Overview
Most congestive heart failure (CHF) disease management and drug-disease interaction antiarrhythmic measures address the recommended management of systolic heart dysfunction (depressed left ventricular ejection fraction generally less than 40%) as opposed to diastolic heart dysfunction; other measures can be applied to the entire CHF population. Patients with predominant systolic heart dysfunction have a different natural history and require different treatment strategies than patients with predominant diastolic dysfunction. Systolic and diastolic heart failure cannot be distinguished based on most heart failure diagnosis codes. New ICD-9 codes published in 2003 are specific for diastolic heart failure and can identify this population if used appropriately. Patients are excluded from selected measures, when appropriate, if there is a code for diastolic heart failure within the last 12 months of the report period.

Disease Management

R-1 Patient(s) currently taking an ACE-inhibitor or acceptable alternative.

ACE-inhibitors are recommended for all patients with significant left ventricular systolic dysfunction with or without symptoms unless contraindicated or not tolerated (1). This is a Class I* recommendation from the American College of Cardiology (ACC) and American Heart Association (AHA) 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult (1). Results of the Studies of Left Ventricular Dysfunction (SOLVD) prevention trials showed that ACE-inhibitors significantly reduced the incidence of heart failure, rate of hospitalization, and mortality in patients with systolic dysfunction (2,3). Results in similar trials have been consistent across a broad range of patients (age, sex, etiology, and New York Heart Association class). Patients with lower ejection fractions appear to have the greatest benefit (4-6). Clinicians are encouraged to use doses that have been shown to reduce the risk of cardiovascular events in clinical trials (1).

ACE-inhibitors may be contraindicated or not tolerated by some patients (1,7). ACE-inhibitors should not be prescribed to patients who have experienced life-threatening adverse reactions (angioedema or anuric renal failure) during previous exposure to the drug. ACE-inhibitors are contraindicated during pregnancy and should be prescribed with caution in patients with very low systemic blood pressures (systolic blood pressures less than 80mm Hg), markedly elevated serum creatinine levels (creatinine greater than 3 mg/dL), bilateral renal artery stenosis, or elevated levels of serum potassium (greater than 5.5 mmol/L) (7). Given the limitations of claims data, it is not possible to reliably identify contraindications or previous adverse events. In some of these situations, an acceptable alternative (angiotensin II receptor antagonist or combination hydralazine plus oral or transdermal nitrates) can be used instead of an ACE-inhibitor (1). These are Class IIa* and Class IIb* recommendations from the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult (1). In addition, the African-American Heart Failure Trial demonstrated that the addition of isosorbide dinitrate plus hydralazine as a fixed-dose combination with standard heart failure therapy is efficacious and increases survival in black patients (8).

Patients are excluded from this measure if there is a code for diastolic heart failure within the last 12 months of the report period.

*The ACC/AHA guideline recommendation format for classifying indications and summarizing both the evidence and expert opinions is as follows (1):

Class I: Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective.
Class II: Conditions for which there is conflicting evidence and/or divergence of opinion about the usefulness/efficacy of a procedure or treatment.
Class IIa: The weight of evidence or opinion is in favor of the procedure or treatment.
Class IIb: Usefulness/efficacy is less well established by evidence or opinion.
Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.
Beta-blockers are recommended for patients with stable heart failure due to left ventricular dysfunction unless contraindicated or not tolerated (1). This is a Class I* recommendation from the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult (1). Like ACE-inhibitors, beta-blockers can reduce the risk of death and the combined risk of death or hospitalization (1-6).

Beta-blockers may be contraindicated or not tolerated by some patients (1). Patients should not take a beta-blocker if they have symptomatic bradycardia or advanced heart block (unless treated with a pacemaker). Beta-blockers may be contraindicated for some patients with reactive airway disease (1). Given the limitations of claims data, it is not possible to reliably identify contraindications or previous adverse events.

Patients are excluded from this measure if there is a code for diastolic heart failure within the last 12 months of the report period.
Beta-blockers are recommended for patients with stable heart failure due to left ventricular dysfunction unless contraindicated or not tolerated (1). This is a Class I* recommendation from the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult (1). Beta-blockers that have been proven in clinical trials to reduce mortality are specifically recommended. These beta-blockers include bisoprolol, carvedilol, and sustained release metoprolol succinate (1-5). Based on this recommendation from the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult and the consensus opinion of experts, an individual was defined as adherent to this measure if they received any of the following medications during the last 120 days of the report period through 90 days after the end of the report period: bisoprolol, carvedilol, sustained release metoprolol succinate, or metoprolol tartrate.

Beta-blockers may be contraindicated or not tolerated by some patients (1). Patients should not take a beta-blocker if they have symptomatic bradycardia or advanced heart block (unless treated with a pacemaker). Beta-blockers may be contraindicated for some patients with reactive airway disease (1). Given the limitations of claims data, it is not possible to reliably identify contraindications or previous adverse events.

Patients are excluded from this measure if there is a code for diastolic heart failure within the last 12 months of the report period.


Patient(s) with CHF and atrial fibrillation currently taking warfarin or oral thrombin inhibitors.

Warfarin therapy is recommended for patients with heart failure that have paroxysmal or persistent atrial fibrillation (1). This is a Class I* recommendation from the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult (1).

The selection of an antithrombotic agent must be based on assessment of the absolute risk of stroke from AF and the risk of bleeding as a complication of antithrombotic therapy (2). The list of contraindications includes diseases, identifiable through claims data, which would identify persons at increased risk of a bleeding complication or impaired cognitive function (i.e., dementia); these individuals may not be candidates for warfarin therapy. In addition, warfarin is contraindicated in pregnant women (3). Published lists of contraindications for warfarin along with the consensus opinion of experts were the primary source of our recommended list of contraindications for warfarin use (4). Given the limitation of claims data, it is otherwise difficult to identify patients who may have an increased risk of bleeding as a complication of warfarin therapy.

A new oral direct thrombin inhibitor, dabigatran, has recently been FDA approved for use in nonvalvular atrial fibrillation. Advantages of this medication class include oral dosing, lack of required laboratory monitoring or dose adjustment unless creatinine clearance is < 30. Disadvantages include higher cost, twice daily dosing and lack of reversibility. Use of this medication was reviewed by the EBM expert consultant panel with recommendation for inclusion of dabigatran as an alternative to warfarin in patients with congestive heart failure and atrial fibrillation (5).


### Medication Adherence (Minimum compliance 80%)

- **Patient(s) compliant with prescribed ACE-inhibitor-containing medication.**
- **Patient(s) compliant with prescribed Angiotensin II Receptor Antagonist-containing medication.**
- **Patient(s) compliant with prescribed Hydralazine-containing medication.**
- **Patient(s) compliant with prescribed Nitrate.**
- **Patient(s) compliant with prescribed beta-blocker-containing medication.**
- **Patient(s) compliant with prescribed selective aldosterone receptor antagonist.**
- **Patient(s) compliant with prescribed digoxin.**

Adherence to a prescribed medication regimen is essential for treatment success. Although no clear threshold of sub-optimal medication adherence is defined for most medications, many studies use a threshold of 80 percent and higher to define adherence. Approximately 75 percent of all claims-based analysis of individuals with chronic diseases uses an 80 percent or higher threshold. In addition, studies have demonstrated improved outcomes (e.g., decreased hospital rates) when using a threshold of 80 percent and higher to define adherence.

Given this information, we use an 80 percent or higher threshold to define medication adherence. This 80 percent threshold is used for all medications, except antiretroviral medications (see HIV/AIDS condition) that use a threshold of 85 percent.

Different approaches have been used to measure adherence. Although adherence cannot be measured directly from claims information, it can be measured indirectly by evaluating prescription filling patterns and computing a possession ratio (PR). Possession ratio is defined as the ratio of days supplied to days elapsed. Days supplied is computed by summing the days supplied field for a series of prescriptions, excluding the days supplied from the last prescription in the series (the last prescription is used only to establish the end date). Days elapsed is computed by subtracting the earliest fill date from the latest fill date and then subtracting any overlapping days of confinement. The PR assumes that the patient is, on average, refilling prescriptions at or close to the time that the previous prescription is exhausted. PR uses prescriptions filled during the last 180 days of the reporting period through 90 days after the end of the reporting period (provided claims incurred after the reporting period are included in the input data set). A minimum of two prescriptions is required to compute PR. The following figure illustrates how PR is computed.


**Patient Safety**

**S-M**

Patient(s) taking ACE-inhibitor, angiotensin II receptor blocker, selective aldosterone receptor antagonist, or digoxin that had serum potassium test in last 12 reported months.

Serum potassium should be monitored routinely in patients with heart failure (1). This is of particular importance for patients taking ACE-inhibitors, angiotensin II receptor antagonists, or selective aldosterone receptor antagonists since these medications can cause hyperkalemia (1,2). In addition, patients taking digoxin should have their serum potassium assessed periodically; the frequency of assessment will depend on the clinical setting (3). The consensus opinion of experts was the primary source of our recommendation for an annual serum potassium at minimum for patients taking ACE-inhibitors, angiotensin II receptor antagonists, selective aldosterone receptor antagonists, or digoxin since the frequency of assessment is dependent on the clinical status of the patient and is not clearly defined in the literature.


**S-M**

Patient(s) taking ACE-inhibitor, angiotensin II receptor blocker, selective aldosterone receptor antagonist, or digoxin that had serum creatinine test in last 12 reported months.

Renal function should be monitored routinely in patients with heart failure (1). This is of particular importance...
for patients taking ACE-inhibitors, angiotensin II receptor antagonists, or selective aldosterone receptor antagonists since these medications can adversely affect renal function (1,2). In addition, patients taking digoxin should have their renal function assessed periodically; the frequency of assessments will depend on the clinical setting (3). The consensus opinion of experts was the primary source of our recommendation for an annual creatinine at minimum for patients taking ACE-inhibitors, angiotensin II receptor antagonists, selective aldosterone receptor antagonists, or digoxin since the frequency of assessment is dependent on the clinical status of the patient and is not clearly defined in the literature.


S-DI 9000014 Patient(s) taking contraindicated Class I antiarrhythmic medication (excludes patients with diastolic heart failure).

Class I antiarrhythmic agents can exert important cardiodepressant and proarrhythmia effects. The use of these agents is contraindicated based on the clinical evidence (1). Class I antiarrhythmics include the following medications: Disopyramide, Procainamide, Quinidine, Lidocaine, Tocainide, Mexiletine, Encainide, Flecaïnide, Moricizine, and Propafenone. This is a Class I* recommendation from the ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult (1).

Patients are excluded from this rule if there is a code for diastolic heart failure within the last 12 months of the report period.


Care Pattern

CP-I 9000016 Patient(s) that had an annual physician visit.

Initial and ongoing assessment of a patient’s ability to perform routine and desired activities of daily living is recommended for patients with CHF; this should include assessment of fluid status (1). The consensus opinion of experts was the primary source of our recommendation for an annual provider visit at minimum since the frequency of assessment is dependent on the clinical status of the patient and is not clearly defined in the literature.


CP-I 9000017 Patient(s) with indications that had cardiology consultation in last 24 reported months.

Primary care physicians with knowledge and experience in heart failure should be able to care for most patients with uncomplicated disease. By contrast, patients who remain symptomatic despite basic medical therapy may benefit from care directed by a consulting physician with special expertise and training in the care of patients with heart failure (1,2). Based on this recommendation, this measure was developed using the EBM Connect consultant panel process. This measure identifies cardiology consultation within 24 months for patients with two
or more CHF hospitalizations or emergency room visits in the past year. Given the limitation of claims data, it is otherwise difficult to identify patients that would benefit from specialty consultation.
