- Infection
- Medication noncompliance
- Medications (e.g., megestrol acetate, NSAIDs, doxorubicin)
- Pulmonary embolism
- Pulmonary hypertension
- Renal failure
- Sleep-disordered breathing
- Thyroid disease (hypo- or hyperthyroidism)
- Uncontrolled hypertension
- Valvular heart disease (e.g., aortic stenosis, mitral regurgitation)

NSAID: nonsteroidal anti-inflammatory drug.

## ASSESSMENT

Assessment of the severity of heart failure is important in helping to guide treatment and in helping to establish realistic care goals. Two methods are currently used: the New York Heart Association (NYHA) and the American College of Cardiology/American Heart Association (ACC/AHA) classification schemes. The severity of heart failure can be classified symptomatically by the use of a scheme such as the NYHA functional classification, which groups patients according to the amount of physical effort needed to produce heart failure symptoms (Table 5).[28]

The use of the NYHA functional classifications to quantify the degree of functional limitation imposed by heart failure is subject to considerable interobserver variability and is insensitive to important changes in exercise capacity. Formal testing of exercise tolerance, such as a 6-minute walk test (walking in a hallway for 6 minutes), may be needed to better quantify functional capacity. Reports about the effects of drug treatment for heart failure often categorize patients' responses by NYHA class rather than by age. Practitioners should be aware, however, that because of age-related changes in

**TABLE 5**
**New York Heart Association Heart Failure Classification Scheme**

| Class | Patient Symptoms |
|---|---|
| Class I (Mild) | No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnea (shortness of breath). |
| Class II (Mild) | Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnea. |
| Class III (Moderate) | Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnea. |
| Class IV (Severe) | Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased. |

pharmacokinetics and pharmacodynamics, an 85-year-old patient with NYHA Class IV heart failure may respond very differently to a medication than a 50-year-old patient with equally severe disease. In addition, older adults in PA/LTC facilities may have functional limitations for noncardiac reasons, thus making it difficult to assign a NYHA class. Nonetheless, NYHA Class III heart failure has an annual mortality rate of up to 45% and NYHA Class IV heart failure an associated mortality rate of up to 50%.[29]

An alternative method of classifying heart failure, which emphasizes both the development and the progression of the disease, the ACC/AHA scheme, was developed in 2005.[1] This classification scheme identifies the following four stages in the development of heart failure syndrome:

- Stage A. Patients at risk for heart failure but without structural heart disease or symptoms
- Stage B. Patients with structural heart disease but without signs or symptoms of heart failure (corresponds to NYHA Class I)
- Stage C. Patients with structural heart disease with prior or current symptoms of heart failure (most patients with heart failure fall into this category; corresponds to NYHA Classes II–III)
- Stage D. Patients with refractory heart failure who may be eligible for specialized interventions (e.g., continuous inotropic infusions, end-of-life care, procedure to facilitate fluid removal, left ventricular assist devices [LVADs]; corresponds to NYHA Class IV)

In the absence of an arrhythmia; disease of the pericardium, myocardium, or endocardium; and valvular disease or disease of the great vessels, heart failure is defined by left ventricular dysfunction, which may be systolic, diastolic, or both. Systolic heart failure is now referred to as **heart failure with reduced left ventricular ejection fraction** (LVEF); diastolic heart failure is referred to as **heart failure with preserved LVEF.**[1] Reduced LVEF refers to reduced myocardial contractility; preserved LVEF refers to decreased LV filling caused by decreased compliance during diastole. Contributors to heart failure with preserved LVEF include a decreased rate of relaxation, a rapid heart rate, and ventricular stiffness that reflects an elevated pulmonary capillary wedge pressure leading to symptoms. Coronary

artery disease and hypertension are the most common causes of both types of LV dysfunction. In 75% of cases, heart failure has antecedent hypertension.[2] LV function should be measured by imaging studies. Heart failure with reduced LVEF has an LVEF cutoff of 40% or less, whereas heart failure with preserved LVEF is defined as an LVEF of greater than 50%. Many individuals with heart failure have elements of both systolic and diastolic dysfunction. For example, heart failure caused by ischemic cardiomyopathy, although mostly caused by systolic dysfunction, also has an element of diastolic dysfunction owing to stiffness of the ventricular walls impairing ventricular filling during diastole.

Since publication of the 2009 ACCF/AHA heart failure guideline, stage D has been defined as "patients with truly refractory [heart failure] who might be eligible for specialized, advanced treatment strategies, such as mechanical circulatory support, procedures to facilitate fluid removal, continuous inotropic infusions, or cardiac transplantation or other innovative or experimental surgical procedures, or for end-of-life care, such as hospice".[1] Clinical clues can also assist clinicians in identifying patients who are progressing toward advanced heart failure (Table 6) and who have poor cardiac prognosis (Table 7).

**TABLE 6**
**Clinical Events That Can Help to Identify Patients With Advanced Heart Failure**

- Repeated (2 or more) hospitalizations or emergency department visits for heart failure in the past year
- Progressive deterioration in renal function (e.g., rise in BUN and creatinine)
- Weight loss without other cause (e.g., cardiac cachexia)
- Intolerance to ACE inhibitors owing to hypotension or worsening renal function
- Intolerance to beta-blockers owing to worsening heart failure or hypotension
- Frequent systolic blood pressure less than 90 mm Hg
- Persistent dyspnea with dressing or bathing requiring rest
- Inability to walk 1 block on level ground owing to dyspnea or fatigue
- Recent need to escalate diuretics to maintain volume status, often reaching daily furosemide equivalent dose greater than160 mg/d, use of supplemental metolazone therapy, or both
- Progressive decline in serum sodium, usually to less than 133 mEq/L
- Frequent ICD shocks

ACE: angiotensin-converting enzyme; BUN: blood urea nitrogen; ICD: implantable cardioverter-defibrillator.
Source: Yancy et al, 2013[1]; Russell et al, 2008[30]

**TABLE 7**
**Indicators of Poor Cardiac Prognosis**

- Aortic stenosis
- Cachexia
- High B-type natriuretic peptides
- Low left ventricular ejection fraction
- Low serum sodium
- Marked left ventricular dilation
- Progressive renal dysfunction
- Syncope and near-syncope
- Valvular regurgitation
- Ventricular arrhythmias

### STEP 4

**Decide if a workup is appropriate.** The goals of a diagnostic work-up of CHF are to

- Determine the underlying etiology of heart failure, such as an arrhythmia; disease of the pericardium, myocardium, or endocardium; valvular disease; or disease of the great vessels
- Determine whether the symptoms are caused by preserved or reduced ventricular function
- Assess comorbid diseases that may impact the course of CHF or require further treatment
- Provide information for prognostication
- Guide treatment

A workup may not be indicated if the patient has a terminal or end-stage condition, if the workup would not change the management course, or if the patient or legally authorized representative refuses either the work-up or treatment. Determine whether a workup for heart failure was performed during a hospitalization or sometime before admission to the facility. Always consider the effects of the workup on the patient's treatment goal and outcomes. If the burden of the workup is greater than the potential benefit of treatment, the workup may not be indicated. Also keep in mind reversible etiologies that can be treated in line with the goals of care.

One of the goals of a workup may be to determine prognosis. For example, recognition of the presence of poor kidney function (low glomerular filtration rate), hyponatremia, hypoalbuminemia, decline in ventricular ejection fraction, or a markedly elevated B-type natriuretic peptide (BNP) or N-terminal proBNP (NT-proBNP) level may all point to a poor prognosis and may help in prognostication and in care planning. BNP is a peptide released by heart muscle as a result of myocardial stretch and may be a useful biomarker for establishing the presence and the severity of heart failure, especially if the cause for a patient's dyspnea is unclear.[9] Monitoring BNP levels over time may help to guide therapy in some patients. Be aware that other cardiac (e.g., acute coronary syndrome, valvular heart disease, atrial fibrillation, cardiac surgery, cardioversion) and noncardiac (e.g., advanced age, anemia, renal failure, obstructive sleep apnea, pneumonia, critical illness, sepsis, toxic medications) conditions can elevate BNP levels. (See Appendix 1.)

In summary, the purpose and objectives of further investigations should be discussed at length with the patient because unnecessary testing may lead to physical and emotional burdens on patients and their family members.

## STEP 5

**Perform appropriate imaging studies to help to elucidate the etiology or severity of heart failure.** If a workup is determined to be appropriate, perform initial studies to look for reversible and irreversible etiologies so that appropriate therapy may be selected. The most common reversible causes of heart failure are listed in Table 8. Although most underlying etiologies are irreversible (but may be treatable), searching for treatable risk factors of acute exacerbations will provide guidance on how to reduce the likelihood of a future exacerbation and can help to ameliorate the symptoms of the current exacerbation.

Imaging studies should be strongly considered for patients with heart failure if not already performed, unless precluded by an advance directive or by the patient's or legally authorized representative's informed decision to decline the study. The practitioner may consider referral to a cardiologist if the etiology of heart failure is not clear, if consideration is being given to invasive diagnostic studies, or if the etiology is less common, such as iron overload or sarcoidosis. Once identified, the underlying etiology should be clearly documented by the practitioner, in addition to the reason for any acute exacerbation.

**Chest x-ray.** Relative ease of administration, low cost, and easy availability make chest x-rays a valuable tool for heart failure assessment in PA/LTC patients. A chest x-ray is recommended as an initial noninvasive test in patients with new heart failure. A chest x-ray is not useful for determining the type of LV dysfunction, but may identify the presence of effusions, infiltrates, and vascular congestion, all of which may contribute to heart failure severity.

**Echocardiography.** Two-dimensional echocardiography, combined with Doppler flow studies, can provide useful diagnostic information in patients with heart failure and defines structural heart disease.[1] This test can help to determine whether LVEF is preserved or reduced and can help to identify structural abnormalities in the pericardium, valves, myocardium, and ventricles. This procedure can also provide hemodynamic data that can help in the assessment and treatment of patients with heart failure. Repeat studies are recommended for patients who present with a sudden change in their health status and for those who are on therapies that might affect cardiac function (ACC 2013 guidelines; Class or recommendation 1; Level of evidence C).[1]

**TABLE 8**

**Most Frequent Potentially Reversible Causes of Heart Failure**

- Arrhythmia (e.g., atrial fibrillation)
- Coronary artery disease
- High salt intake
- Infection
- Medications (e.g., antiarrhythmic drugs, calcium channel blockers, NSAIDs, thiazolidinediones)
- Pulmonary embolism
- Renal failure
- Severe anemia
- Thyroid disease (hypo- or hyperthyroidism)
- Uncontrolled hypertension
- Untreated obstructive sleep apnea
- Valvular heart disease

**Radionuclide scanning.** Radionuclide scans may provide a more precise measurement of ejection fraction but require venous injection of radioactive material and may not be practical in debilitated patients.

### STEP 6

**Decide if interventions for modifiable risk factors and treatment of potentially reversible etiologies are appropriate.** After conducting a detailed cardiopulmonary history, performing a careful physical examination, reviewing laboratory data and medications, and completing or obtaining the results of an imaging study (if indicated), the next step is to determine whether interventions for risk factors or treatment for reversible etiologies are appropriate, available, and consistent with the patient's or legally authorized representative's wishes (i.e., their preferred goal of care). Treatment of reversible causes of heart failure (see Table 8) and some exacerbations of chronic heart failure may require transferring the patient to an acute-care setting (refer to PALTmed's clinical practice guideline, *Transitions of Care in the Long-Term Care Continuum*[a]). In all cases, the reasons for performing or not performing a workup, for undertaking or not undertaking treatment, or for sending a patient to the hospital versus treating at the PA/LTC facility, should be documented in the patient's medical record. Such discussions require that patients and their legally authorized representatives understand the disease processes and can balance the benefit of treatment with its impact on quality of life.

## TREATMENT

### STEP 7

**Develop an individualized care plan and define treatment goals.** As previously noted, the management of heart failure in the PA/LTC setting requires that the practitioner and interprofessional team collaborate with the patient and caregiver to identify the most appropriate care goals for each patient. The individualized care plan for heart failure management may result in any one or more of the following:

- Improved quality of life
- Increased tolerance to activity and exercise
- Symptom relief
- Prevention of exacerbations
- Reduced hospitalizations and emergency room visits
- Prolongation of life to the extent possible
- Better articulation by the patient and family of their preferences for end-of-life care (hospice)

Define care goals by taking into account the patient's comorbidities (e.g., elevated blood pressure, dyslipidemia, diabetes mellitus), prognosis, life expectancy, cognitive status, and preferences, including those expressed in advance health care directives. Use of the ePrognosis (Estimating Prognosis for Elders) calculators and other resources (http://eprognosis.ucsf.edu/; accessed 09/03/14) can be very helpful when confronted with decision making for a patient with heart failure and multimorbidity. The Seattle Heart Failure Model calculator (http://depts.washington.edu/shfm/; accessed 08/30/14)[31]

[a] PALTmed. Transitions of Care in the Long-Term Care Continuum. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/transitions-care-cpg.

for prognostication of mortality may also be helpful when discussing goals with the family. The individualized and goal-guided care plan should explicitly state the patient's care goals and describe the treatment approaches to be implemented in accordance with those goals, a rationale for selecting or excluding any particular treatment approach, and a plan for monitoring the patient's course. For example, a patient with advanced heart failure may choose to continue medications but may refuse to comply with a low-salt diet because of the poor taste and resulting impact on quality of life; or a patient may choose only symptom relief medication (i.e., diuretics), but may refuse life-prolonging medication such as beta-blockers that could worsen fatigue. Such discussions should be clearly detailed in the record so that facility staff members, caregivers, and state surveyors recognize that these individualized goals of care were defined by the patient. For patients with cognitive impairment, legally authorized representatives need to help to define these goals on the basis of their knowledge of the patient's wishes. Note that a short-stay patient admitted to a skilled nursing facility, especially after hospitalization for CHF, may have more aggressive treatment goals.

## STEP 8

**Optimize treatment for comorbid and contributing factors as well as cardiac factors as appropriate.** Discontinue or taper medications that can cause or exacerbate heart failure (see Tables 4 and 8). Treat exacerbating conditions such as anemia, cardiac arrhythmia, fever, hyperthyroidism, infection, ischemic heart disease,[32] uncontrolled hypertension, obstructive sleep apnea, and chronic kidney disease.[33,34] (See the section **Management of Anemia in Heart Failure Patients**.) Also address the consequences of the patient's failing heart. Specific pharmacotherapy should be based on the presence or absence of fluid volume overload and the nature of the ventricular dysfunction. For patients whose heart failure etiologies are complex, a cardiac consultation may be appropriate, but the burden of a specialty visit should be weighed against patient comfort and goals of care.

Nonpharmacologic interventions that should be considered in patients with heart failure include specific education to facilitate heart failure self-care (Class 1, Level B), cardiopulmonary rehabilitation (Class 1; Level A),[35] increasing physical activity, dietary modifications including decreasing salt intake (Class 1; Level C), decreasing (preferably stopping) smoking and alcohol consumption, and psychosocial and spiritual support. (See the section **Salt and Fluid Restriction**.) Because patients with heart failure who develop bacterial or viral respiratory infections may decompensate, all patients with heart failure should be offered pneumococcal vaccine and annual influenza vaccinations.

**Salt and fluid restriction.** Although recent literature has questioned the role of salt and fluid restriction in acute decompensated heart failure,[36] the role of salt and fluid restriction in chronic CHF is still important (Class 1; Level B). Salt and fluid restriction may be helpful in patients who have heart failure with evidence of volume overload and congestion. In patients with moderate to severe heart failure who opt to control their symptoms through diet, consider recommending a reduction in salt intake to less than 2 g per day (which may help to control symptoms). For patients who find a diet containing 2 g or less of sodium per day to be unpalatable, restriction to 3 g per day may be used. Recommendations for diet restrictions should be consistent with each patient's prognosis, nutritional status, and quality of life. Salt restriction may alleviate the need for fluid restriction and diuretic use. For patients who do not tolerate medication well, salt restriction is the only method of controlling volume. Practitioners should be aware, however, that because diets are generally liberalized in the PA/LTC setting, simply writing an order for a "no-added-salt diet" will not achieve adequate limitation of salt intake. Providing specific instructions in the patient's chart as to the amount of salt to be included in the patient's diet may be a more effective approach. The facility leadership should request more

options for sodium restriction from both in-house and corporate dietary services so that patients have the option to conform to current recommendations (http://www.cdc.gov/Features/Sodium/; accessed 09/01/14).

Fluids should be restricted in patients who are hyponatremic with serum sodium of less than 130 mEq/L or who have difficult-to-control fluid retention despite diuretics and salt restriction. In general, however, dietary restrictions should be ordered with caution on an individualized basis, taking quality of life and nutritional status considerations into account (see PALTmed's clinical practice guideline, *Altered Nutritional Status*[d]). In a recent memorandum to surveyors, CMS shared the findings of a task force that included 12 organizations representing clinical professions involved in developing diet orders and providing food service (e.g., physicians, nurses, occupational and physical therapists, pharmacists, dietitians). The new standards recommend that a regular diet become the default, with only a small number of individuals needing restrictions.[37]

**Management of anemia in heart failure patients.** Four types of anemia can be found in heart failure: iron deficiency anemia, anemia of chronic disease, hemo-dilutional state, and concomitant renal disease. Evaluation of anemia should include serum vitamin B-12, folate, and iron studies to evaluate for nutritional deficiencies as well as to help to differentiate between iron deficiency anemia and anemia of chronic disease. In patients with chronic heart failure, iron deficiency can be inferred by serum ferritin concentrations less than 100 mcg/dL (absolute iron deficiency) or serum ferritin of 100–299 mcg/dL, and transferrin saturation less than 20% (functional iron deficiency).[38] Anemia of chronic disease is characterized by ferritin greater than 100, low transferrin and transferrin saturation states, and low to normal iron.

Treatment of anemia in CHF is an emerging field and most studies have centered on ambulatory patients. The potential benefits of treating anemia include improved oxygen delivery and its effect on exercise tolerance and symptoms, with the goal to reduce hospitalizations and decrease mortality.

There have been few vigorous studies on transfusion in CHF alone; most data are from studies involving patients with both ischemic heart disease and heart failure. New societal guidelines from the American Association of Blood Banks (AABB) and the American College of Physicians recommend a restrictive transfusion approach with parameters of 7 to 8 g/dL versus the previous liberal transfusion parameters of less than 10 g/dL. If transfusion is required, careful attention should be paid to potential volume overload during transfusion.[39,40]

There have been few randomized controlled trials on oral iron replacement. In general, oral iron is poorly tolerated secondary to gastrointestinal effects such as nausea and severe constipation. Oral iron replacement should be considered if true iron deficiency is identified and used only until iron deficiency has resolved.

The current evidence does not support the use of intravenous iron supplementation or the use of erythropoiesis-stimulating agents in the frail PA/LTC population.

## STEP 9

**Treat fluid volume overload if present.** Retention of sodium and water causes fluid volume overload. Patients with fluid volume overload may have dyspnea, evidence of pulmonary congestion on chest x-ray, lung crackles, orthopnea, paroxysmal nocturnal dyspnea, distention of jugular veins, or peripheral edema.

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[d] PALTmed. Altered Nutritional Status. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/altered-nutritional-status-cpg.

Start the patient with fluid volume overload on a loop diuretic immediately. Diuretics improve symptoms and quality of life but do not necessarily prolong life. Diuretics administered orally may be less effective in patients with severe heart failure because of decreased absorption of the drug through the edematous gut. These patients may require parenteral diuretic treatment. Individuals receiving diuretic therapy should periodically be evaluated for electrolyte disturbances and development of contraction alkalosis from overdiuresis. Use of compression stockings or wrapping of the lower extremities with elastic bandages from the toes to the knees along with therapeutic elevation of the foot of the bed frame (not a knee Gatch bed) at night and three times per day for 20 minutes may be helpful for edema of the lower extremities if not contraindicated because of significant peripheral arterial disease.

Consider initiating loop diuretic therapy with oral furosemide at a dose of 20 mg to 40 mg once daily, preferably in the morning. Goals of titration should include treating fluid overload, avoiding symptomatic hypotension, and maintaining renal perfusion. If the initial dose fails to produce sufficient diuresis, double it or add a second dose daily until the desired diuresis is achieved. In patients with more severe heart failure, administering metolazone (a thiazide diuretic) 2.5 mg to 5 mg 30 minutes before furosemide may improve diuresis. Both furosemide and metolazone demonstrate continued efficacy in patients with moderate to severe renal insufficiency; however, this drug combination may increase the potential for hypokalemia, hyponatremia, and hypomagnesemia.[41] For this reason, serum electrolytes and blood urea nitrogen (BUN)/creatinine should be closely monitored in patients who are receiving both furosemide and metolazone. If it is necessary to dose diuretics more frequently than once daily, the final dose of the day should be given before 4:00 PM, if possible, to avoid nocturia.[42-45]

Bumetanide and torsemide are other frequently used loop diuretics (and may be more bioavailable with an edematous bowel).[46] Although each agent in this class has somewhat different pharmacologic properties, at equipotent doses there are few meaningful clinical differences between them. Bumetanide could be given if the patient is allergic to sulfa. The choice of agent should be based on the patient's condition and the expertise and experience of the attending physician or consultant. Once volume overload has resolved, try to reduce the diuretic regimen to the lowest possible dose(s) and consider discontinuing these agents if this is clinically tolerated by the patient. Indications and dose equivalents of thiazide, loop, and potassium-sparing diuretics are given in Table 9.

**TABLE 9**
**Diuretic Indications and Dose Equivalents**

| Diuretic | Indication | Adult Dose | Equivalent Dose* | Cost per Dose | Comment |
|---|---|---|---|---|---|
| **Thiazide Diuretics** | | | | | |
| Chlorothiazide (Diuril) | Edema caused by heart failure, liver disease, kidney disease, estrogen or corticosteroid therapy<br><br>Hypertension | PO or IV 500 mg – 1 gram daily or twice daily. Many patients respond to intermittent therapy (example: every other day) | 250 mg PO or IV | 500 mg tab generic = $0.25<br><br>500 mg injection generic = more than $300.00 | Chlorothiazide is the only thiazide diuretic available as an injection. Use with caution in patients with renal disease owing to azotemia. |
| Chlorthalidone (Thalitone) | Edema caused by heart failure, liver disease, kidney disease, estrogen or corticosteroid therapy<br><br>Hypertension | Edema: 12.5–25 mg daily; maximum = 100 mg†<br><br>Hypertension: 25 mg daily initially; maximum = 100 mg daily | 50 mg daily equivalent to hydrochlorothiazide<br><br>50 mg twice daily† | 25 mg generic = $0.25 | May be twice as potent as hydrochlorothiazide‡ and has a longer half-life of 48 to 72 h. Use with caution in patients with renal disease owing to azotemia. |
| Hydrochlorothiazide (Hydrodiuril) | Edema caused by heart failure, liver disease, kidney disease, estrogen or corticosteroid therapy<br><br>Hypertension | Edema: 25–100 mg daily<br><br>Hypertension: 12.5 mg daily initially; maximum = 50 mg daily | 25 mg PO | 25 mg generic = $0.15 | Use with caution in patients with renal disease owing to azotemia. |
| Metolazone (Zaroxolyn) | Edema caused by heart failure or kidney disease | Edema: 5–20 mg daily<br><br>Hypertension: 2.5–5 mg daily | 2.5 mg PO | 10 mg generic = $0.75 | May be effective at CrCl less than 30 mL/min.§ |

**TABLE 9 Continued**
Diuretic Indications and Dose Equivalents

| Diuretic | Indication | Adult Dose | Equivalent Dose* | Cost per Dose | Comment |
|---|---|---|---|---|---|
| **Loop Diuretics** | | | **Equivalent Dose to Furosemide** | | |
| Bumetanide (Bumex) | Edema caused by heart failure, liver disease, kidney disease | PO: 0.5–2 mg x 1 dose, may repeat in 4–5 hours; routine doses scheduled 2–3 times a day; maximum = 10 mg/day<br><br>IV/IM: 0.5–1 mg initially; maximum = 10 mg/day | 1 mg PO<br><br>1 mg IV | 1 mg PO generic = $0.45<br><br>1 mg/4 mL injection = $1.75 | 1 mg bumetanide = 40 mg furosemide.¶ ‖ |
| Ethacrynic Acid (Edecrin) | Edema caused by heart failure, liver disease, kidney disease<br><br>Short term management of ascites | PO: 50 mg daily; maximum = 200 mg twice daily<br><br>IV: 50 mg or 0.5 mg/kg/ dose 1 time | 50 mg PO<br><br>50 mg IV | 25 mg PO generic = $4.71<br><br>50 mg = $731.00 | Only loop diuretic without a sulfa group. |
| Furosemide (Lasix) | Edema caused by heart failure, liver disease, kidney disease<br><br>Hypertension | Edema: PO 20–80 mg one or two times a day<br><br>Hypertension: 20–40 mg twice daily<br><br>IV/IM 20–40 mg initially; maximum = 100 mg/day | 20 mg IV<br><br>40 mg PO | 40 mg PO generic = $0.15<br><br>40 mg/4mL injection = $1.40 | |

**TABLE 9 Continued**
Diuretic Indications and Dose Equivalents

| Diuretic | Indication | Adult Dose | Equivalent Dose* | Cost per Dose | Comment |
|---|---|---|---|---|---|
| Torsemide (Demadex) | Edema caused by heart failure, liver disease, kidney disease<br><br>Hypertension | Heart failure: PO or IV 10–20 mg initially; maximum = 200 mg<br><br>Cirrhosis: 5–10 mg initially; maximum = 40 mg<br><br>Hypertension: 5 mg daily initially; maximum = 10 mg/day | IV equivalent dose not available<br><br>20 mg PO | 10 mg PO generic = $0.70<br><br>20 mg/2 mL injection = $8.75 | 10–20 mg torsemide = 40 mg furosemide. |
| **Potassium-Sparing Diuretics** | | | **Equivalent Dose#** | | |
| Amiloride (Midamor) | Restore potassium levels and prevent hypokalemia in heart failure or hypertension | 5 mg daily initially; maximum = 20 mg/day | 20 mg | 5 mg generic = $1.25 | |
| Eplerenone (Inspra) | Heart failure after myocardial infarction<br><br>Hypertension | Heart failure: 25 mg daily initially; titrate to 50 mg daily over 4 weeks, as tolerated<br><br>Hypertension: 50 mg daily; maximum = 50 mg twice daily | 200 mg** | 50 mg generic = $4.00 | Eplerenone is metabolized by cytochrome P450 3A4 and is subject to many drug interactions that increase the likelihood of developing hyperkalemia. |

**TABLE 9 Continued**
Diuretic Indications and Dose Equivalents

| Diuretic | Indication | Adult Dose | Equivalent Dose* | Cost per Dose | Comment |
|---|---|---|---|---|---|
| Spironolactone (Aldactone) | Edema caused by heart failure, cirrhosis, nephrotic syndrome<br><br>Hypertension<br><br>Hypokalemia<br><br>To increase survival in severe heart failure (NYHA class III–IV) | Edema: 100 mg daily<br><br>Hypertension: 50–100 mg daily; maximum = 200 mg daily<br><br>Hypokalemia: 25–100 mg daily in divided doses; maximum = 200 mg daily<br><br>Severe heart failure: 25 mg daily initially; maximum = 50 mg/day | 50 mg | 50 mg generic = $0.80 | |
| Triamterene (Dyrenium) | Edema caused by heart failure, kidney disease, steroid use, idiopathic edema; edema secondary to hyperaldosteronism | 100 mg twice daily initially; maximum = 300 mg/day | 200 mg | 50 mg generic = $1.10 | |

IM: intramuscular; IV: intravenous; NYHA: New York Heart Association; PO: oral.
* Society of Critical Care Medicine, 2012[47]
† Saklayen, 2008[48]
‡ Bloch et al, 2006[49]
§ National Kidney Foundation KDOQI clinical practice guidelines on hypertension and antihypertensive agents in chronic kidney disease. January, 2012
‖ Bumetanide full prescribing information. TEVA. Sellersville, PA March 2010[50]
¶ Bumetanide injection full prescribing information. Hospira. Lake forest, IL November 2004[51]
# Jackson et al, 1982[52]
** Brown, 2003[53]

## STEP 10

**Treat heart failure with reduced LVEF.** An angiotensin-converting enzyme (ACE) inhibitor is the first-line treatment for all patients with heart failure, but particularly for those with reduced LVEF (Table 10). ACE inhibitors exert effects on the renin-angiotensin system and cause both preload and afterload reduction and, consequently, favorable effects on cardiac contractility. ACE inhibitors should not be started if the patient is volume depleted because doing so may lead to hypotension. Titrate the initial dose upward as tolerated to the maximal dose; do not exceed the maximum (Table 11). ACE inhibitors improve quality of life,[54-57] survival, and risk of hospitalization,[57,58] largely as a result of their neurohormonal effects. In most studies, quality of life is measured by a decline in the number of hospitalizations, an increase in functional status, and a reduction in symptoms.

Consider contraindications before starting an ACE inhibitor (Table 12). Start with a low dose (see Table 11), recognizing that hypotension and hyperkalemia may occur. Hypotension is likely to occur within hours; hyperkalemia may not occur for a few days or weeks. Strive to titrate as close to the target dose as the patient can tolerate.

Before starting an ACE inhibitor, avoid excessive use of loop diuretics, which could result in volume depletion. Be aware that ACE inhibitors interact with drugs such as lithium and potassium-sparing agents. ACE inhibitors also increase the potential for electrolyte disturbance and toxicity, especially hyperkalemia. Table 13 lists adverse effects of ACE inhibitors; Table 14 lists risk factors for hypotension.

Patients who cannot tolerate ACE inhibitors because of intractable cough may be able to tolerate an angiotensin II receptor blocker (ARB).[59,60] Be aware, however, that there is a certain amount of cross-reactivity between ACE inhibitors and ARBs.[59,61,62] Currently available ARBs include candesartan, eprosartan, irbesartan, losartan, telmisartan, and valsartan. Practitioners who prescribe these drugs should be familiar with their doses and titration schedules. The combination of hydralazine and isosorbide dinitrate also produces both preload and afterload reduction and can be used if both ACE inhibitors and ARBs are contraindicated; this combination has shown improved outcomes in certain populations such as African Americans.

### TABLE 10
**Medications for Treating Heart Failure with Reduced LVEF**

- ACE inhibitors (ARBs if patient cannot tolerate ACE inhibitors)
- Aldosterone antagonists (in selected patients)
- Beta-blockers
- Digoxin (in selected patients)
- Diuretics
- Isosorbide dinitrate/hydralazine (in NYHA class III or IV and selected African American patients)

ACE: angiotensin-converting enzyme; ARB: angiotensin II receptor blocker; LVEF: left ventricular ejection fraction.

**TABLE 11**
**Recommended Dosages of ACE Inhibitors in Elderly Patients**

| Drug | Starting Dose for Heart Failure | Target Dose for Heart Failure | Comments |
|---|---|---|---|
| Captopril (Capoten, generics) | 6.25 mg three times daily | 50 mg three times daily | May increase dose after 1 to 2 weeks.<br><br>If target dose cannot be reached, patients probably receive some benefit from lower doses.<br><br>Avoid abrupt discontinuation when possible.<br><br>Use caution in patients with hypotension, hyponatremia, diabetes, renal impairment, or hypovolemia and in patients taking potassium.<br><br>Check potassium, SCr, and blood pressure within 1 week of initiation or dosage increase in the elderly and within 1 to 2 weeks of initiation or dose increase in others. Recheck in 3 to 4 weeks if stable. If SCr increases less than 30%, recheck potassium, SCr, and blood pressure after 2 to 3 weeks and again in 3 to 4 weeks. Increases up to 30% that stabilize within 2 to 3 weeks are acceptable. Evaluate for hypoperfusion (e.g., volume depletion, NSAID use), then bilateral renal artery stenosis if SCr increases more than 30% within 1 month of starting therapy. Serum creatinine increases of 30% to 50% may respond to a 50% dosage decrease. Discontinue if SCr increases more than 1 mg/dL (88.4 mcmol/L), SCr increases more than 30% within the first 2 months of therapy despite dosage decrease, or potassium is greater than 5.5 mEq (mmol)/L. If stable, recheck SCr and potassium once or twice yearly or if patient condition or medications change. |
| Enalapril (Vasotec, generics) | 2.5 mg twice daily | 10 mg twice daily | |
| Fosinopril | 5 to 10 mg once daily | 40 mg once daily | |
| Lisinopril (Prinivil, Zestril, generics) | 2.5 to 5 mg once daily | 20 mg once daily | |
| Quinapril (Accupril, generics) | 5 mg twice daily | 20 mg twice daily | |
| Ramipril (Altace, generics) | 1.25 to 2.5 mg once daily | 5 mg twice daily or 10 mg once daily | |
| Trandolapril (Mavik, generics) | 1 mg once daily | 4 mg once daily | |

SCr: serum creatinine.
Source: Pharmacist's Letter/Prescriber's Letter, November 2013.[63]

**TABLE 12**
**Contraindications to the Use of ACE Inhibitors**

Absolute contraindications
- Angioedema
- Hypersensitivity to ACE inhibitors

Relative contraindications
- Cough
- Hypovolemia
- Renal artery stenosis
- Serum potassium greater than 5.0 mEq/L
- Severe aortic stenosis
- Systolic blood pressure less than 100

**TABLE 13**
**Adverse Effects of ACE Inhibitors**

- Angioedema
- Cough
- Hyperkalemia
- Hyponatremia
- Hypotension
- Renal failure

**TABLE 14**
**Risk Factors for Hypotension in Patients Taking ACE Inhibitors**

- Recent increase in diuretic dose
- Serum creatinine greater than 1.7 mg/dL
- Serum sodium less than 135 mEq/L
- Volume depletion

**Beta-Blockers.** The effect of beta-blockers on heart failure has been evaluated in many published placebo-controlled clinical trials and in tens of thousands of patients.[64-72] All trials enrolled patients with reduced LVEF who had already been treated with diuretics and ACE inhibitors with or without digitalis. Strong evidence now supports long-term treatment with beta-blockers to improve symptoms

of heart failure and patients' clinical status, as well as to enhance patients' overall sense of well-being, by down-regulating the catecholamine system.[69,73-79] Beta-blockers have also been shown to reduce the risk of death and the combined risk of death or hospitalization among patients with heart failure[66,67,69,72,80]; however, the mean age in the published trials was generally younger than that in the PA/LTC setting.

Beta-blockers are indicated for all patients with stable heart failure caused by reduced LVEF in the absence of a contraindication to their use, and, as above, should only be started in patients with euvolemic and compensated status. Diuretics should be added to beta-blockers in patients with heart failure and fluid retention to prevent a worsening of fluid retention that may complicate the initiation of beta-blocker therapy.[81-83]

Carvedilol, carvedilol extended release, metoprolol succinate (extended-release), and bisoprolol have all been shown to reduce hospitalizations and mortality in patients who have heart failure with reduced LVEF, and these are the only beta-blockers indicated for heart failure patients. Table 15 lists contraindications to beta-blocker therapy.

Table 16 shows typical initial and target doses of beta-blockers. Titrate the dose slowly and carefully. In patients who are clinically stable, titrate to the target dose by doubling the dose at least every 2 to 4 weeks. Beta-blockers are usually well tolerated when used in this manner. Studies suggest that better outcomes are achieved at target doses.[1]

Caregivers should be aware of potential adverse reactions to beta-blockers (Table 17). If a patient develops symptomatic bradycardia or hypotension or other troublesome symptoms such as fatigue following a dose increase that appear to be related to beta-blocker therapy, reduce the dose to the previously tolerated level. When the patient's condition has stabilized and other therapies have been optimized (e.g., the diuretic dose has been increased to treat fluid volume overload and the ACE inhibitor dose has been optimized), gradual titration of the beta-blocker may be attempted again. Patients who experience side effects during initial titration attempts may tolerate higher doses after being treated with a lower dose for 1 to 2 months.

**TABLE 15**
**Contraindications to the Use of Beta-Blockers**

Patients who have acutely decompensated heart failure or any of the following conditions should not take beta-blockers:

- Bradycardia or advanced heart block without a pacemaker
- Hypotension
- Need for intravenous therapy for heart failure
- Reactive airways disease*
- Severe peripheral arterial disease
- Sick sinus syndrome
- Significant fluid retention requiring intensive diuretic therapy
- Profound fatigue or other serious adverse events after using beta-blockers

* Note that the nonselective beta-blocker carvedilol should be avoided in patients with reactive airways disease. The selective beta-blockers (i.e., atenolol, betaxolol, bisoprolol, metoprolol tartrate immediate release, metoprolol succinate extended release, nebivolol, carvedilol phosphate extended release, and acebutolol) are usually tolerated by these patients.

**TABLE 16**

**Typical Dosages of Beta-Blockers Approved by the Food and Drug Administration for Treating Heart Failure in Elderly Patients**

| Agent | Initial Dose | Target Dose | Comments |
|---|---|---|---|
| Bisoprolol | 1.25 mg daily | 10 mg daily | Bisoprolol and metoprolol are beta-1 selective; carvedilol blocks beta-1, beta-2, and alpha-1 receptors.<br><br>Principal adverse effects are fluid retention, worsening heart failure, fatigue, bradycardia, heart block, and hypotension.<br><br>Monitor vitals closely during upward titration. Do not increase dose until any adverse effects have resolved.<br><br>Use diuretics to manage fluid retention.<br><br>Decrease dose in the event of bradycardia associated with dizziness or lightheadedness, or second- or third-degree heart block.<br><br>If hypotension occurs, separate beta-blocker from other hypotensive agents (e.g., ACE inhibitors) or decrease diuretic dose. For clinical hypoperfusion, decrease dose or discontinue. Fatigue blamed on beta-blockers may actually be caused by overdiuresis, sleep apnea, or depression. Avoid abrupt discontinuation when possible. Continue beta-blocker even if it does not seem to improve heart failure symptoms. |
| Carvedilol immediate release | 3.125 mg twice daily | 25 mg twice daily | |
| Carvedilol extended release | 10 mg daily | 40–80 mg daily | |
| Metoprolol extended release | 12.5 mg daily | 200 mg daily | |

ACE: angiotensin-converting enzyme.

**TABLE 17**
**Potential Adverse Effects of Beta-Blockers**

- Depression (for lipophilic beta-blockers that can cross the blood-brain barrier, such as metoprolol tartrate)
- Exacerbation of heart failure
- Increased shortness of breath
- Profound fatigue
- Sexual dysfunction
- Symptomatic bradycardia or heart block
- Symptomatic hypotension

**Digoxin.** Several placebo-controlled trials have shown that digoxin provides symptomatic relief, improves exercise tolerance and functional capacity, and improves quality of life for patients with mild to moderate heart failure.[84-90] Another trial showed that treatment with digoxin for 2 to 5 years in patients with NYHA Class II or III heart failure did not reduce mortality but did relieve symptoms and reduce hospitalizations.[91]

Digoxin is currently recommended for the control of ventricular rate in patients with atrial fibrillation; however, beta-blockers are superior to digoxin for reducing ventricular rate.[92-95] Digoxin may be related to poor appetite, and in the Beers list of medications is categorized as a medicine that should be avoided in older patients at doses greater than 0.125 mg/d.[96] Thus, digoxin should be reserved for patients with a good benefit-to-risk ratio for its use. Digoxin at a dose no higher than 0.125 mg daily may be considered for reducing symptoms and hospitalizations resulting from heart failure in elderly patients with NYHA Class II to IV heart failure who are receiving the maximum tolerated dose of ACE inhibitors, loop diuretics, and beta-blockers and who are in sinus rhythm. In these patients, digoxin serum concentrations should generally be 1.0 ng/mL or less.[97] Serum concentrations do not need to be checked routinely except to exclude toxicity.

**Aldosterone antagonists.** In a select group of patients with heart failure, aldosterone antagonists (eplerenone, spironolactone) may be useful to counter the adverse effects of aldosterone, such as baroreceptor dysfunction, direct vascular damage, and myocardial and vascular fibrosis. In the Randomized Aldosterone Evaluation Study,[98] the aldosterone antagonist spironolactone reduced mortality among patients with stable NYHA Class III to IV heart failure. Criteria for inclusion in this study were ejection fraction less than 35%, creatinine less than 2.5 mg/dL, and potassium less than 5.0 mEq/L; however, patients aged over 80 were excluded.

Hyperkalemia may occur in patients treated with aldosterone antagonists. Patients who take ACE inhibitors or who have renal impairment or diabetes are at higher risk for hyperkalemia. Spironolactone also blocks androgen receptors, potentially causing gynecomastia. The newer aldosterone antagonist, eplerenone, is less likely than spironolactone to cause gynecomastia.[99]

**Isosorbide dinitrate/hydralazine.** The combination of isosorbide dinitrate and hydralazine has been shown to decrease mortality, reduce the rate of first hospitalization, and improve quality of life in African American patients with heart failure.[100] This combination is now indicated for the treatment of heart failure as an adjunct to standard therapy (e.g., ACE inhibitor or ARB, beta-blocker, loop diuretic,

and/or digoxin and an aldosterone antagonist) in all patients with stable NYHA Class III to IV heart failure and also in African American patients to improve survival and patient-reported functional status and prolong the time to hospitalization for heart failure. This combination should be used for African American patients who remain symptomatic despite optimal medical therapy (as described above). It should not be used for the treatment of heart failure in patients who have not taken an ACE inhibitor and should not be substituted for an ACE inhibitor in patients who are tolerating that therapy. The most common adverse effects seen with isosorbide dinitrate/hydralazine are gastrointestinal complaints and headache (caused by the vasodilatory effects of the drug combination). Orthostatic hypotension is another frequently encountered adverse event in older patients who take nitrates.

**Other medications.** Although non-dihydropyridine calcium channel blockers may be harmful in patients with low LVEF, amlodipine may be of benefit for the management of comorbid hypertension and ischemic heart disease (i.e., angina) but does not offer a functional or survival benefit.[1] The 2013 ACCF/AHA Guideline also states that omega-3 fatty polyunsaturated acid supplementation is a reasonable adjunctive in patients with heart failure with reduced or preserved EF; however, published data have failed to demonstrate the benefit of routine vitamin, nutritional, or hormonal supplementation (except for omega-3 fatty acids).[1]

**Implantable cardioverter-defibrillators (ICD) and cardiac resynchronization therapy (CRT).** Selected patients in the PA/LTC setting should be referred to a cardiologist for consideration for implantable cardioverter-defibrillator therapy. Implantable cardioverter-defibrillators are indicated to reduce the risk of sudden death in patients with LVEF less than 35% despite optimal medical therapy. Implantable cardioverter-defibrillators will not ameliorate symptoms, but are beneficial to prolong life. Thus, it is crucial that before a referral is made to the cardiologist for the placement of a defibrillator, the potential impact of such a placement on the patient's life quality be determined and discussed with the patient and the family. A discussion of the discomfort of a defibrillator's firing is also warranted, as is a discussion of the issues surrounding the defibrillator at the end of life with recommendations on what may be done.

Cardiac resynchronization therapy may be indicated if the patient has persistent heart failure symptoms despite optimal medical management, meets the ACCF/AHA indications for implantation of these devices (LVEF less than 35%; QRS duration greater than 120 ms; Class III or IV), and has a reasonable expectation of survival with a good functional status for more than 1 year.[1]

**Summary.** The patient with heart failure with reduced LVEF who has fluid volume overload should receive a loop diuretic. After correcting any hypovolemia, start an ACE inhibitor and titrate to the target dose as tolerated. Add a beta-blocker to ACE inhibitor therapy and titrate to the target dose as tolerated. Dual therapy has been shown to decrease morbidity and mortality in patients with heart failure. Isosorbide dinitrate and hydralazine may be added in African American patients whose heart failure remains uncontrolled on standard therapy. Digoxin may be added in selected patients to improve symptoms and enhance quality of life. Spironolactone may be introduced cautiously in selected patients with stable NYHA Class III to IV heart failure who need and want all interventions that have been demonstrated to decrease mortality.

## STEP 11

**Treat heart failure with preserved LVEF.** A normal ejection fraction (greater than 40%) in the presence of pulmonary congestion and other heart failure symptoms suggests heart failure with preserved LVEF. Physiologically, heart failure with preserved LVEF is characterized by impaired ventricular relaxation (filling) caused by a stiff, noncompliant ventricle. Over half of all heart failure patients in the PA/LTC setting may have heart failure with preserved LVEF.

Despite the prevalence of morbidity and mortality related to heart failure with preserved LVEF, no results are available from prospective, randomized, blinded, multicenter trials to guide treatment decisions. The goals of intervention are to decrease fluid volume overload and treat elevated filling pressures. Many patients with heart failure with preserved LVEF have underlying hypertension, leading many experts to believe that blood pressure control may be the single most important treatment strategy for this condition. On the basis of the Eighth Joint National Committee (JNC 8) Guideline, for those aged over 60 years, the target systolic blood pressure should be less than 150 and the target DBP should be less than 90.[101] Table 18 lists the pharmacologic options for treating heart failure with preserved LVEF.

**TABLE 18**
**Medication Options for Treating Heart Failure with Preserved LVEF**

- ACE inhibitors
- Beta-blockers
- Calcium-channel blockers
- Diuretics
- Nitrates

ACE: angiotensin-converting enzyme; LVEF: left ventricular ejection fraction.

## STEP 12

**Initiate cardiac rehabilitation.** As defined by the American Association of Cardiovascular and Pulmonary Rehabilitation, cardiac rehabilitation is the "process by which persons with cardiovascular disease (including but not limited to patients with coronary heart disease) are restored to and maintained at their optimal physiological, psychological, social, vocational, and emotional status".[102]

Formal cardiac rehabilitation and intensive cardiac rehabilitation programs have specific eligibility and treatment requirements and are conducted in phases often beginning in the acute-care hospital following a cardiac event and then transitioning into the outpatient setting. Cardiac rehabilitation may also be initiated safely as an outpatient. Those formally defined programs are covered by Medicare and most private insurance carriers with some variation depending on local coverage determinations (http://www.medicare.gov/coverage/cardiac-rehab-programs.html; accessed 09/04/2014). This formal program for acute-care and outpatient settings has three phases, as shown in Table 19.

**TABLE 19**
**Phases of Cardiac Rehabilitation**

- Phase I (Inpatient Period). This stage can last anywhere from 1 to 14 days for cardiovascular patients undergoing invasive procedures or suffering from acute events.
- Phase II (Immediate Outpatient Period). This is the convalescent stage after a hospital discharge. The length is partly determined by risk stratification and monitoring need. By definition, this period is the most closely monitored phase of rehabilitation.
- Phase III (Maintenance Period). The third stage of recovery is an extended outpatient period following Phase II. The patient is not intensely monitored or supervised but is still involved in regular endurance exercise training and lifestyle change.

Source: Adapted from Gonzalez et al, 2004[102]

Facilities must be familiar with regulations, definitions, and payment and insurance coverage implications related to formal cardiac rehabilitation and intensive cardiac rehabilitation programs. PA/LTC facilities are well-positioned to support alternative models to traditional cardiac rehabilitation, such as individualized telehealth or internet-based interventions that address barriers associated with transportation or responsibilities at home or work.[103] Cardiac rehabilitation can be useful in *clinically stable* patients with heart failure to improve functional capacity, exercise duration, health-related quality of life, and mortality.[1]

The demonstrated benefits of cardiac rehabilitation programs are shown in Table 20.

**TABLE 20**
**Beneficial Effects of Cardiac Rehabilitation**

- Decreases cardiovascular events
- Decreases mortality at up to 5 years after participation
- Fosters lifelong healthy behaviors
- Improves adherence with preventative medications
- Improves function and exercise capacity
- Improves modifiable risk factors
- Improves quality of life

Source: American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) slide set. Available at: https://www.aacvpr.org/Portals/0/resources/professionals/CRupdate2.06.12.pdf. Accessed 08/30/14.

Formal and intensive cardiac rehabilitation programs contain a valuable framework and related guidelines that can be adopted as "best practice" in PA/LTC settings with an informal cardiac reha-

bilitation program. The core components of a formal cardiac rehabilitation program are presented in Table 21. The CMS guidelines specify that these components be included in a cardiac rehabilitation program.

**TABLE 21**
**Components of Cardiac Rehabilitation**

1. Physician prescribed exercise: Exercise training and other therapeutic exercise including aerobic and strength training.
2. Cardiac risk factor modification: Includes education, counseling, and behavioral intervention related to the individual's care and tailored to the individual's needs. It may include a combination of one or more of the following.
   - Physical activity
   - Nutrition
   - Lipid management
   - Blood pressure management
   - Smoking cessation
   - Weight management
   - Diabetes management
   - Psychosocial management
3. Psychosocial Assessment: Evaluation of the individual's mental and emotional functioning as it relates to the individual's rehabilitation or cardiac condition.
4. Outcomes Assessment: Evaluation of the patient's progress as it relates to the individual's rehabilitation goals and program.

Source: https://www.aacvpr.org/About/AboutCardiacPulmonaryRehab/tabid/560/Default.aspx#CardiacFAQ. Accessed 08/30/14.

The "physiological" aspect of a cardiac program (exercise prescription and physical activity) is important. Prompt referral to physical therapy should therefore be considered to initiate this important component.

Reimbursement for treatments described within this informal-type program would be consistent with existing payer/regulation practices related to skilled care for the discipline involved. Again, ensure understanding of all payer, regulation, and documentation requirements.

**Exercise and physical activity prescription.** Exercise and activity improve functional capacity, reduce activity-related abnormal signs and symptoms, and improve measures related to hypertension, obesity, glucose, psychosocial parameters, quality of life, and depression.[104] The safety of exercise and resistance training with cardiac patients is well established, and detailed guidelines for prescribing aerobic and resistance exercise for patients with cardiovascular disease are available in detail. These guidelines include risk stratification, activity guidelines, and supervision requirements.[104-111]

Consensus recommendations for exercise and activity prescription include prescribing a combination of the following main components:[106,108]

- Testing to determine suitability and safety, and physical activity and exercise evaluation
- Aerobic, flexibility, and resistance training (including the upper extremities)
- Patient education to understand the exercise expectations (e.g., heart rate changes, appropriate levels of exercise)

More specifically, the American Heart Association/American Association of Cardiovascular and Pulmonary Rehabilitation Scientific Statement *Core Components of Cardiac Rehabilitation/Secondary Prevention Programs*[109] details the physical activity and exercise training components of a comprehensive cardiac rehabilitation program. These are included in Appendix 3. Recommendations for the duration, frequency, and intensity of all modes of exercise are given within the various guidelines referenced above.[104-111] In addition to following the guidelines, consider the following when working with the older adult within the PA/LTC patient setting:

- Refer to the "Exercise Recommendations for Older Adults" from the Section on Geriatrics of the American Physical Therapy Association[112]
- Perform resistance training versus pure isometric exercises
- Consider broader interpretations of exercise programs,[104] including considerations of
  - Differences in needs between male and females
  - Occupational or leisure activities and activities of daily living
  - Importance of socialization
  - Importance of diversity of activities
- Use a "rating of perceived exertion" scale such as the Borg Rating of Perceived Exertion (http://www.cdc.gov/physicalactivity/everyone/measuring/exertion.html; accessed 09/01/14)

Proven outcomes of exercise in cardiac rehabilitation independently or in conjunction with the comprehensive program contribute to[102]

- Improvement in blood lipid levels
- Improvement in exercise tolerance
- Improvement in psychosocial well-being and stress reduction
- Improvement in symptoms
- Reduction in mortality (multifactorial cardiac rehabilitation service can reduce cardiovascular mortality in patients following myocardial infarction)
- Reduction of cigarette smoking (curbing symptoms of nicotine withdrawal)
- Safety (the safety of exercise is established by the very low rate of occurrence of myocardial infarction and cardiovascular complications during exercise training)

Exercise and physical activity prescription should be made by a physical therapist (and occupational therapist as applicable) after receipt of a physician order, along with any guidance for patient-specific laboratory values or vital sign limitations or ranges and clearance. Note that many patients in the PA/LTC setting have multimorbidity and may have been functioning outside of "normal" laboratory value or vital sign ranges for many years. Guidance from the physician on patient-specific ranges is critical for proper exercise prescription and safe patient progress.

The core of proper exercise prescription is the assessment of aerobic capacity and muscle force production. Optimal exercise testing for aerobic capacity assessment is via ventilatory expired gas

analysis. Because this method requires the use of special equipment and increased staff expertise, however, most exercise testing is performed without analysis of ventilatory gas. Aerobic capacity can be estimated from the workload achieved while the patient is using an ergometer or treadmill, for example. This work is expressed in metabolic equivalents (METs),[113] units used to estimate the amount of oxygen used by the body during physical activity. The goal in cardiac rehabilitation is to improve cardiovascular capacity through physical exercise training, whether in a minimally supervised or unsupervised setting. Peak exercise capacity measured in METs is the strongest predictor of risk of death among both healthy individuals and those with cardiovascular disease. Higher exercise capacity is protective even in the presence of risk factors or disease.[102,114]

Although peak or maximal exercise testing is the gold standard for assessing maximum aerobic capacity, its role is limited in the assessment of many LTC patients.[115] Submaximal exercise tests are safer and more appropriate for the typical LTC patient. Common submaximal exercise testing appropriate for the LTC patient may include the Modified Bruce Treadmill Test, the Astrand and Rhyming Cycle Ergometer Test, the Timed Up and Go test, and the 12- and 6-Minute Walk Tests. As with any exercise test, there are many factors to consider in selecting the proper submaximal test for the individual patient.[115] Always begin with a pretest work-up to identify indications for exercise testing and to be alerted to any underlying conditions and medications. Ensure that proper testing procedures and conditions exist. Maintain stringent monitoring of the patient's response to exercise and a "rating of perceived exertion" along with other exercise testing results, which are essential to test validity and patient safety.[115]

## STEP 13

**Initiate other appropriate interventions as indicated.** Other interventions by the interprofessional team may be helpful. For example, social services intervention is indicated if an advance directive needs to be drawn up or if a patient's family may benefit from counseling. Assessment and treatment of comorbid conditions, such as depression, may improve outcomes related to CHF. Dietary counseling is critical to assess the need for or extent of dietary salt restriction. A rehabilitation consultation may be indicated to develop an individualized restorative exercise program. Education can be provided to patients, families, and nursing staff about the dietary needs of patients with heart failure, the side effects of medications used to treat heart failure, symptoms that should be reported, and safety issues and environmental modifications.

## STEP 14

**Determine when the patient has end-stage heart failure.** If a frail patient with heart failure with or without comorbidities is short of breath or has fatigue at rest, has multiple episodes of heart failure exacerbation, or has multiple emergency department visits or hospitalizations despite optimal treatment, she or he may have end stage heart failure. As previously noted, the goals of care for the patient with heart failure should be stated explicitly. If prolonging life or decreasing exacerbations that lead to frequent hospitalizations is a goal of care, the consistent and aggressive application of the interventions outlined in this guideline and elsewhere is appropriate. For patients at or near the end of life, however, it may be appropriate to switch to a mode of care in which maintaining quality of life and relieving symptoms and suffering are the primary goals. In such cases, each intervention for heart failure must be assessed for both the palliation it provides and the intrusiveness and potential discomfort it entails.

Before the patient with heart failure develops advanced disease, he or she should be counseled about end-of-life planning and encouraged to draw up an advance health care directive, if this has not already been done. This helps to ensure that the patient's wishes and care preferences are respected and relieves the family of difficult decisions.

When a patient who has a DNR/AND (Do Not Resuscitate/Allow Natural Death) order is hospitalized, the facility should strive to communicate to hospital staff members the patient's wishes with regard to life-sustaining treatment in the event of a cardiopulmonary arrest. Many states now implement programs such as the Physician Orders for Life-Sustaining Treatment (POLST, POST, MOLST, and others) Paradigm, which includes a signed order that clarifies the patient's wishes concerning end-of-life interventions and that accompanies the patient across care settings. (A list of states with POLST Paradigm programs is available at http://www.polst.org; accessed 09/06/14.) Additionally, ensure that all staff members caring for the patient have ready access to relevant care directives.

Subject to the patient's wishes, ensure that all likely causes of decline have been considered and that all appropriate therapies have been exhausted before concluding that the patient's condition is end-stage. For additional guidance on end-of-life care, see PALTmed's publication (in the LTC Information Series), *Palliative Care in the LTC Setting*.[e]

**Palliative and Hospice Care.** Heart failure is not curable. It is a progressive disease associated with decreased life expectancy. The goal of palliative and hospice care is to maximize patients' quality of life as they approach life's end and to allow optimal time to provide psychological and physical support for the patient and family. Many patients can benefit from palliative interventions well before qualifying for the Medicare hospice benefit. Diuretics may be indicated as a palliative measure to address symptoms associated with fluid volume overload. Continuation of an ACE inhibitor will lower the likelihood of, or worsening of, symptoms of heart failure, thereby lessening dyspnea. Opioids can be used to relieve pain and dyspnea as well. The use of non-steroidal anti-inflammatory drugs to treat pain should be avoided because these may worsen heart failure as the result of fluid retention.[116] Consultations with hospice or palliative care experts may be considered.

When a patient meets the criteria for hospice and the patient, family or legally authorized representative, and interprofessional team decide that end-of-life care is most appropriate, additional interventions aimed at symptom relief and with consideration of psychosocial and spiritual support become paramount. A retrospective analysis based on Medicare claims data found that, among patients with CHF, those who ultimately chose hospice care lived an average of 81 days longer than those who did not.[117] Management of end-of-life symptoms such as apprehension, dry mouth, dyspnea, fatigue, nausea, pain, and restlessness should be the main focus of the patient's care plan. If the patient has a defibrillator in place, a discussion should take place and a joint decision be made about when to turn the device off.

The National Hospice and Palliative Care Organization's (NHPCO) 1996 Guidelines[118] for hospice eligibility for heart failure patients include a) symptoms of recurrent heart failure at rest (NYHA class IV) and b) optimal treatment with ACE inhibitors, diuretics, and vasodilators (contemporary optimal treatment now includes beta-blockers, aldosterone antagonists, and device therapies). The guidelines further state that an ejection fraction of less than 20% is "helpful supplemental objective evidence" but not required. The guidelines assert that each of the following further decreases survival:

- Treatment-resistant ventricular or supraventricular arrhythmias
- History of cardiac arrest in any setting

[e] PALTmed. Palliative Care in the Long-Term Care Setting. LTC Information Tool Kit. Ordering information available at https://paltmed.org/products

- History of unexplained syncope
- Cardiogenic brain embolism
- Concomitant disease

Since the inception of the NHPCO guidelines, several models have been developed to predict both short- and long-term mortality among heart failure patients. Two recent models purport to predict mortality among patients hospitalized with acutely decompensated heart failure.

Fonarow et al,[119] using a model based on admission BUN (greater than 43 mg/dL), creatinine (greater than 2.75 mg/dL), and systolic blood pressure (less than 115 mm Hg), identified in-hospital mortality rates ranging from about 2% (0/3 risk factors) to 20% (3/3 risk factors).

Lee et al,[120] using a model based on admission physiologic variables and comorbidities (almost all from the list of indicators in Fonarow et al[119]), identified 30-day and 1-year mortality rates ranging from less than 1% to less than 10%, respectively, for the lowest-risk patients to more than 50% and more than 75%, respectively, for the highest-risk patients. Whereas both models are applicable to bedside use, neither has been applied prospectively or in independent patient samples, nor do they address heart failure treatments as predictive variables.

More recently, Levy et al[121] developed a 24-variable risk model by using the PRAISE1 (n = 1,125) database and validated it against the preexisting ELITE2, ValHeFT, UW, RENAISSANCE, and IN-CHF (n = 9,942) databases. The model purports to accurately estimate mean 1-, 2-, and 3-year survival and, importantly, dynamically incorporates clinical and laboratory variables, heart failure medications, and device therapies. It awaits independent, prospective evaluation in unselected heart failure patients. A web-based interactive calculator can be accessed at http://www.seattleheartfailuremodel.org (accessed 08/30/14).

The bottom line is that meticulous application of medication and device therapies can and will continue to change heart failure prognosis. Heart failure follows an unpredictable disease trajectory, one that is highly mutable by application of evidence-based therapies, yet still marked by a high incidence of sudden death. The 1996 NHPCO criteria are not accurate predictors of 6-month mortality. Although several models have recently been developed to aid in determining short- and long-term mortality in heart failure patients, these models await independent, prospective validation. At present, accurate prognostication remains problematic in the LTC setting.

## MONITORING

### STEP 15

**Monitor the patient's condition and response to treatment.** Ongoing monitoring of the patient's condition and response to treatment is imperative (Table 22). The facility staff, particularly the nursing assistants, can be crucial in the prompt recognition of any changes in patients' health conditions. The PALTmed *Know-It-All System*[b,c] and other tools listed in Appendix 2 can help to ensure that the frontline and nursing staff are trained for prompt recognition and communication of changes to the clinicians.

[b] PALTmed. Know-It-All Before You Call – Data Collection System. Essential clinical data collection: A guide for nurses on reporting change of condition. Ordering information available at eporting change of condition. Ordering information available at https://paltmed.org/products.

[c] PALTmed. Know-It-All Before You're Called – Diagnosing System. Essential clinical data exchange: A guide for attending practitioners on change of condition. Ordering information available at https://paltmed.org/products.

For heart failure patients, the assessment of fluid volume status by monitoring weights at least once or twice a week (more frequently if the patient's condition is unstable), but at the discretion of the practitioner, is crucial. Weight gain in a known heart failure patient is an important clue that the patient may be going into heart failure. The practitioner should specify the weight change at which he or she should be notified (generally 2 to 5 pounds). The nursing staff should promptly notify the practitioner if the patient exceeds the specified weight change, and nurses should perform an assessment of the patient and convey their findings to the treating clinician.

In patients receiving pharmacologic therapy, monitor electrolytes, BUN, and creatinine (see Appendix 1). Repeat these measurements as frequently as necessary, depending on the patient's condition and the combination of drugs the patient is receiving. Assessment by nursing staff of the patient's general functional status—including both activities of daily living and participation in recreational activities—is another important element of monitoring in the patient with heart failure. The completion of a flow sheet for heart failure patients may help with monitoring patient progression. A flow sheet can also assist staff members in communicating the changes noted to the practitioner weekly (Appendix 4). If a patient is not achieving the explicit goals set by the interprofessional team, document the reasons for this in the patient's medical record. Also document how the patient's care plan will be modified in an effort to reach the stated goals. If it is determined that the current goals cannot be achieved, document the reasons for this and set more realistic goals. Also, if consultation or follow-up with a cardiologist or center specializing in heart failure is indicated, make the referral and document its importance in patient management.

Telemonitoring and other telehealth interventions have been advocated for use in heart failure, although available studies have been limited to home-based applications and have usually been combined with care management and other programmatic approaches to transitions of care. The available data to date have not demonstrated a measureable impact on emergency department use or number of hospital days for patients who are hospitalized, and the cost-effectiveness of such interventions remains unknown.[122,123]

**TABLE 22**
**Components of Monitoring for Heart Failure Patients**

- Close supervision of patient's respiratory patterns, with particular assessment of any orthopnea and dyspnea
- Daily attention to patient's cognitive status
- Daily attention to patient's functional status
- Electrolytes, renal function, and magnesium, as indicated
- Frequent weights (daily during acute exacerbation vs. twice a week or weekly in stable patients)
- Serum medication levels as indicated (e.g., digoxin)
- Serum natriuretic peptide (BNP, NT-ProBNP) levels in select patients
- Signs and symptoms (e.g., bilateral leg or abdominal swelling, rales, angina symptoms, dyspnea, fatigue, change in mental status)
- Vital signs changes, particularly elevated or low blood pressure or pulse changes including bradycardia or tachycardia or oxygen saturation

BNP: B-type natriuretic peptide, NT-ProBNP: N-terminal proBNP.

## STEP 16

**Monitor the facility's management of heart failure**. Systematic monitoring is needed to determine the effectiveness of the PA/LTC facility's management of patients with heart failure. In this regard, the medical director can help with creating a facility interprofessional team that can supervise the care of patients with heart failure. At a minimum, such a team should include the medical director, a member of the nursing staff, and a certified nursing assistant, but other valuable members could include the facility dietitian, therapy staff, consultant pharmacist, and activities personnel. The medical director can facilitate the regular meetings of this team and implement policies that encourage the use of proactive tools including the PALTmed *Know-It-All System*.[b,c] The medical director may also take the lead in compiling patient and family education handouts and policies for staff education regarding heart failure.

Appendix 5 presents suggested process and outcome indicators for measuring facility performance. Facilities may wish to select the indicators most relevant to their population and staff for inclusion in their quality improvement process. The medical director should be actively involved in this process.

## SUMMARY

Heart failure is a common condition among patients in PA/LTC facilities. Patients with heart failure in this setting are likely to be female, to be aged over 80, and to have multimorbidity that may complicate the recognition and management of heart failure. Managing heart failure in these circumstances requires the interprofessional team to develop a patient-centered plan of care.

The goals of care for patients with heart failure should be stated explicitly. If prolonging life or decreasing exacerbations that lead to frequent hospitalizations is a goal of care, the consistent and aggressive application of the interventions outlined in this guideline and elsewhere is appropriate. For patients at or near the end of life, however, interventions for heart failure must be assessed for both the palliation they provide and the intrusiveness and potential discomfort they entail. The reasons for performing or not performing a workup, or for undertaking or not undertaking treatment, should always be carefully documented in the patient's medical record.

Heart failure may be classified on the basis of left ventricular function as systolic or diastolic. Systolic heart failure is now referred to as heart failure with reduced LVEF; diastolic heart failure is referred to as heart failure with preserved LVEF.

Echocardiography and radionuclide scanning are recommended imaging tests for measuring LV function in patients with heart failure in whom a workup is deemed to be appropriate. A chest x-ray is not useful for determining type of LV dysfunction.

ACE inhibitors, ARBs, and beta-blockers are the mainstays of therapy for both heart failure with reduced LVEF and heart failure with preserved LVEF. These drug classes have been shown to decrease morbidity and mortality in patients with heart failure. Digoxin may be added to improve symptoms and enhance quality of life in patients with heart failure with reduced LVEF.

Considerable progress has been made during the past two decades in providing symptomatic relief for patients with heart failure. By implementing the processes and practices outlined in this guideline and by keeping up with new recommendations for managing heart failure as they emerge, the interprofessional team can improve the quality of life of patients with heart failure in the PA/LTC setting.

[b] PALTmed. Know-It-All Before You Call – Data Collection System. Essential clinical data collection: A guide for nurse onn reporting change of condition. Ordering information available at https://paltmed.org/products.

[c] PALTmed. Know-It-All Before You're Called – Diagnosing System. Essential clinical data exchange: A guide for attending practitioners on change of condition. Ordering information available at https://paltmed.org/products.

## RECOMMENDATIONS

### Heart Failure in the Post-Acute and Long-Term Care Setting

See Grading System for Recommendations in PALTmed Clinical Practice Guidelines immediately below this table (pp 37-38).

| Recommendation | Quality of Evidence | Strength of Recommendation |
|---|---|---|
| **General** | | |
| 1. Clinicians should avoid prescribing non-steroidal anti-inflammatory drugs (NSAIDs) to patients with heart failure as they may increase blood pressure and promote sodium and water retention | Moderate | High |
| 2. Use of the calcium channel blockers verapamil and diltiazem should be avoided in patients with heart failure. These agents' negative inotropic effects may exacerbate heart failure. | Moderate | High |
| 3. Treatment of anemia in congestive heart failure (CHF)<br>• Use conservative blood-transfusion strategy (threshold transfusion of hemoglobin (Hgb) 7-8 g/dl in stable heart failure)<br>• Do not use erythropoiesis-stimulating agents in patients with mild to moderate anemia and heart failure<br>• Intravenous iron carboxymaltose may be used in patients with stable heart failure | Low<br>Moderate<br>Moderate | Weak<br>Strong<br>Weak |
| 4. All patients with heart failure should receive counseling/education regarding self-care | Moderate | Strong |
| 5. Clinicians should discuss goals of care with patients with heart failure and their families | Low | Strong |
| 6. Patients with heart failure or advanced heart failure should receive palliative and supportive care as part of a comprehensive care plan designed to improve quality of life. Patients with Stage D heart failure should be offered palliative care and hospice enrollment. | Low | Strong |
| 7. All patients with heart failure who smoke should be counseled about smoking cessation | High | Strong |
| 8. Clinicians should individualize decisions about fluid and sodium restriction, balancing patient preferences, quality of life, and the objective benefit of relief of congestive symptoms | Moderate | Weak |
| 9. Cardiac rehabilitation may improve functional capacity and quality of life in patients with heart failure | Moderate | Strong |
| 10. Nutritional supplements should not be used as adjunctive therapy in patients with chronic heart failure | Moderate | Strong |
| 11. Effective systems of care coordination, with special attention to care transitions, should be deployed for every patient with chronic heart failure | Moderate | Strong |
| 12. When reviewing a patient's goals of care, clinicians should discuss deactivating pacemakers and implanted cardioverter defibrillators (ICDs) | Low | Strong |
| 13. Clinicians should identify depression and treat it to remission to improve quality of life in patients with heart failure | Low | Strong |

| Recommendation | Quality of Evidence | Strength of Recommendation |
|---|---|---|
| **Recognition** | | |
| 14. Unexplained weight gain in a patient may indicate new or worsening CHF | Moderate | Strong |
| 15. Unexplained tachycardia or hypoxemia in a patient may indicate new or worsening CHF | Moderate | Strong |
| **Assessment** | | |
| 16. Measurement of brain natriuretic peptides (BNP or NT-proBNP) may be useful to support a clinical diagnosis of heart failure in the setting of clinical uncertainty | High | Strong |
| 17. Measurement of BNP or NT-proBNP levels may be useful to assess disease severity or establish prognosis in chronic heart failure | High | Strong |
| **Treatment/Intervention** | | |
| 18. Loop diuretics should be used to improve symptoms in patients with heart failure and evidence of fluid retention | Low | Strong |
| 19. Angiotensin-converting enzyme (ACE) inhibitors are recommended to reduce mortality in patients with heart failure with reduced left ventricular ejection fraction (LVEF) | High | Weak |
| 20. Angiotensin-receptor blockers (ARB) should be prescribed to patients with heart failure with reduced LVEF who are intolerant of ACE inhibitors | High | Strong |
| 21. Unless containdicated, beta blockers are recommended to reduce morbidity and mortality in patients with heart failure with reduced LVEF | High | Weak |
| 22. Unless contraindicated, aldosterone antagonists are recommended to reduce morbidity and mortality in patients with heart failure and ejection fraction of 35% or less | High | Weak |
| 23. The combination of hydralazine and isosorbide nitrates may decrease mortality or morbidity in African American patients with heart failure with reduced LVEF | High | Weak |
| 24. Unless contraindicated, digoxin may decrease hospitalization for heart failure in patients with heart failure with reduced LVEF | High | Weak |
| **Monitoring** | | |
| 25. For consistency patients with heart failure should be weighed at the same time of day | Low | Weak |
| 26. Serum electrolytes and kidney function should be monitored regularly in patients with heart failure who are receiving diuretics | Low | Strong |
| 27. Nurses and aides should be educated about possible symptoms and signs of heart failure in order to better recognize and monitor patients with heart failure | Low | Strong |

## GRADING SYSTEM FOR RECOMMENDATIONS IN PALTmed CLINICAL PRACTICE GUIDELINES

The system PALTmed has adopted for grading the recommendations in its clinical practice guidelines is modified from the GRADE Working Group system.*

Judgments about the quality of evidence require assessing the validity of results for important outcomes in individual studies. Explicit criteria were used in making these judgments. In the GRADE Working Group, a systematic review of available evidence guides these judgments. Sequential judg-ments are made concerning the following factors:

- The quality of evidence across studies for each important outcome
- Which outcomes are critical to a decision
- The overall quality of evidence across these critical outcomes
- The balance between benefits and harms
- The strength of recommendations

Reviewers consider four key elements: study design, study quality, consistency, and directness.

### Definitions

The **quality of evidence** indicates the extent to which one can be confident that an estimate of effect is correct.

The **strength of a recommendation** indicates the extent to which one can be confident that adherence to the recommendation will do more good than harm.

**Study design** refers to the basic study design (broadly, observational studies and randomized trials).

**Study quality** refers to the detailed study methods and execution. Appropriate criteria are used to assess study quality for each important outcome. For randomized trials, for example, these criteria might include the adequacy of allocation concealment, blinding, and follow up. Reasons for downgrading a quality rating must be explicit (e.g., failure to blind patients and physicians reduced the quality of evidence for an intervention's impact on pain severity, a serious limitation).

**Consistency** refers to the similarity of effect estimates across studies. If there is important unexplained inconsistency in study results, confidence in the effect estimate for that outcome is reduced.

**Directness** refers to the extent to which the people, interventions, and outcome measures in the studies are similar to those of interest. For example, the directness of the evidence may be uncertain if the people of interest are older, sicker, or have more comorbidity than those in the studies. To determine whether important uncertainty exists, one can ask whether there is a compelling reason to expect important differences in the effect size. Because many interventions have more or less the same relative effects across most patient groups, reviewers should not use overly stringent criteria in deciding whether evidence is direct.

### Criteria

PALTmed's Clinical Practice Committee has chosen to use the following criteria for assigning grade of evi-dence due to the lack of high quality randomized controlled trials in post-acute and/or long-term care:

#### *Quality of Evidence*

**High:** At least 1 randomized controlled trial (RCT) ***OR*** 3 pre/post interventions or other prospective interventions or 3 well-structured, relevant observational studies.

**Moderate:** Studies that use well-tested methods to make comparisons in a fair way, but where the results leave room for uncertainty (e.g., because of the size of the study, losses to follow-up, or the method used for selecting groups for comparison).
**Low:** Studies in which the results are doubtful because the study design does not guarantee that fair comparisons can be made.

*Strength of Recommendation*

**Strong:** Benefits clearly outweigh risks.
**Weak:** Benefits are balanced with risks.
**Insufficient:** Evidence is inadequate to make a recommendation.

Criteria for *decreasing* the grade of a recommendation:

- Serious (- 1) or very serious (- 2) limitation to study quality
- Important inconsistency (- 1)
- Some (- 1) or major (- 2) uncertainty about directness
- Imprecise or sparse data (- 1)
- High probability of reporting bias (- 1)

Criteria for *increasing* the grade of a recommendation:

- Strong evidence of association: Significant relative risk greater than 2 (less than 0.5), based on consistent evidence from two or more observational studies, with no plausible confounders (+1)
- Very strong evidence of association: Significant relative risk greater than 5 (less than 0.2), based on direct evidence with no major threats to validity (+2)
- Evidence of a dose-response gradient (+1)
- All plausible confounders would have reduced the effect (+1)

These criteria are cumulative – e.g., if RCTs have serious limitations ***and*** there is uncertainty about the directness of the evidence, the grade of evidence would drop from high to low.

* Atkins D, Best D, Briss PA, et al; GRADE Working Group. Grading quality of evidence and strength of recommendations. BMJ 2004;328:1490

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## APPENDIX 1
### Laboratory Testing for Heart Failure

- Initial testing – CBC, urinalysis, electrolytes, BUN, creatinine, transaminases
- Natriuretic peptides – BNP and NT-proBNP
  - High sensitivity and specificity for differentiating between cardiac and noncardiac causes
    - Useful to rule out CHF owing to high negative predictive value (greater than 98%)
  - Concentrations expected to exceed diagnostic cutoff in 90% of patients with CHF
  - Best documented use is emergency testing in patients presenting with acute dyspnea and a clinical scenario suggesting CHF
    - BNP less than 100 pg/mL or NT-proBNP less than 300 pg/mL – heart failure unlikely
      - Cutoff of 100 pg/mL provides maximal combination of sensitivity, specificity, and negative predictive value for contributing to diagnosis of CHF
    - BNP 100–400 pg/mL or NT-proBNP 300–450 pg/mL (less than 50 years) or 300–900 pg/mL (50–75 years) – heart failure possible
    - BNP greater than 400 pg/mL or NT-proBNP greater than 450 pg/mL (less than 50 years), greater than 900 pg/mL (50–75 years), greater than 1,800 pg/mL (75 years or older) – heart failure likely
  - Single cutpoint strategy BNP less than 100 pg/mL or NT-proBNP less than 900 pg/mL – some suggest heart failure unlikely
  - Performs slightly better in men than in women and in younger (less than 70 years) than in older patients; may not be as useful in patients aged more than75 years
  - Clinical sensitivity and specificity of NT-proBNP

| **Clinical Sensitivity and Specificity of NT-proBNP** | | | | | |
|---|---|---|---|---|---|
| Age (years) | less than 45 | 45–54 | 55–64 | 65–74 | 75 or older |
| Diagnostic cutoff (pg/mL) | less than 125 | less than 125 | less than 125 | less than 125 | less than 450 |
| Males, clinical sensitivity (%) | 82 | 88 | 90 | 92 | 87 |
| Males, clinical specificity (%) | 96 | 93 | 88 | 87 | 89 |
| Females, clinical sensitivity (%) | 87 | 91 | 89 | 94 | 82 |
| Females, clinical specificity (%) | 85 | 86 | 80 | 58 | 88 |

- In renal failure (GFR less than 60 mL/min/1.73 $m^2$) – BNP 200 pg/mL or NT-proBNP 1,200 pg/mL; heart failure likely
- In obesity – BNP 170 pg/mL for BMI less than 25 $kg/m^2$, 110 pg/mL for BMI 25-35 $kg/m^2$, 54 pg/mL for BMI greater than or equal to 35 $kg/m^2$

- Other possible testing
  - TSH and free T4 – rule out hyper- or hypothyroidism
  - Fasting transferrin in patients of northern European descent – rule out hemochromatosis
  - Lipid studies
  - Glycosylated hemoglobin – rule out diabetes mellitus

## Prognosis

- BNP
  - Several recent studies suggest BNP value at discharge may be a reliable indicator of recurrent admission and morbidity
    - less than 300 pg/mL associated with benign course
  - Reduction of natriuretic peptides during therapy associated with improved clinical outcome
  - BNP greater than 125 pg/mL or NT-proBNP greater than 1,000 pg/mL with rising values – predictive of adverse outcome

## Laboratory Testing Summary

Tests generally appear in the order most useful for common clinical situations.

| Test Name | Recommended Use | Limitations |
|---|---|---|
| NT-proBNP | Aid in assessing severity of CHF and prognosis in symptomatic and asymptomatic patients<br><br>ProBNP is generally more sensitive but less specific than BNP | In patients with renal insufficiency, NT-proBNP may accumulate to concentrations that no longer correlate with New York Heart Association functional classifications.<br><br>Do not use as a stand-alone test; assess clinical presentation and other evaluation (e.g., chest x-ray, echocardiogram) |
| BNP | Aid in assessing severity of CHF and prognosis in symptomatic and asymptomatic patients | Blood concentrations of natriuretic peptides may be elevated in patients with myocardial infarction and in patients who are candidates for or are undergoing renal dialysis.<br><br>False-positive results more common in females aged over 75 years.<br><br>Do not use as a stand-alone test; assess clinical presentation and other evaluation (e.g., chest x-ray, echocardiogram) |

## Additional Tests

### CBC with Platelet Count and Automated Differential

| | | Hemoglobin (Hgb) | Hematocrit (Hct) | White Blood Cells (WBC) | Platelets (Plts) |
|---|---|---|---|---|---|
| Geriatric Value | Male | 11.5 gm/dL | 30%–45% | 3,000–9,000 mcL/mm3 | Minimal change |
| | Female | 11.0 gm/dL | 36%–65% | | |
| Normal Adult Value | Male | 13.0 gm/dL | 40%–54% | 4,500–10,000 mcL/mm3 | 150,000–400,000 mcL |
| | Female | 12.0 gm/dL | 36%–46% | | |

### Electrolyte Panel

| | | Cholesterol | High-Density Lipoproteins (HDL) | Triglycerides | Serum Glucose | Calcium | Potassium |
|---|---|---|---|---|---|---|---|
| Geriatric Value | Male | May increase by 30 mg/dL | Increase by 30% between ages 30 and 80 | Increases by 30% | 70–120 mg/dL | No change | Slight increase |
| | Female | May increase by 55 mg/dL | Decreases by 30% between ages 30 and 80 | Increases by 50% | | | |
| Normal Adult Value | Male | Less than 200 mg/dL | Greater than 45 mg/dL | 40–160 mg/dL | 70–110 mg/dL | 4.5–5.5 mEq/L | 3.5–5.3 mEq/L |
| | Female | | Greater than 55 mg/dL | 35–135 mg/dL | | | |

## Hepatic Function Panel

| | BUN | Creatinine | Creatinine Clearance | Serum Alanine Amino-transferase (ALT, SGPT) | Serum Aspartate Amino-transferase (AST, SGOT) | Alkaline Phosphatase (Alk Phos) | Gamma-Gluta-Myltransferase (GGT) |
|---|---|---|---|---|---|---|---|
| **Geriatric Value** | 8–28 mg/dL or slightly higher | 0.6–1.2 mg/dL | Formula | 17–30 U/L | 18–30 U/L | 30–140 U/L | 9–55 U/L |
| **Normal Adult Value** | 5–25 mg/dL | 0.5–1.5 mg/dL | 85–135 mL/min | 10–35 U/L | 8–38 U/L | 20–130 U/L | M 4–23 IU/L |

BMI: body mass index; BNP: B-type natriuretic peptide; BUN: blood urea nitrogen; CBC: complete blood count; CHF: congestive heart failure; GFR: glomerular filtration rate; NT-proBNP: N-terminal proBNP; T4: thyroxine; TSH: thyroid-stimulating hormone.

Source: Adapted from Edwards N, Baird C. Interpreting laboratory values in older adults. Medsurg Nurs 2005; 14: 220-229; quiz 230.

## APPENDIX 2

**Recognizing and Communicating Changes in Patient Condition: Tools For Use by Direct Care Staff**

- **PALTmed**. **Know-It-All System**.
  - Know-It-All Before You Call – Data Collection System. Essential clinical data collection: A guide for nurses on reporting change of condition. (Ordering information available at https://paltmed.org/products/know-it-alltm-you-call-data-collection-system-paltc-assisted-living-setting)
  - Know-It-All When You're Called – Diagnosing System. Essential clinical data exchange: A guide for attending practitioners on change of condition. (Ordering information available at https://paltmed.org/products/know-it-alltm-when-youre-called-diagnosing-system)
- **A New Leaf** Tool (Harrington CC. Assessing heart failure in long-term care facilities. J Gerontol Nurs 2008; 34: 9-14. doi: 10.3928/00989134-20080201-10)
- The **STOP and WATCH** early warning tool from the INTERACT tools (Available at http://interact2.net/docs/Communication Tools/Early_Warning_Tool_(StopWatch)c.pdf.)
- The **SBAR** Tool: Situation, Background, Assessment, Recommendation (Resources and toolkit available from the Institute for Healthcare Improvement at http://www.ihi.org/Topics/SBARCommunicationTechnique/Pages/default.aspx)

## APPENDIX 3

### Physical Activity and Exercise Training Components of a Comprehensive Cardiac Rehabilitation Program

1. Physical Activity Counseling
    a. Evaluation
        i. Assess current physical activity level (e.g., questionnaire, pedometer) and determine domestic, occupational, and recreational needs.
        ii. Evaluate activities relevant to age, gender, and daily life (e.g., driving, sexual activity, sports, gardening, household tasks), readiness to change behavior, self-confidence, barriers to increased physical activity, and social support in making positive changes.
    b. Interventions
        i. Provide advice, support, and counseling about physical activity needs on initial evaluation and in follow-up. Target exercise program to meet individual needs. Provide educational materials as part of counseling efforts. Consider exercise tolerance or simulated work testing for patients with heavy labor jobs.
        ii. Consistently encourage patients to accumulate 30 to 60 minutes per day of moderate-intensity physical activity on 5 or more (preferably most) days of the week. Explore daily schedules to suggest how to incorporate increased activity into usual routine (e.g., parking farther away from entrances, walking 2 or more flights of stairs, walking during lunch break).
        iii. Advise low-impact aerobic activity to minimize risk of musculoskeletal injury. Recommend gradual increases in the volume of physical activity over time.
        iv. Caution patients to avoid performing unaccustomed vigorous physical activity (e.g., racquet sports, manual snow removal). Reassess the patient's ability to perform such activities as exercise training program progresses.
    c. Expected Outcomes
        i. Patient shows increased participation in domestic, occupational, and recreational activities.
        ii. Patient shows improved psychosocial well-being, reduction in stress, facilitation of functional independence, prevention of disability, and enhancement of opportunities for independent self-care to achieve recommended goals.
        iii. Patient shows improved aerobic fitness and body composition and lessens coronary risk factors (particularly for the sedentary patient who has adopted a lifestyle approach to regular physical activity).
2 Exercise Training
    a. Evaluation
        i. Symptom-limited exercise testing prior to participation in an exercise-based cardiac rehabilitation program is strongly recommended. The evaluation may be repeated as changes in clinical condition warrant. Test parameters should include assessment of heart rate and rhythm, signs, symptoms, ST-segment changes, hemodynamics, perceived exertion, and exercise capacity.
        ii. On the basis of patient assessment and the exercise test if performed, stratify the patient's risk to determine the level of supervision and monitoring required during exercise training. Use risk stratification schema as recommended by the AHA and the AACVPR.

b. Interventions
    i. Develop an individualized exercise prescription for aerobic and resistance training that is based on evaluation findings, risk stratification, comorbidities (e.g., peripheral arterial disease, musculoskeletal conditions), and patient and program goals. The exercise regimen should be reviewed by the program medical director or referring physician, modified if necessary, and approved. Exercise prescription should specify frequency (F), intensity (I), duration (D), modalities (M), and progression (P).
        1. For aerobic exercise: F_3–5 days/wk; I_50%–80% of exercise capacity; D_20–60 minutes; and M_walking, treadmill, cycling, rowing, stair climbing, arm/leg ergometry, and others using continuous or interval training as appropriate.
        2. For resistance exercise: F_2–3 days/wk; I_10–15 repetitions per set to moderate fatigue; D_1–3 sets of 8–10 different upper and lower body exercises; and M_calisthenics, elastic bands, cuff/hand weights, dumbbells, free weights, wall pulleys, or weight machines.
    ii. Include warm-up, cool-down, and flexibility exercises in each exercise session.
    iii Provide progressive updates to the exercise prescription and modify further if clinical status changes.
    iv. Supplement the formal exercise regimen with activity guidelines as outlined in the Physical Activity Counseling section of this table.
c. Expected Outcomes
    i. Patient understands safety issues during exercise, including warning signs and symptoms.
    ii. Patient achieves increased cardiorespiratory fitness and enhanced flexibility, muscular endurance, and strength.
    iii. Patient achieves reduced symptoms, attenuated physiologic responses to physical challenges, and improved psychosocial well-being.
    iv. Patient achieves reduced global cardiovascular risk and mortality resulting from an overall program of cardiac rehabilitation/secondary prevention that includes exercise training.

AHA: American Heart Association; AACVPR: American Association of Cardiovascular and Pulmonary Rehabilitation.

Source: Balady GJ, Williams MA, Ades PA, et al. Core components of cardiac rehabilitation/secondary prevention programs: 2007 update: A scientific statement from the American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee, the Council on Clinical Cardiology; the Councils on Cardiovascular Nursing, Epidemiology and Prevention, and Nutrition, Physical Activity, and Metabolism; and the American Association of Cardiovascular and Pulmonary Rehabilitation. Circulation 2007; 115: 2675-2682. doi: CIRCULATIONAHA.106.180945 [pii] 10.1161/CIRCULATIONAHA.106.180945

## APPENDIX 4
### Heart Failure Flow Sheet

Patient Name: _____

Baseline Weight: _____

Baseline BUN/Creatinine: _____

| Date | SOB | Cough | Weight | BP | Pulse | Leg edema | Lung exam Rales/ wheezing | BUN/ Creatinine | K+ | Diuretic/ dose |
|---|---|---|---|---|---|---|---|---|---|---|
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Prepared by Hosam Kamel, MD, MPH, CMD.

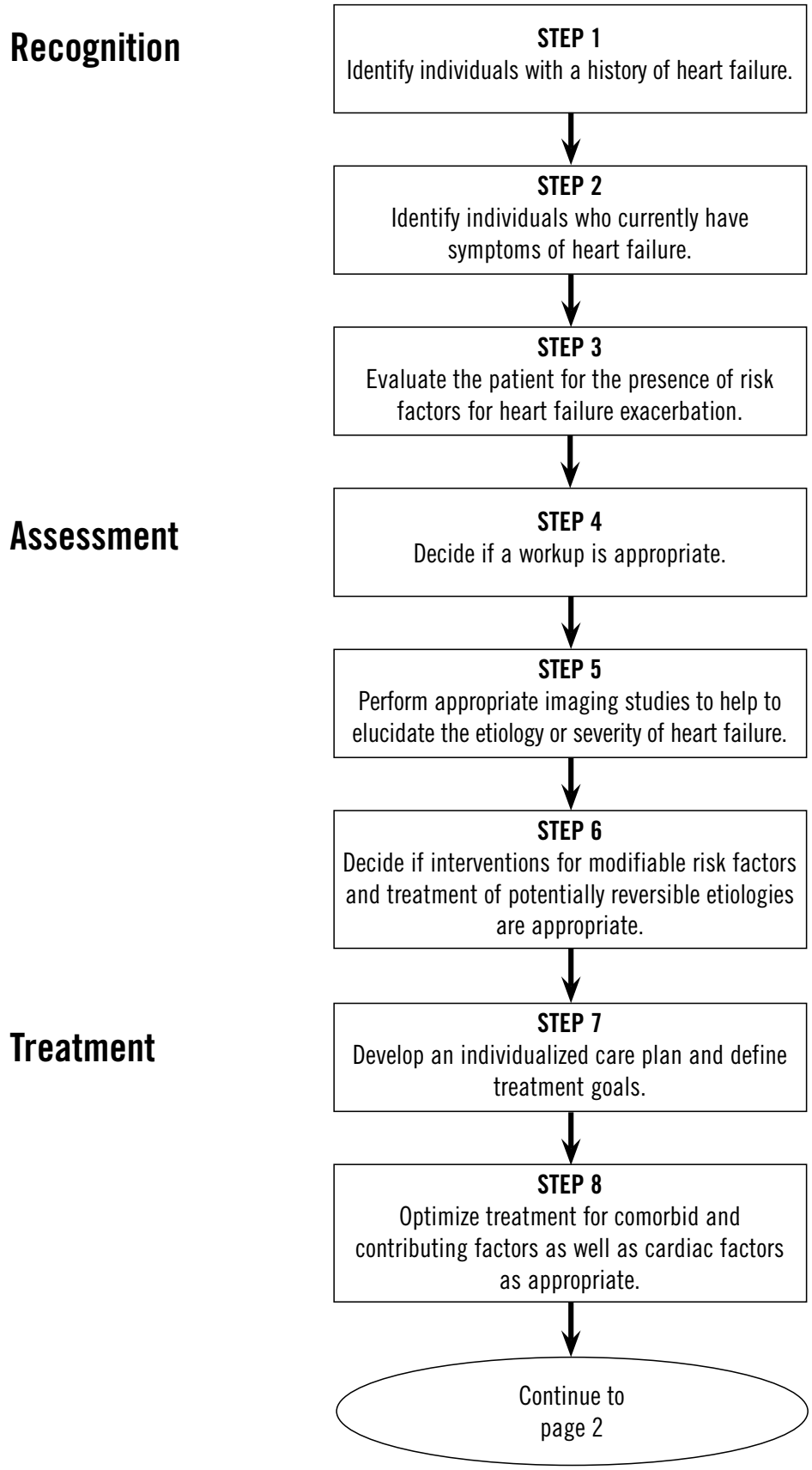
## APPENDIX 5
### Sample Performance Measures and Quality Indicators

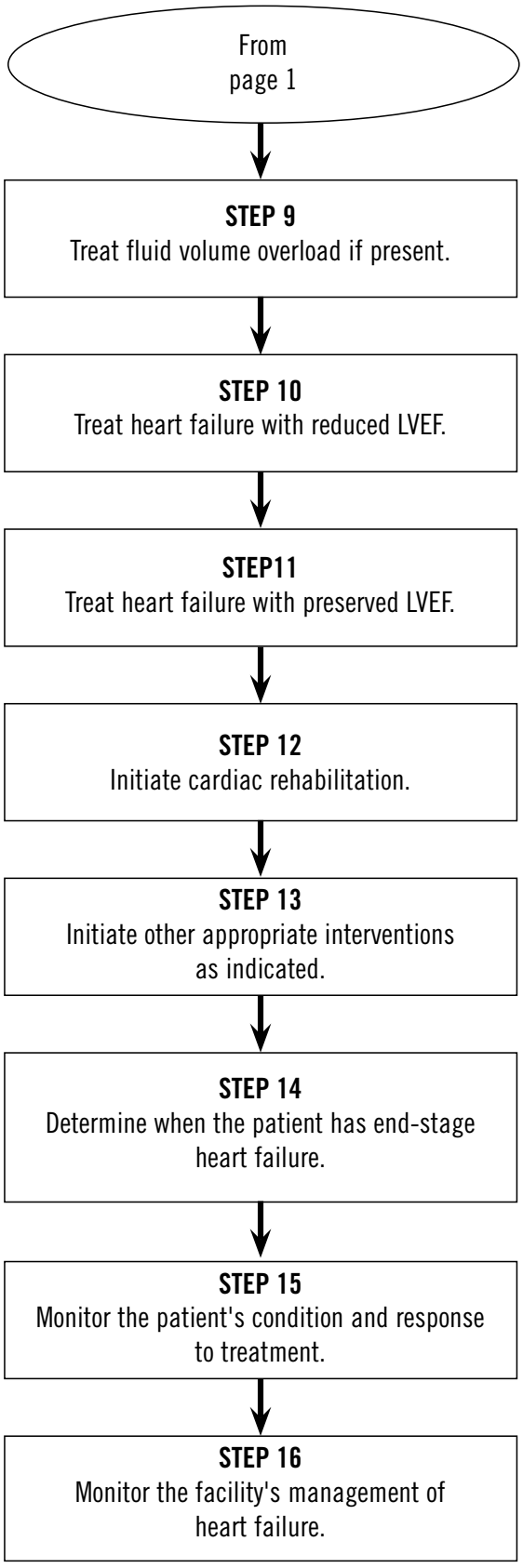
#### Process Measures
- Percentage of patients for whom the history and physical examination includes an evaluation for signs and symptoms of, and risk factors for, heart failure
- Percentage of heart failure patients with documentation in the medical record that left ventricular systolic function has been evaluated
- Percentage of patients for whom medications were reviewed and agents that can cause or exacerbate heart failure identified
- Percentage of patients with a diagnosis of heart failure with a left ventricular ejection fraction less than 40% who were prescribed an ACE inhibitor or ARB therapy, OR a medical, patient, or system reason is documented for not prescribing an ACE inhibitor or ARB
- Percentage of patients with a diagnosis of heart failure with a left ventricular ejection fraction less than 40% who were prescribed beta-blocker therapy, OR a medical, patient, or system reason is documented for not prescribing beta-blocker therapy
- Percentage of patients for whom the patient's weight was checked appropriately to monitor heart failure.
- Percentage of patients for whom pertinent laboratory tests are monitored appropriately (e.g., renal function, electrolytes)

#### Outcome Measures
- Percentage of population with an emergency room transfer and/or hospital admission for heart failure
- Percentage of patients with a 30-day readmission for any cause after a hospitalization with a principal diagnosis of heart failure
- Mortality rate attributable to heart failure

ACE: angiotensin-converting enzyme; ARB: angiotensin II receptor blocker.

This is the heart failure in the post-acute and long-term care setting algorithm to be used in conjunction with the written text of this clinical practice guideline. The numbers next to the different components of the algorithm correspond with the steps in the text.


Recognition
STEP 1
Identify individuals with a history of heart failure.
STEP 2
Identify individuals who currently have symptoms of heart failure.
STEP 3
Evaluate the patient for the presence of risk factors for heart failure exacerbation.
Assessment
STEP 4
Decide if a workup is appropriate.
STEP 5
Perform appropriate imaging studies to help to elucidate the etiology or severity of heart failure.
STEP 6
Decide if interventions for modifiable risk factors and treatment of potentially reversible etiologies are appropriate.
Treatment
STEP 7
Develop an individualized care plan and define treatment goals.
STEP 8
Optimize treatment for comorbid and contributing factors as well as cardiac factors as appropriate.
Continue to page 2


From page 1
STEP 9
Treat fluid volume overload if present.
STEP 10
Treat heart failure with reduced LVEF.
STEP11
Treat heart failure with preserved LVEF.
STEP 12
Initiate cardiac rehabilitation.
STEP 13
Initiate other appropriate interventions as indicated.
STEP 14
Determine when the patient has end-stage heart failure.
STEP 15
Monitor the patient's condition and response to treatment.
STEP 16
Monitor the facility's management of heart failure.

## Monitoring

**Post-Acute and Long-Term Care Medical Association (PALTmed)** developed this guideline with the support and cooperation of the following individuals, organizations and associations:

**Gwendolen Buhr, MD, MHS, MEd, CMD, Clinical Practice Committee Chair**
**Charles Cefalu, MD, MS, Former Clinical Practice Committee Chair**
**Hosam Kamel, MD, CMD, Project Chair and Former Clinical Practice Committee Vice-Chair**

**Organizational Participants:**

American College of Health Care Administrators
American Geriatrics Society
American Health Care Association
American Society of Consultant Pharmacists
Frontline Caregiver
Gerontological Advanced Practice Nurses Association
LeadingAge
National Association of Directors of Nursing Administration in Long Term Care
National Consumer Voice for Quality
The Foundation for Post-Acute and Long-Term Care Medicine



**Post-Acute and Long-Term Care Medical Association (PALTmed)**
9891 Broken Land Parkway
Suite 101
Columbia, MD 21046

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