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## HEART FAILURE

Recommendations are categorized in terms of either conditional or imperative statements. While conditional statements clearly define a specific situation, imperative statements are broadly applicable to the target population and do not impose restraints on their application.

Conditional recommendations are presented in an if/then format, such that:

If CONDITION then ACTION(S) because REASON(S)

Fulfillment of the condition triggers one or more guideline-specified actions. In contrast, imperative recommendations include terms such as “require,” “must,” and “should,” and do not contain conditional text that would limit their applicability to specified circumstances.

Resources Available with Each Recommendation

In addition to the recommendation statement and strength rating, you will find on each recommendation page:

- A brief narrative summary of the evidence analyzed to reach the recommendation
- A statement of justification, or reason for the strength of the recommendation
- Detailed information on the evidence supporting the recommendations and background narrative (available in the Supporting Evidence section toward the bottom of each recommendation page)
- A reference list at the end of each recommendation page that includes all the sources used in the evidence analysis for the particular recommendation (each reference is hyperlinked to a summary of the article analyzed in the evidence analysis).

Below, you will find a list of the **Heart Failure (2017)** Recommendations, organized according to the stage of the Nutrition Care Process and by topic. The project started with a review of the 2008 recommendations. Selected recommendations were reviewed. The project started with a review of the 2008 recommendations. Selected recommendations were reviewed. Download the **Summary of Changes 2017** which provides an overview of the recommendation revisions and updates.

Note: This is a PDF of the Evidence Analysis Library (EAL). Links are not active in this document. Please visit the EAL ([www.anddeal.org](http://www.anddeal.org)) to view the supporting documentation.

### HF: Medical Nutrition Therapy (2017)

- **Recommendation(s)**

#### **HF: Medical Nutrition Therapy in Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)**

For adults with heart failure (NYHA Classes I - IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should provide medical nutrition therapy (MNT) to treat heart failure and contributing comorbidities, such as hypertension, disorders of lipid metabolism, diabetes mellitus and obesity. Every patient with heart failure should have a clear, detailed, and evidence-based plan of care that ensures the achievement of guideline determined medical therapy (GDMT) goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. Research reports that medical nutrition therapy resulted in a significant decrease in sodium intake and maintenance of body weight.

**Rating: Strong**  
Imperative

## **HF: Frequency and Duration of Medical Nutrition Therapy in Heart Failure (NYHA Classes I-IV/AHA Stages B and C)**

For adults with heart failure (NYHA Classes I - IV/AHA Stages B and C), the registered dietitian nutritionist (RDN) should provide an initial medical nutrition therapy (MNT) encounter lasting 30-60 minutes, with a follow-up encounter four to six weeks later, and determine if and when additional MNT encounters are needed. Research reports that this frequency and duration of medical nutrition therapy resulted in a significant decrease in sodium intake, as well as maintenance of serum sodium levels and body weight.

**Rating: Fair**  
Conditional

## **HF: Frequency and Duration of Medical Nutrition Therapy in Advanced Heart Failure (NYHA Class IV/AHA Stage D)**

For adults with advanced heart failure (NYHA Class IV/AHA Stage D), the registered dietitian nutritionist (RDN) should provide an initial medical nutrition therapy (MNT) encounter and additional follow-up encounters as often as every two weeks. Research reports that this frequency and duration of medical nutrition therapy resulted in increased exercise tolerance, higher physical component scores on quality of life measures and decreased anxiety, as well as maintenance of body weight.

**Rating: Fair**  
Conditional

### **RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION**

None.

### **CONDITIONS OF APPLICATION**

The recommendation *HF: Frequency and Duration of Medical Nutrition Therapy in Heart Failure (NYHA Classes I-IV/AHA Stages B and C)* applies to patients with heart failure classified as NYHA Classes I-IV/AHA Stages B and C.

The recommendation *HF: Frequency and Duration of Medical Nutrition Therapy in Advanced Heart Failure (NYHA Class IV/AHA Stage D)* applies to patients with advanced heart failure classified as NYHA Class IV/AHA Stage D.

Regarding nutrition practice guidelines for hypertension, the registered dietitian nutritionist (RDN) should refer to the [Academy of Nutrition and Dietetics Hypertension Systematic Review and Guideline](#).

Regarding nutrition practice guidelines for disorders of lipid metabolism, the registered dietitian nutritionist (RDN) should refer to the [Academy of Nutrition and Dietetics Disorders of Lipid Metabolism Evidence-based Nutrition Practice Guidelines](#).

Regarding nutrition practice guidelines for diabetes, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Diabetes Mellitus Types 1 and 2 Systematic Review and Guideline](#).

Regarding nutrition practice guidelines for adult weight management, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Adult Weight Management Evidence-Based Nutrition Practice Guidelines](#).

Regarding nutrition practice guidelines for chronic kidney disease, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Chronic Kidney Disease Systematic Review and Guideline](#).

### **POTENTIAL COSTS ASSOCIATED WITH APPLICATION**

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary; however, MNT sessions are essential for improved outcomes.

### **RECOMMENDATION NARRATIVE**

A total of three studies were included in the evidence analysis supporting the recommendations. Two studies were conducted in patients with heart failure (NYHA Classes I - IV/AHA Stages B and C) (Arcand et al, 2005; Donner Alves et al, 2012) and one study in patients with advanced heart failure (NYHA Class IV/AHA Stage D) (Kugler et al, 2012):

- Two neutral-quality randomized clinical trials (Arcand et al, 2005; Donner Alves et al, 2012)
- One positive-quality non-randomized controlled trial (Kugler et al, 2012)

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

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- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that despite a significant decrease in sodium intake in the dietitian education group (who received two 30-45 minute individualized nutrition-counseling appointments with a registered dietitian, four to six weeks apart) compared to usual care (who received only a self-help educational package), serum sodium levels were maintained within normal range before and after the trial in both groups (Arcand et al, 2005). Research is needed regarding the effect of medical nutrition therapy on renal function labs and clinical labs in patients with heart failure. **Grade III**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures. **Grade V**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that despite the intensive intervention provided in the dietitian education groups (who received two 30-60 minute individualized nutrition-counseling appointments with a registered dietitian, four to six weeks apart) compared to usual care (who received only a self-help educational package or an initial meeting with the nutritionist to undergo anthropometric evaluation, quality of life and nutritional knowledge questionnaires, and 24-hour dietary recall), there were no significant differences in quality of life or body weight (Arcand et al, 2005; Donner et al, 2012). Research is needed regarding the effect of medical nutrition therapy on quality of life, signs and symptoms. **Grade III**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported that subjects in the multidisciplinary intervention group (who received four individualized educational sessions from a registered dietitian nutritionist, as well as individualized dietary counselling interventions depending on the patient's body mass index and family's lifestyle and nutrition, and additional follow-up visits via telephone as often as every 2 weeks) had increased exercise tolerance, higher physical component scores on quality of life measures, and decreased anxiety compared to control subjects, who only received standardized recommendations (to stay on a healthy diet, to target the normal BMI ranges, to improve physical fitness by exercising on a routine basis and to seek psychosocial support if needed). In addition, while intervention subjects maintained their weight, control subjects gained significantly more weight after 18 months (Kugler et al, 2012). **Grade III**

**From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):**

**7.1. Stage A: Recommendations**

Class I

- Hypertension and lipid disorders should be controlled in accordance with contemporary guidelines to lower the risk of HF. **(Level of Evidence: A)**
- Other conditions that may lead to or contribute to HF, such as obesity, diabetes mellitus, tobacco use, and known cardiotoxic agents, should be controlled or avoided. **(Level of Evidence: C)**

**11.1. Coordinating Care for Patients With Chronic HF: Recommendations**

Class I

- Effective systems of care coordination with special attention to care transitions should be deployed for every patient with chronic HF that facilitate and ensure effective care that is designed to achieve GDMT and prevent hospitalization. **(Level of Evidence: B)**
- Every patient with HF should have a clear, detailed, and evidence-based plan of care that ensures the achievement of GDMT goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient's healthcare team. **(Level of Evidence: C)**
- Palliative and supportive care is effective for patients with symptomatic advanced HF to improve quality of life. **(Level of Evidence: B)**

## **RECOMMENDATION STRENGTH RATIONALE**

- Conclusion Statements in support of these recommendations were given Grades III and V
- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A, B and C

## **MINORITY OPINIONS**

Consensus reached.

## **Supporting Evidence**

*The recommendations were created from the evidence analysis on the following questions. To see detail of the evidence analysis, click the blue hyperlinks below (recommendations rated consensus will not have supporting evidence linked).*

[In patients with heart failure \(NYHA Classes I–IV/AHA Stages B and C\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs?](#)

[In patients with heart failure \(NYHA Classes I–IV/AHA Stages B and C\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures \(re-admissions rate, length of stay, mortality\)?](#)

[In patients with heart failure \(NYHA Classes I–IV/AHA Stages B and C\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality of life, signs and symptoms?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality of life, signs and symptoms?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures \(re-admissions rate, length of stay, mortality\)?](#)

## **REFERENCES**

[Arcand JL, Brazel S, Joliffe C, et al. Education by a dietitian in patients with heart failure results in improved adherence with a sodium-restricted diet: A randomized trial. \*Am Heart J.\* 2005; 150: 716e1-716e5.](#)

[Kugler C, Malehsa D, Schrader E, Tegtbur U, Guetzlaff E, Haverich A, Strueber M. A multi-modal intervention in management of left ventricular assist device outpatients: dietary counselling, controlled exercise and psychosocial support. \*European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery\* 2012; 42:1026-32](#)

[Donner Alves F, Correa Souza G, Brunetto S, Schweigert Perry I, Biolo A. Nutritional orientation, knowledge and quality of diet in heart failure: randomized clinical trial. \*Nutricio'n hospitalaria\* 2012; 27:441-8](#)

## **REFERENCES NOT GRADED IN ACADEMY OF NUTRITION AND DIETETICS EVIDENCE ANALYSIS PROCESS**

Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2013;128:e240–e327.

## HF: Nutrition Assessment (2017)

### HF: Nutrition Assessment in Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)

The registered dietitian nutritionist (RDN) should assess the following in adults with heart failure (NYHA Classes I-IV/AHA Stages B, C and D), to formulate the nutrition care plan:

- *New York Heart Association (NYHA) functional classification*, which describes the severity of symptoms and exercise intolerance as follows:
  - Class I: No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
  - Class II: Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).
  - Class III: Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.
  - Class IV: Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increase
- *Biochemical data, medical tests and medication usage*:
  - Lipid profiles
  - Blood pressure and/or Doppler blood pressure
  - Echocardiogram (left ventricular ejection fraction 40% or less)
  - Complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), blood urea nitrogen, serum creatinine, glucose, fasting lipid profile, liver function tests, thyroid-stimulating hormone, brain natriuretic peptide (BNP) or N-terminal pro-B-type natriuretic peptide (NT-proBNP)
  - Use of medications, prescription and other over-the-counter medications, herbal supplements and complementary or alternative medications.
- *Nutrition-focused physical findings*:
  - Height, weight, body mass index (BMI) and waist circumference
  - Edema, congestion and shortness of breath
  - Cachexia and muscle wasting
  - Hand grip strength testing
- *Client history*:
  - General health and demographic information
  - Social history
  - Cultural preferences
  - Health literacy and numeracy
  - Education and occupation
  - Knowledge, beliefs, attitudes, motivation, readiness to change, self-efficacy and willingness and ability to make behavioral changes
  - Physical activity, including activities of daily living
  - Patient or family nutrition-related medical and health history
  - Other medical or surgical treatments
  - Previous nutrition care services and medical nutrition therapy (MNT) recommendations.
- *Food and nutrition-related history*:
  - Food, beverage and nutrient intake including energy intake, serving sizes, meal-snack patterns, carbohydrate, fiber, types and amounts of fat, protein, micronutrient intake and alcohol intake
  - Allergies and food intolerances
  - Early satiety
  - Altered sense of taste (hypogeusia and/or dysgeusia)
  - Dry mouth (xerostomia)
  - Gastrointestinal distress (nausea, vomiting, diarrhea, malabsorption, bloating, etc)
  - Experience with food, previous and current food and nutrition history, eating environment, access to healthy foods and eating out.

Every patient with heart failure should have a clear, detailed, and evidence-based plan of care that ensures the achievement of guideline determined medical therapy (GDMT) goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease.

**Rating: Strong  
Imperative**

## RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION

None.

## CONDITIONS OF APPLICATION

### Comparison of ACCF/AHA Stages of Heart Failure (HF) and New York Heart Association (NYHA) Functional Classifications

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

## POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary; however, MNT sessions are essential for improved outcomes.

## RECOMMENDATION NARRATIVE

From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):

### 6.1. Clinical Evaluation

#### 6.1.1. History and Physical Examination: Recommendations

Class I

- A thorough history and physical examination should be obtained/performed in patients presenting with HF to identify cardiac and noncardiac disorders or behaviors that might cause or accelerate the development or progression of HF. **(Level of Evidence: C)**
- In patients with idiopathic DCM, a 3-generational family history should be obtained to aid in establishing the diagnosis of familial DCM. **(Level of Evidence: C)**

- Volume status and vital signs should be assessed at each patient encounter. This includes serial assessment of weight, as well as estimates of jugular venous pressure and the presence of peripheral edema or orthopnea. **(Level of Evidence: B)**

#### 6.1.2. Risk Scoring: Recommendation

##### Class IIa

- Validated multivariable risk scores can be useful to estimate subsequent risk of mortality in ambulatory or hospitalized patients with HF. **(Level of Evidence: B)**

### 6.2 Diagnostic Tests: Recommendations

##### Class I

- Initial laboratory evaluation of patients presenting with HF should include complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), blood urea nitrogen, serum creatinine, glucose, fasting lipid profile, liver function tests, and thyroid-stimulating hormone. **(Level of Evidence: C)**
- Serial monitoring, when indicated, should include serum electrolytes and renal function. **(Level of Evidence: C)**
- A 12-lead ECG should be performed initially on all patients presenting with HF. **(Level of Evidence: C)**

##### Class IIa

- Screening for hemochromatosis or HIV is reasonable in selected patients who present with HF. **(Level of Evidence: C)**
- Diagnostic tests for rheumatologic diseases, amyloidosis, or pheochromocytoma are reasonable in patients presenting with HF in whom there is a clinical suspicion of these diseases. **(Level of Evidence: C)**

### 6.3 Biomarkers: Recommendations

#### A. Ambulatory/Outpatient

##### Class I

- In ambulatory patients with dyspnea, measurement of BNP or N-terminal pro-B-type natriuretic peptide (NT-proBNP) is useful to support clinical decision making regarding the diagnosis of HF, especially in the setting of clinical uncertainty. **(Level of Evidence: A)**
- Measurement of BNP or NT-proBNP is useful for establishing prognosis or disease severity in chronic HF. **(Level of Evidence: A)**

##### Class IIa

- BNP- or NT-proBNP-guided HF therapy can be useful to achieve optimal dosing of GDMT in select clinically euvolemic patients followed in a well-structured HF disease management program. **(Level of Evidence: B)**

##### Class IIb

- The usefulness of serial measurement of BNP or NT-proBNP to reduce hospitalization or mortality in patients with HF is not well established. **(Level of Evidence: B)**
- Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with chronic HF. **(Level of Evidence: B)**

#### B. Hospitalized/Acute

##### Class I

- Measurement of BNP or NT-proBNP is useful to support clinical judgment for the diagnosis of acutely decompensated HF, especially in the setting of uncertainty for the diagnosis. **(Level of Evidence: A)**

- Measurement of BNP or NT-proBNP and/or cardiac troponin is useful for establishing prognosis or disease severity in acutely decompensated HF. **(Level of Evidence: A)**

#### Class IIb

- The usefulness of BNP- or NT-proBNP–guided therapy for acutely decompensated HF is not well established. **(Level of Evidence: C)**
- Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with acutely decompensated HF. **(Level of Evidence: A)**

### 6.4. Noninvasive Cardiac Imaging: Recommendations

#### Class I

- Patients with suspected or new-onset HF, or those presenting with acute decompensated HF, should undergo a chest x-ray to assess heart size and pulmonary congestion and to detect alternative cardiac, pulmonary, and other diseases that may cause or contribute to the patient's symptoms. **(Level of Evidence: C)**
- A 2-dimensional echocardiogram with Doppler should be performed during initial evaluation of patients presenting with HF to assess ventricular function, size, wall thickness, wall motion, and valve function. **(Level of Evidence: C)**
- Repeat measurement of EF and measurement of the severity of structural remodeling are useful to provide information in patients with HF who have had a significant change in clinical status; who have experienced or recovered from a clinical event; or who have received treatment, including GDMT, that might have had a significant effect on cardiac function; or who may be candidates for device therapy. **(Level of Evidence: C)**

#### Class IIa

- Noninvasive imaging to detect myocardial ischemia and viability is reasonable in patients presenting with de novo HF, who have known CAD and no angina, unless the patient is not eligible for revascularization of any kind. **(Level of Evidence: C)**
- Viability assessment is reasonable in select situations when planning revascularization in HF patients with CAD. **(Level of Evidence: B)**
- Radionuclide ventriculography or magnetic resonance imaging can be useful to assess LVEF and volume when echocardiography is inadequate. **(Level of Evidence: C)**
- Magnetic resonance imaging is reasonable when assessing myocardial infiltrative processes or scar burden. **(Level of Evidence: B)**

#### Class III: No Benefit

- Routine repeat measurement of LV function assessment in the absence of clinical status change or treatment interventions should not be performed. **(Level of Evidence: B)**

### 6.5. Invasive Evaluation: Recommendations

#### Class I

- Invasive hemodynamic monitoring with a pulmonary artery catheter should be performed to guide therapy in patients who have respiratory distress or clinical evidence of impaired perfusion in whom the adequacy or excess of intracardiac filling pressures cannot be determined from clinical assessment. **(Level of Evidence: C)**

#### Class IIa

- Invasive hemodynamic monitoring can be useful for carefully selected patients with acute HF who have persistent symptoms despite empiric adjustment of standard therapies and:
  - whose fluid status, perfusion, or systemic or pulmonary vascular resistance is uncertain;
  - whose systolic pressure remains low, or is associated with symptoms, despite initial therapy;
  - whose renal function is worsening with therapy;
  - who require parenteral vasoactive agents; or
  - who may need consideration for MCS or transplantation. **(Level of Evidence: C)**



- When ischemia may be contributing to HF, coronary arteriography is reasonable for patients eligible for revascularization. **(Level of Evidence: C)**
- Endomyocardial biopsy can be useful in patients presenting with HF when a specific diagnosis is suspected that would influence therapy. **(Level of Evidence: C)**

#### Class III: No Benefit

- Routine use of invasive hemodynamic monitoring is not recommended in normotensive patients with acute decompensated HF and congestion with symptomatic response to diuretics and vasodilators. **(Level of Evidence: B)**

#### Class III: Harm

- Endomyocardial biopsy should not be performed in the routine evaluation of patients with HF. **(Level of Evidence: C)**

### 11.1. Coordinating Care for Patients With Chronic HF: Recommendations

#### Class I

- Effective systems of care coordination with special attention to care transitions should be deployed for every patient with chronic HF that facilitate and ensure effective care that is designed to achieve GDMT and prevent hospitalization. **(Level of Evidence: B)**
- Every patient with HF should have a clear, detailed, and evidence-based plan of care that ensures the achievement of GDMT goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient's healthcare team. **(Level of Evidence: C)**
- Palliative and supportive care is effective for patients with symptomatic advanced HF to improve quality of life. **(Level of Evidence: B)**

#### RECOMMENDATION STRENGTH RATIONALE

- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A, B and C

#### MINORITY OPINIONS

Consensus reached.

#### Supporting Evidence

*The recommendations were created from the evidence analysis on the following questions. To see detail of the evidence analysis, click the blue hyperlinks below (recommendations rated consensus will not have supporting evidence linked).*

#### REFERENCES NOT GRADED IN ACADEMY OF NUTRITION AND DIETETICS EVIDENCE ANALYSIS PROCESS

Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, Falk V, Gonzalez-Juanatey JR, Harjola VP, Jankowska EA, Jessup M, Linde C, Nihoyannopoulos P, Parissis JT, Pieske B, Riley JP, Rosano GM, Ruilope LM, Ruschitzka F, Rutten FH, van der Meer P, on behalf of the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC), developed with the special contribution of the Heart Failure Association (HFA) of the ESC. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J* 2016; May 20.

Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013;128:e240–e327.

## HF: Assessment of Energy Needs (2017)

- **Recommendation(s)**

### **HF: Measure Resting Metabolic Rate (RMR) in Adults with Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)**

If indirect calorimetry is available, the registered dietitian nutritionist (RDN) should use a measured resting metabolic rate (RMR), which is then multiplied by a physical activity factor to estimate total energy needs in adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D). Measurement of resting metabolic rate using indirect calorimetry is more accurate than estimating resting metabolic rate using predictive equations.

**Rating: Consensus**  
Conditional

### **HF: Estimate Resting Metabolic Rate (RMR) in Adults with Heart Failure (NYHA Classes I - IV/AHA Stages B and C)**

If indirect calorimetry is not available, the registered dietitian nutritionist (RDN) should use 22kcal per kg actual body weight (for normally nourished patients) to 24kcal per kg actual body weight (for malnourished patients) to estimate resting metabolic rate (RMR), which is then multiplied by a physical activity factor to estimate total energy needs in adults with heart failure (NYHA Classes I–IV/AHA Stages B and C). In these patients, measured resting metabolic rate (RMR) ranged from 22kcal per kg actual body weight in normally nourished patients to 24kcal per kg actual body weight in malnourished patients.

**Rating: Fair**  
Conditional

### **HF: Estimate Resting Metabolic Rate (RMR) in Adults with Advanced Heart Failure (NYHA Class IV/AHA Stage D)**

If indirect calorimetry is not available, the registered dietitian nutritionist (RDN) should use 18kcal per kg actual body weight to estimate resting metabolic rate (RMR), which is then multiplied by a physical activity factor to estimate total energy needs in adults with advanced heart failure (NYHA Class IV/AHA Stage D). In these patients, the average measured resting metabolic rate (RMR) using indirect calorimetry was 1, 610kcal per day (17.69kcal per kg actual body weight).

**Rating: Consensus**  
Conditional

### **HF: Estimate Total Energy Needs Using RMR and Activity Factors in Adults with Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)**

The registered dietitian nutritionist (RDN) should multiply the resting metabolic rate (RMR, measured or estimated) by one of the following physical activity factors to estimate total energy needs in adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D):

- *Sedentary*: 1.0 or more to less than 1.4
- *Low active*: 1.4 or more to less than 1.6
- *Active*: 1.6 or more to less than 1.9
- *Very active*: 1.9 or more to less than 2.5.

The Dietary Reference Intakes (DRI) Physical Activity Levels (PAL) represent the ratio of total energy expenditure to basal energy expenditure and are defined as sedentary, low active, active or very active.

**Rating: Consensus**  
Imperative

## **RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION**

Since indirect calorimetry measurements in these recommendations include disease processes related to heart failure, the inclusion of a stress factor is not needed when estimating total energy needs.

## CONDITIONS OF APPLICATION

The application of the recommendations *HF: Measure Resting Metabolic Rate (RMR) in Adults with Heart Failure (NYHA Classes I–IV/AHA Stages B, C and D)*, *HF: Estimate Resting Metabolic Rate (RMR) in Adults with Heart Failure (NYHA Classes I–IV/AHA Stages B and C)*, and *HF: Estimate Resting Metabolic Rate (RMR) in Adults with Advanced Heart Failure (NYHA Class IV/AHA Stage D)* depends on the availability of indirect calorimetry.

### **Dietary Reference Intake (DRI) Physical Activity Levels (PAL)**

- *Sedentary*: Typical daily living activities (e.g., household tasks, walking to the bus)
- *Low active*: Typical daily living activities plus 30 to 60 minutes of daily moderate activity (e.g., walking at five to seven km per hour or three to four miles per hour)
- *Active*: Typical daily living activities plus at least 60 minutes of daily moderate activity
- *Very active*: Typical daily living activities plus at least 60 minutes of daily moderate activity plus an additional 60 minutes of vigorous activity or 120 minutes of moderate activity.

## POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary, however MNT sessions are essential for improved outcomes.

If applicable, costs of equipment and staff time with the use of indirect calorimetry may be additional.

## RECOMMENDATION NARRATIVE

One positive-quality cross-sectional study was included in the evidence analysis supporting the recommendations, conducted in patients with heart failure (NYHA Classes I–IV/AHA Stages B and C) (Aquilani, Opasich et al, 2003). None of the studies were conducted in patients with advanced heart failure (NYHA Class IV/AHA Stage D).

*Heart Failure (NYHA Classes I–IV/AHA Stages B and C)*:

- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), measured resting metabolic rate (RMR) ranged from 22kcal per kg actual body weight in normally nourished patients to 24kcal per kg actual body weight in malnourished patients (Aquilani, Opasich et al, 2003). Research is needed regarding measured resting metabolic rate in patients with heart failure
- **Grade III**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D)*:

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on their measured resting metabolic rate.
- **Grade V**

## RECOMMENDATION STRENGTH RATIONALE

Conclusion statements in support of these recommendations were given Grade III and Grade V.

## MINORITY OPINIONS

Consensus reached.

## **Supporting Evidence**

The recommendations were created from the evidence analysis on the following questions. To see detail of the evidence analysis, click the blue hyperlinks below (recommendations rated consensus will not have supporting evidence linked).

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is their measured resting metabolic rate (RMR)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is their measured resting metabolic rate (RMR)?

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## **HF: Nutrition Intervention (2017)**

### **HF: Energy and Protein Intake (2017)**

#### **Recommendation(s)**

##### **HF: Individualize Energy Intake in Heart Failure (NYHA Classes I–IV/AHA Stages B, C and D)**

For adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should individualize energy intake, meeting total estimated energy needs [resting metabolic rate (RMR, measured or estimated), which is then multiplied by a physical activity factor] for weight maintenance, the prevention of further weight gain or loss, and the prevention of catabolism. Research reports that medical nutrition therapy resulted in maintenance of body weight (one of the goals of medical nutrition therapy for heart failure) along with effective management of comorbid conditions, such as hypertension, disorders of lipid metabolism, diabetes mellitus and obesity.

**Rating: Strong**  
Imperative

##### **HF: Intentional Weight Loss in Obesity and Heart Failure (NYHA Classes I–IV/AHA Stages B and C)**

For adults with heart failure (NYHA Classes I–IV/AHA Stages B and C) who are also obese, once the patient is considered weight-stable and euvoletic (sodium, fluid and medication adherent), the registered dietitian nutritionist (RDN) may or may not consider intentional weight loss. Purposeful weight loss via healthy dietary intervention or physical activity for improving health-related quality of life or managing comorbidities such as diabetes mellitus, hypertension or sleep apnea may be reasonable in obese patients with heart failure.

**Rating: Weak**  
Conditional

## **HF: Individualize Protein Intake in Heart Failure (NYHA Classes I–IV/AHA Stages B, C and D)**

For adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should individualize protein intake, prescribing at least 1.1g protein per kg actual body weight to prevent catabolism. Research reports that in patients with heart failure who are either normally nourished or malnourished, reported protein intakes ranging from 1.1g to 1.4g per kg actual body weight per day resulted in positive nitrogen balance, while protein intakes ranging from 1.0g to 1.1g per kg actual body weight per day resulted in negative nitrogen balance.

**Rating: Fair**  
Imperative

### **RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION**

Sibutramine or ephedra weight loss preparations are contraindicated in heart failure. Use of ephedra weight-loss preparations may contribute to the development of heart failure and should be avoided.

If weight loss is started without evidence of weight stability, the following may occur:

- Worsening of condition
- Hypercatabolic state
- Individualized energy intake may be based on improper weight and therefore underestimate or overestimate needs.

### **CONDITIONS OF APPLICATION**

The recommendation, *HF: Purposeful Weight Loss in Obesity and Heart Failure (NYHA Classes I–IV/AHA Stages B and C)* applies only to patients with heart failure (NYHA Classes I–IV/AHA Stages B and C) who are also obese, and once the patient is considered weight-stable and euvoletic (sodium, fluid and medication adherent).

For weight management in other conditions, the registered dietitian nutritionist (RDN) should coordinate care with an interdisciplinary health care team, especially for patients with the following conditions:

- Advanced heart failure patients (NYHA Class IV/AHA Stage D) awaiting transplantation
- Heart failure patients (NYHA Classes I–IV/AHA Stages B, C and D) who have cardiac cachexia.

Regarding nutrition practice guidelines for adult weight management, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Adult Weight Management Evidence-Based Nutrition Practice Guidelines](#).

Regarding nutrition practice guidelines for chronic kidney disease, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Chronic Kidney Disease Systematic Review and Guideline](#).

### **POTENTIAL COSTS ASSOCIATED WITH APPLICATION**

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary, however MNT sessions are essential for improved outcomes.

### **RECOMMENDATION NARRATIVE**

Two studies were included in the evidence analysis supporting the recommendations, both conducted in patients with heart failure (NYHA Classes I–IV/AHA Stages B and C) (Aquilani, Opasich et al, 2003; Aquilani, Opasich et al, 2008). None of the studies were conducted in patients with advanced heart failure (NYHA Class IV/AHA Stage D).

- One positive-quality randomized controlled trial (Aquilani, Opasich et al, 2008)
- One positive-quality cross-sectional study (Aquilani, Opasich et al, 2003).

*Heart Failure (NYHA Classes I–IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), measured resting metabolic rate (RMR) ranged from 22kcal per kg actual body weight in normally nourished patients to 24kcal per kg actual body weight in malnourished patients (Aquilani, Opasich et al, 2003). Research is needed regarding measured resting metabolic rate in patients with heart failure **(Grade III)**.
- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C) that are either normally nourished or malnourished, reported protein intakes ranging from 1.1g to 1.4g per kg actual body weight per day resulted in positive nitrogen balance (Aquilani, Opasich et al, 2008), while protein intakes ranging from 1.0g to 1.1g per kg actual body weight per day resulted in negative nitrogen balance (Aquilani, Opasich et al, 2003). Research is needed regarding the relationship between protein intake and nitrogen balance in patients with heart failure **(Grade II)**.

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on their measured resting metabolic rate. **(Grade V)**.
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the relationship between protein intake and nitrogen balance. **(Grade V)**.

**From the Evidence Analysis Regarding Medical Nutrition Therapy in Heart Failure:**

A total of three studies were included in the evidence analysis supporting the recommendations. Two studies were conducted in patients with heart failure (NYHA Classes I–IV/AHA Stages B and C; Arcand et al, 2005; Donner Alves et al, 2012) and one study in patients with advanced heart failure (NYHA Class IV/AHA Stage D; Kugler et al, 2012).

- Two neutral-quality randomized clinical trials (Arcand et al, 2005; Donner Alves et al, 2012)
- One positive-quality non-randomized controlled trial (Kugler et al, 2012).

*Heart Failure (NYHA Classes I–IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), research reported that despite a significant decrease in sodium intake in the dietitian education group (who received two 30- to 45-minute individualized nutrition-counseling appointments with a registered dietitian, four to six weeks apart), compared to usual care (who received only a self-help educational package), serum sodium levels were maintained within normal range before and after the trial in both groups (Arcand et al, 2005). Research is needed regarding the effect of medical nutrition therapy on renal function labs and clinical labs in patients with heart failure. **(Grade III)**.
- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures. **(Grade V)**.
- In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), research reported that despite the intensive intervention provided in the dietitian education groups (who received two 30- to 60-minute individualized nutrition-counseling appointments with a registered dietitian, four to six weeks apart), compared to usual care (who received only a self-help educational package or an initial meeting with the nutritionist to undergo anthropometric evaluation, quality of life and nutritional knowledge questionnaires, and 24-hour dietary recall), there were no significant differences in quality of life or body weight (Arcand et al, 2005; Donner et al, 2012). Research is needed regarding the effect of medical nutrition therapy on quality of life, signs and symptoms. **(Grade III)**.

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs. **(Grade V)**.
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures. **(Grade V)**.
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported that subjects in the multi-disciplinary intervention group (who received four individualized educational sessions from a registered dietitian nutritionist, as well as individualized dietary counseling interventions, depending on the patient's body mass index and family's lifestyle and nutrition, and additional follow-up visits via telephone as often as every two weeks) had increased exercise tolerance, higher physical component scores on quality of life measures and decreased anxiety

compared to control subjects, who only received standardized recommendations (to stay on a healthy diet, to target the normal BMI ranges, to improve physical fitness by exercising on a routine basis and to seek psychosocial support if needed). In addition, while intervention subjects maintained their weight, control subjects gained significantly more weight after 18 months (Kugler et al, 2012). **(Grade III)**.

#### **From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):**

##### **7.1. Stage A: Recommendations**

###### *Class I*

- Hypertension and lipid disorders should be controlled in accordance with contemporary guidelines to lower the risk of HF. **(Level of Evidence: A)**.
- Other conditions that may lead to or contribute to HF, such as obesity, diabetes mellitus, tobacco use and known cardiotoxic agents should be controlled or avoided. **(Level of Evidence: C)**.

#### **From the 2016 ACCF/AHA Scientific Statement for Contributory Risk and Management of Comorbidities of Hypertension, Obesity, Diabetes Mellitus, Hyperlipidemia, and Metabolic Syndrome in Chronic Heart Failure:**

##### *Recommendations for the Recognition and Treatment of Obesity in Patients at Risk for or With Established HF*

###### Stages B and C Heart Failure

- Purposeful weight loss via healthy dietary intervention or physical activity for the purposes of improving health-related QOL or managing comorbidities such as diabetes mellitus, hypertension, or sleep apnea may be reasonable in obese patients with HF. **(Class IIb; Level of Evidence C)**.
- Sibutramine or ephedra weight loss preparations are contraindicated in HF. Use of ephedra weight-loss preparations may contribute to the development of HF and should be avoided. **(Class III: Harm; Level of Evidence C)**.

#### **RECOMMENDATION STRENGTH RATIONALE**

- Conclusion statements in support of these recommendations were given Grade II, Grade III and Grade V.
- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A and C.
- The 2016 ACCF/AHA Scientific Statement for Contributory Risk and Management of Comorbidities of Hypertension, Obesity, Diabetes Mellitus, Hyperlipidemia, and Metabolic Syndrome in Chronic Heart Failure received Levels of Evidence C.

#### **MINORITY OPINIONS**

Consensus reached.

#### **Supporting Evidence**

*The recommendations were created from the evidence analysis on the following questions. To see detail of the evidence analysis, click the blue hyperlinks below (recommendations rated consensus will not have supporting evidence linked).*

[In patients with heart failure \(NYHA Classes I–IV/AHA Stages B and C\), what is the relationship between protein intake and nitrogen balance?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the relationship between protein intake and nitrogen balance?](#)

[In patients with heart failure \(NYHA Classes I–IV/AHA Stages B and C\), what is their measured resting metabolic rate \(RMR\)?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is their measured resting metabolic rate \(RMR\)?](#)

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures (re-admissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on renal function labs and clinical labs?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of medical nutrition therapy by a registered dietitian nutritionist on quality measures (re-admissions rate, length of stay, mortality)?

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## HF: Sodium and Fluid Intake (2017)

### HF: Individualize Sodium and Fluid Intake in Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)

For adults with heart failure (NYHA Classes I - IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should individualize sodium and fluid intake, within the ranges of 2000 - 3000 mg sodium per day and 1 - 2 L fluid per day. Research reports that a sodium intake of 2000 - 3000 mg per day and fluid intake of 1 - 2 L per day resulted in improvements in quality measures (readmissions rate, length of stay and mortality rate), renal function and clinical laboratory measures (blood urea nitrogen, creatinine, brain natriuretic peptide and serum sodium), symptom burden (shortness of breath, difficulty breathing when lying flat, swelling of legs or ankles, lack of energy, and lack of appetite) and body weight.

**Rating: Fair**  
Imperative

#### RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION

None.

#### CONDITIONS OF APPLICATION

If the patient is hypovolemic, alterations in diuretics, fluid and sodium intake should be considered before treating for renal insufficiency.

Regarding nutrition practice guidelines for hypertension, the registered dietitian nutritionist (RDN) should refer to the [Academy of Nutrition and Dietetics Hypertension Systematic Review and Guideline](#).

Regarding nutrition practice guidelines for chronic kidney disease, the registered dietitian nutritionist should refer to the [Academy of Nutrition and Dietetics Chronic Kidney Disease Systematic Review and Guideline](#).

Caffeinated and alcoholic beverages should be included in overall daily fluid intake. If a patient currently drinks alcohol, and if not contraindicated, then a maximum of one drink per day for women and up to two drinks per day for men may be tolerated. This level of alcohol consumption has been demonstrated to not be harmful in heart failure patients.

#### POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary; however, MNT sessions are essential for improved outcomes.

#### RECOMMENDATION NARRATIVE

A total of four studies were included in the evidence analysis supporting the recommendations. Three studies were conducted in patients with heart failure (NYHA Classes I - IV/AHA Stages B and C) (Arcand et al, 2011; Paterna et al, 2011; Son et al, 2011) and one study in patients with advanced heart failure (NYHA Class IV/AHA Stage D) (Spaderna et al, 2013):

- One positive-quality randomized controlled trial (Paterna et al, 2011)
- Two positive-quality prospective cohort studies (Arcand et al, 2011; Son et al, 2011)
- One neutral-quality prospective cohort study (Spaderna et al, 2013)

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that among subjects receiving 1 L fluid per day, those consuming 2800 mg sodium per day had significantly reduced BUN, creatinine and BNP levels than those consuming 1800 mg sodium per day. In addition, subjects consuming 2800 mg sodium per day had serum sodium levels that were increased and maintained within normal limits, whereas subjects consuming 1800 mg sodium per day had a gradual reduction in serum sodium to below normal limits (Paterna et al, 2011). Further research is needed regarding the effect of sodium and/or fluid intake on renal function and clinical labs. **Grade III**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that among subjects receiving 1 L fluid per day, those consuming 2800 mg sodium per day had significantly reduced readmissions rate,

length of stay and mortality rate than those consuming 1800 mg sodium per day (Paterna et al, 2011). However, among subjects receiving 2.0- 2.4 L fluid per day, subjects consuming 2800 mg sodium per day or more had significantly higher mortality rates than subjects consuming 1900 mg sodium per day or less, and no patient death was observed in the middle tertile of 2000-2700 mg sodium per day (Arcand et al, 2011). Further research is needed regarding the effect of sodium and/or fluid intake on quality measures. **Grade III**

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that among subjects receiving 1 L fluid per day, those consuming 2800 mg sodium per day had significant and sustained reductions in body weight and improvements in NYHA class compared to those consuming 1800 mg sodium per day (Paterna et al, 2011). In addition, research reported that a sodium intake less than 3000 mg/day resulted in reduced symptom burden (in terms of frequency and severity of shortness of breath, difficulty breathing when lying flat, swelling of legs or ankles, lack of energy, and lack of appetite) when compared to sodium intake levels above 3000 mg/day but fluid intake was not reported (Son et al, 2011). Further research is needed regarding the effect of sodium and/or fluid intake on quality of life, signs and symptoms. **Grade III**

#### *Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported that hyponatremia (<130 mg/dL) was associated with fluid intake >2 L/day (Spaderna et al, 2013). Research is needed regarding the effect of sodium and/or fluid intake on BUN, creatinine and BNP in patients with advanced heart failure. **Grade III**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported an increased risk of death/deterioration associated with frequent consumption of salty foods and/or increased ratio of fluids to cardiac index (Spaderna et al, 2013). Research is needed regarding the effect of sodium and/or fluid intake on readmissions rate and length of stay in patients with advanced heart failure. **Grade III**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported that patients who consumed salty foods more frequently were more likely to be symptomatic, as indicated by NYHA functional class IV (Spaderna et al, 2013). Research is needed regarding the effect of sodium and/or fluid intake on quality of life in patients with advanced heart failure. **Grade III**

#### **From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):**

##### *7. Treatment of Stages A to D*

##### *7.2 Stage B: Recommendations*

##### Class I

- In patients with structural cardiac abnormalities, including LV hypertrophy, in the absence of a history of MI or ACS, blood pressure should be controlled in accordance with clinical practice guidelines for hypertension to prevent symptomatic HF. **(Level of Evidence: A)**

##### *7.3. Stage C*

##### *7.3.1. Nonpharmacological Interventions*

##### *7.3.1.3. Sodium Restriction: Recommendation*

##### Class IIa

- Sodium restriction is reasonable for patients with symptomatic HF to reduce congestive symptoms. **(Level of Evidence: C)**

##### *7.4 Stage D*

##### *7.4.3. Water Restriction: Recommendation*

##### Class IIa

- Fluid restriction (1.5 to 2 L/d) is reasonable in stage D, especially in patients with hyponatremia, to reduce congestive symptoms. **(Level of Evidence: C)**

#### **RECOMMENDATION STRENGTH RATIONALE**

- Conclusion Statements in support of these recommendations were given Grade III
- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A and C

## **MINORITY OPINIONS**

Consensus reached.

## **Supporting Evidence**

*The recommendations were created from the evidence analysis on the following questions. To see detail of the evidence analysis, click the blue hyperlinks below (recommendations rated consensus will not have supporting evidence linked).*

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of sodium or fluid intake on renal function labs and clinical labs?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of sodium or fluid intake on quality measures \(re-admissions rate, length of stay, mortality\)?](#)

[In patients with heart failure \(NYHA Classes I-IV/AHA Stages B and C\), what is the effect of sodium or fluid intake on renal function labs and clinical labs?](#)

[In patients with advanced heart failure \(NYHA Class IV/AHA Stage D\), what is the effect of sodium or fluid intake on quality of life, signs and symptoms?](#)

[In patients with heart failure \(NYHA Classes I-IV/AHA Stages B and C\), what is the effect of sodium or fluid intake on quality measures \(readmissions rate, length of stay, mortality\)?](#)

[In patients with heart failure \(NYHA Classes I-IV/AHA Stages B and C\), what is the effect of sodium or fluid intake on quality of life, signs and symptoms?](#)

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## HF: Physical Activity (2017)

### HF: Encourage Individualized Physical Activity Plan for Adults with Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)

Unless medically contraindicated, the registered dietitian nutritionist (RDN) should encourage an individualized physical activity plan for adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D). Regular physical activity is recommended as safe and effective for patients with heart failure who are able to participate to improve functional status and 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.

**Rating: Strong**  
Conditional

### RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION

Physical activity in some individuals with heart failure may contribute to disability or death; thus, consultation with a physician prior to beginning an exercise program is recommended.

### CONDITIONS OF APPLICATION

The recommendation, *HF: Encourage Individualized Physical Activity Plan for Adults with Heart Failure (NYHA Classes I–IV/AHA Stages B, C and D)*, applies to adults with heart failure unless medically contraindicated.

### POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary, however MNT sessions are essential for improved outcomes.

### RECOMMENDATION NARRATIVE

#### From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):

##### 7.3. Stage C

##### 7.3.1. Non-Pharmacological Interventions

##### 7.3.1.6. Activity, Exercise Prescription, and Cardiac Rehabilitation: Recommendations

##### Class I

- Exercise training (or regular physical activity) is recommended as safe and effective for patients with HF who are able to participate to improve functional status. **(Level of Evidence: A)**

##### Class IIa

- Cardiac rehabilitation can be useful in clinically stable patients with HF to improve functional capacity, exercise duration, HRQOL and mortality. **(Level of Evidence: B)**

## From the 2016 ESC Guideline for the Diagnosis and Treatment of Acute and Chronic Heart Failure:

### 14. Multi-Disciplinary Team Management

- It is recommended that regular aerobic exercise is encouraged in patients with HF to improve functional capacity and symptoms. **(Class I, Level A)**
- It is recommended that regular aerobic exercise is encouraged in stable patients with HFrEF to reduce the risk of HF hospitalization. **(Class I, Level A)**

### RECOMMENDATION STRENGTH RATIONALE

- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A and B
- The 2016 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure received Class I, Level A.

### MINORITY OPINIONS

Consensus reached.

### Supporting Evidence

### REFERENCES NOT GRADED IN ACADEMY OF NUTRITION AND DIETETICS EVIDENCE ANALYSIS PROCESS

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- Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013; 128: e240-e327.

### **HF: Educate on Self-Care (2017)**

#### **HF: Educate on Self-Care for Adults with Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)**

For adults with heart failure (NYHA Classes I - IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should educate on self-care, on topics such as, but not limited to:

- Appropriate eating plan based on stage and class of heart failure, as well as other comorbidities
- Energy and protein intake
- Sodium and fluid intake
- Physical activity
- Self-monitoring of weight and symptoms

Adults with heart failure should receive specific education to facilitate heart failure self-care.

**Rating: Fair**  
**Imperative**

### RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION

None.

### CONDITIONS OF APPLICATION

None.

### POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary; however, MNT sessions are essential for improved outcomes.

### RECOMMENDATION NARRATIVE

From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):

7.3. Stage C

7.3.1. *Nonpharmacological Interventions*

7.3.1.1. *Education: Recommendation*

Class I

- Patients with HF should receive specific education to facilitate HF self-care. **(Level of Evidence: B)**

### RECOMMENDATION STRENGTH RATIONALE

- The 2013 ACCF/AHA Guideline for the Management of Heart Failure received Level of Evidence B

### MINORITY OPINIONS

Consensus reached.

### Supporting Evidence

### REFERENCES NOT GRADED IN ACADEMY OF NUTRITION AND DIETETICS EVIDENCE ANALYSIS PROCESS

Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013;128:e240–e327.

## HF: Coordination of Care (2017)

- **Recommendation(s)**

### HF: Coordination of Care for Adults with Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)

For adults with heart failure (NYHA Classes I - IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should implement medical nutrition therapy (MNT) for heart failure and coordinate care as part of an interdisciplinary health care team. Every patient with heart failure should have a clear, detailed, and evidence-based plan of care that ensures the achievement of guideline determined medical therapy (GDMT) goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient's healthcare team.

**Rating: Fair**  
Imperative

### HF: Consult with Interdisciplinary Health Care Team Regarding Vitamin, Mineral and Herbal Supplementation in Heart Failure (NYHA Classes I - IV/AHA Stages B, C and D)

For adults with heart failure (NYHA Classes I - IV/AHA Stages B, C and D), the registered dietitian nutritionist (RDN) should consult with others on the interdisciplinary health care team regarding vitamin, mineral and herbal supplementation. Due to the many interactions between various supplements and common medications, it is unclear whether certain supplements, such as omega-3 fatty acids, coenzyme Q10, vitamin D, iron and thiamin, are appropriate for patients with heart failure.

**Rating: Weak**  
Imperative

## RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION

None.

## CONDITIONS OF APPLICATION

None.

## POTENTIAL COSTS ASSOCIATED WITH APPLICATION

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary; however, MNT sessions are essential for improved outcomes.

## RECOMMENDATION NARRATIVE

### From the evidence analysis regarding Coenzyme Q10 Supplementation in Heart Failure:

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported no hospital admissions or deaths during the three-month intervention period within or between groups receiving either 150 mg/day of oral Coenzyme Q10 or placebo. However, due to the interactions between Coenzyme Q10 and some common heart-failure medications (warfarin, statins and beta-blockers), it is unclear whether this dose and duration of Coenzyme Q10 would be appropriate for patients with heart failure. Research is needed regarding the effect of Coenzyme Q10 supplementation on quality measures in patients with heart failure. **Grade III**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported mixed results regarding the effect of Coenzyme Q10 supplementation on quality of life, signs and symptoms. One study reported that the group receiving 150 mg/day of oral Coenzyme Q10 had a significant improvement of 0.5 units in NYHA functional class after three months compared to the placebo group, which had no significant change; one study reported that 75% of study subjects reported no change in symptoms. However, due to the interactions between Coenzyme Q10

and some common heart-failure medications (warfarin, statins and beta-blockers), it is unclear whether this dose and duration of Coenzyme Q10 would be appropriate for patients with heart failure. Research is needed regarding the effect of Coenzyme Q10 supplementation on quality of life in patients with heart failure. **Grade III**

- In patients with heart failure (NYHA Classes I-IV/AHA Stages B and C), research reported no significant differences in creatinine levels after three months within or between groups receiving either 150 mg/day of oral Coenzyme Q10 or placebo. Research is needed regarding the effect of Coenzyme Q10 supplementation on BUN, BNP and serum sodium in patients with heart failure. **Grade III**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of Coenzyme Q10 supplementation on quality measures. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), research reported that patients with end-stage heart failure awaiting cardiac transplantation receiving 60 mg U/day of Ultrasome-CoQ10 for three months had improved quality of life and significant decreases in frequency of nocturia, severity of fatigue, severity in dyspnea and NYHA functional classification, compared to those receiving placebo. However, due to the interactions between Coenzyme Q10 and some common heart-failure medications (warfarin, statins and beta-blockers), it is unclear whether this dose and duration of Coenzyme Q10 would be appropriate for patients with advanced heart failure. Further research is needed regarding the effect of Coenzyme Q10 supplementation on quality of life, signs and symptoms. **Grade III**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of Coenzyme Q10 supplementation on renal function labs and clinical labs. **Grade V**

**From the evidence analysis regarding Omega-3 Fatty Acid Supplementation in Heart Failure:**

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that omega-3 fatty acid supplementation had no significant effect on mortality rates, but the effect of 2 g/day for six months to one year showed mixed results on hospitalization rates. However, since omega 3 fatty acid supplementation may increase the effects of blood thinning agents such as warfarin, aspirin, clopidogrel, and vitamin E, it is unclear whether this dose and duration of omega-3 fatty acids would be appropriate for patients with heart failure. Research is needed regarding the effect of omega-3 fatty acid supplementation on length of stay in patients with heart failure. **Grade III**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that the group receiving 2 g/day of omega-3 polyunsaturated fatty acids for one year had a significant decrease in NYHA functional class compared to an increase in the placebo group. However, since omega 3 fatty acid supplementation may increase the effects of blood thinning agents such as warfarin, aspirin, clopidogrel, and vitamin E, it is unclear whether this dose and duration of omega-3 fatty acids would be appropriate for patients with heart failure. Research is needed regarding the effect of omega-3 fatty acid supplementation on quality of life in patients with heart failure. **Grade III**
- In patients with heart failure (NYHA Classes I-IV/AHA Stages B and C), research reported that omega-3 fatty acid supplementation, at the level of 2 g/day for three to six months, resulted in significant decreases in BNP levels. However, since omega 3 fatty acid supplementation may increase the effects of blood thinning agents such as warfarin, aspirin, clopidogrel, and vitamin E, it is unclear whether this dose and duration of omega-3 fatty acids would be appropriate for patients with heart failure. Research is needed regarding the effect of omega-3 fatty acid supplementation on BUN, creatinine and serum sodium in patients with heart failure. **Grade III**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of omega-3 fatty acid supplementation on quality measures. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of omega-3 fatty acid supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of omega-3 fatty acid supplementation on renal function labs and clinical labs. **Grade V**

**From the evidence analysis regarding Vitamin D Supplementation in Heart Failure:**

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*



- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), research reported that among patients randomized to either the intervention group receiving 2,000 IU oral vitamin D3 daily for six weeks or the control group, the two adverse events that occurred during the course of the study (one death and one hospitalization) were not associated with the vitamin D supplementation. However, due to the interactions between vitamin D and some common medications (oral corticosteroids, thyroxin, anti-epileptics, tetracyclines, and quinolones), it is unclear whether this dose and duration of vitamin D would be appropriate for patients with heart failure. Research is needed regarding the effect of vitamin D supplementation on quality measures in patients with heart failure. **Grade III**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of vitamin D supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with heart failure (NYHA Classes I-IV/AHA Stages B and C), research reported no significant differences in N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels after six weeks within or between groups receiving either 2,000 IU oral vitamin D3 daily or no supplementation. Research is needed regarding the effect of vitamin D supplementation on renal function labs and clinical labs in patients with heart failure. **Grade III**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of vitamin D supplementation on quality measures. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of vitamin D supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of vitamin D supplementation on renal function labs and clinical labs. **Grade V**

**From the evidence analysis regarding Iron Supplementation in Heart Failure:**

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of iron supplementation on quality measures. **Grade V**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of iron supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of iron supplementation on renal function labs and clinical labs. **Grade V**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of iron supplementation on quality measures. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of iron supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of iron supplementation on renal function labs and clinical labs. **Grade V**

**From the evidence analysis regarding Thiamin Supplementation in Heart Failure:**

*Heart Failure (NYHA Classes I - IV/AHA Stages B and C):*

- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of thiamin supplementation on quality measures. **Grade V**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of thiamin supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), there were no studies identified that reported on the effect of thiamin supplementation on renal function labs and clinical labs. **Grade V**

*Advanced Heart Failure (NYHA Class IV/AHA Stage D):*

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of thiamin supplementation on quality measures. **Grade V**

- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of thiamin supplementation on quality of life, signs and symptoms. **Grade V**
- In patients with advanced heart failure (NYHA Class IV/AHA Stage D), there were no studies identified that reported on the effect of thiamin supplementation on renal function labs and clinical labs. **Grade V**

#### From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):

##### 7.3. Stage C

##### 7.3.2. Pharmacological Treatment for Stage C HFrEF: Recommendations

##### 7.3.2.8. Other Drug Treatment

##### 7.3.2.8.3. Omega-3 Fatty Acids: Recommendation

###### Class IIa

- Omega-3 polyunsaturated fatty acid (PUFA) supplementation is reasonable to use as adjunctive therapy in patients with NYHA class II–IV symptoms and HFrEF (heart failure reduced ejection fraction) or HFpEF (heart failure preserved ejection fraction), unless contraindicated, to reduce mortality and cardiovascular hospitalizations. **(Level of Evidence: B)**

##### 7.3.2.9. Drugs of Unproven Value or That May Worsen HF: Recommendations

###### Class III: No Benefit

- Nutritional supplements as treatment for HF are not recommended in patients with current or prior symptoms of HFrEF. **(Level of Evidence: B)**
- Hormonal therapies other than to correct deficiencies are not recommended for patients with current or prior symptoms of HFrEF. **(Level of Evidence: C)**

#### 8.9. Inpatient and Transitions of Care: Recommendations

###### Class I

- The use of performance improvement systems and/or evidence-based systems of care is recommended in the hospital and early postdischarge outpatient setting to identify appropriate HF patients for GDMT, provide clinicians with useful reminders to advance GDMT, and assess the clinical response. **(Level of Evidence: B)**
- Throughout the hospitalization as appropriate, before hospital discharge, at the first postdischarge visit, and in subsequent follow-up visits, the following should be addressed **(Level of Evidence: B)**:
  - initiation of GDMT if not previously established and not contraindicated;
  - precipitant causes of HF, barriers to optimal care transitions, and limitations in postdischarge support;
  - assessment of volume status and supine/upright hypotension with adjustment of HF therapy as appropriate;
  - titration and optimization of chronic oral HF therapy;
  - assessment of renal function and electrolytes where appropriate;
  - assessment and management of comorbid conditions;
  - reinforcement of HF education, self-care, emergency plans, and need for adherence;
  - and consideration for palliative care or hospice care in selected patients.
- Multidisciplinary HF disease-management programs are recommended for patients at high risk for hospital readmission, to facilitate the implementation of GDMT, to address different barriers to behavioral change, and to reduce the risk of subsequent rehospitalization for HF. **(Level of Evidence: B)**

###### Class IIa

- Scheduling an early follow-up visit (within 7 to 14 days) and early telephone follow-up (within 3 days) of hospital discharge are reasonable. **(Level of Evidence: B)**
- Use of clinical risk-prediction tools and/or biomarkers to identify patients at higher risk for postdischarge clinical events are reasonable. **(Level of Evidence: B)**

## 11.1. Coordinating Care for Patients With Chronic HF: Recommendations

### Class I

- Effective systems of care coordination with special attention to care transitions should be deployed for every patient with chronic HF that facilitate and ensure effective care that is designed to achieve GDMT and prevent hospitalization. **(Level of Evidence: B)**
- Every patient with HF should have a clear, detailed, and evidence-based plan of care that ensures the achievement of GDMT goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient's healthcare team. **(Level of Evidence: C)**
- Palliative and supportive care is effective for patients with symptomatic advanced HF to improve quality of life. **(Level of Evidence: B)**

### From the 2016 ESC Guideline for the Diagnosis and Treatment of Acute and Chronic Heart Failure:

#### 7. Pharmacological Treatment of Heart Failure with Reduced Ejection Fraction

##### 7.4 Other Treatments With Less Certain Benefits in Symptomatic Patients with Heart Failure with Reduced Ejection Fraction

###### 7.4.2 n-3 Polyunsaturated Fatty Acids

- An N-3 PUFA preparation may be considered in symptomatic HF patients to reduce the risk of cardiovascular hospitalization and cardiovascular death (applies only to preparation studied in cited trial, 850 mg of EPA/DHA). **(No Class or Level provided)**

#### 14. Multidisciplinary Team Management

- It is recommended that patients with HF are enrolled in a multidisciplinary care management programme to reduce the risk of HF hospitalization and mortality. **(Class I, Level A)**

### RECOMMENDATION STRENGTH RATIONALE

- Conclusion Statements in support of these recommendations were given Grades III and V
- The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence B and C
- The 2016 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure received Class I, Level A

### MINORITY OPINIONS

Consensus reached.

### Supporting Evidence

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of iron supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of iron supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of iron supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of iron supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of iron supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of iron supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of thiamin supplementation on quality measures (readmissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of thiamin supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of thiamin supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of thiamin supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of thiamin supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of thiamin supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of vitamin D supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of vitamin D supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of vitamin D supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of vitamin D supplementation on quality measures (readmissions rate, length of stay, mortality)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of vitamin D supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of vitamin D supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of Coenzyme Q10 supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of Coenzyme Q10 supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I–IV/AHA Stages B and C), what is the effect of Coenzyme Q10 supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of Coenzyme Q10 supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of Coenzyme Q10 supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of Coenzyme Q10 supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), what is the effect of omega-3 fatty acid supplementation on renal function labs and clinical labs?

In patients with heart failure (NYHA Classes I to IV/AHA Stages B and C), what is the effect of omega-3 fatty acid supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with heart failure (NYHA Classes I - IV/AHA Stages B and C), what is the effect of omega-3 fatty acid supplementation on quality of life, signs & symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of omega-3 fatty acid supplementation on quality measures (re-admissions rate, length of stay, mortality)?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of omega-3 fatty acid supplementation on quality of life, signs and symptoms?

In patients with advanced heart failure (NYHA Class IV/AHA Stage D), what is the effect of omega-3 fatty acid supplementation on renal function labs and clinical labs?

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## HF: Nutrition Monitoring and Evaluation (2017)

### HF: Monitor and Evaluate Effectiveness of Medical Nutrition Therapy (2017)

#### HF: Monitor and Evaluate Effectiveness of Medical Nutrition Therapy (MNT) in Heart Failure (NYHA Classes I-IV/AHA Stages B, C and D)

The registered dietitian nutritionist (RDN) should monitor and evaluate the following in adults with heart failure (NYHA Classes I–IV/AHA Stages B, C and D), to determine the effectiveness of medical nutrition therapy (MNT):

- *New York Heart Association (NYHA) functional classification*, which describes the severity of symptoms and exercise intolerance as follows:
  - Class I: No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
  - Class II: Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).
  - Class III: Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.
  - Class IV: Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.
- *Biochemical data, medical tests and medication usage:*
  - Lipid profiles
  - Blood pressure or Doppler blood pressure
  - Echocardiogram (left ventricular ejection fraction 40% or less)
  - Complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), blood urea nitrogen, serum creatinine, glucose, fasting lipid profile, liver function tests, thyroid-stimulating hormone, brain natriuretic peptide (BNP) or N-terminal pro-B-type natriuretic peptide (NT-proBNP)
  - Use of medications, prescription and other over-the-counter medications, herbal supplements and complementary or alternative medications.
- *Nutrition-focused physical findings:*
  - Height, weight, body mass index (BMI) and waist circumference
  - Edema, congestion and shortness of breath
  - Cachexia and muscle wasting
  - Hand grip strength testing
- *Client history:*
  - General health and demographic information
  - Social history
  - Cultural preferences
  - Health literacy and numeracy
  - Education and occupation
  - Knowledge, beliefs, attitudes, motivation, readiness to change, self-efficacy, and willingness and ability to make behavioral changes
  - Physical activity, including activities of daily living
  - Patient or family nutrition-related medical and health history
  - Other medical or surgical treatments
  - Previous nutrition care services and medical nutrition therapy (MNT) recommendations.
- *Food and nutrition-related history:*
  - Food, beverage and nutrient intake including energy intake, serving sizes, meal-snack patterns, carbohydrate, fiber, types and amounts of fat, protein, micronutrient intake and alcohol intake
  - Allergies and food intolerances
  - Early satiety
  - Altered sense of taste (hypogeusia or dysgeusia)
  - Dry mouth (xerostomia)
  - Gastrointestinal distress (nausea, vomiting, diarrhea, malabsorption, bloating, etc.)

- Experience with food, previous and current food and nutrition history, eating environment, access to healthy foods and eating out.

Every patient with HF should have a clear, detailed and continually updated evidence-based plan of care that ensures the achievement of guideline determined medical therapy (GDMT) goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease.

**Rating: Strong**  
Imperative

### **RISKS/HARMS OF IMPLEMENTING THIS RECOMMENDATION**

None.

### **CONDITIONS OF APPLICATION**

None.

### **POTENTIAL COSTS ASSOCIATED WITH APPLICATION**

Costs of medical nutrition therapy (MNT) sessions and reimbursement vary, however MNT sessions are essential for improved outcomes.

### **RECOMMENDATION NARRATIVE**

**From the 2013 ACCF/AHA Guideline for the Management of Heart Failure (HF):**

#### **6.1. Clinical Evaluation**

##### *6.1.1. History and Physical Examination: Recommendations*

Class I

- A thorough history and physical examination should be obtained or performed in patients presenting with HF to identify cardiac and non-cardiac disorders or behaviors that might cause or accelerate the development or progression of HF. **(Level of Evidence: C)**
- In patients with idiopathic DCM, a three-generational family history should be obtained to aid in establishing the diagnosis of familial DCM. **(Level of Evidence: C)**
- Volume status and vital signs should be assessed at each patient encounter. This includes serial assessment of weight, as well as estimates of jugular venous pressure and the presence of peripheral edema or orthopnea. **(Level of Evidence: B)**

##### *6.1.2. Risk Scoring: Recommendation*

Class IIa

- Validated multi-variable risk scores can be useful to estimate subsequent risk of mortality in ambulatory or hospitalized patients with HF. **(Level of Evidence: B)**

#### **6.2 Diagnostic Tests: Recommendations**

Class I

- Initial laboratory evaluation of patients presenting with HF should include complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), blood urea nitrogen, serum creatinine, glucose, fasting lipid profile, liver function tests and thyroid-stimulating hormone. **(Level of Evidence: C)**

- Serial monitoring, when indicated, should include serum electrolytes and renal function. **(Level of Evidence: C)**
- A 12-lead ECG should be performed initially on all patients presenting with HF. **(Level of Evidence: C)**

#### Class IIa

- Screening for hemochromatosis or HIV is reasonable in selected patients who present with HF. **(Level of Evidence: C)**
- Diagnostic tests for rheumatologic diseases, amyloidosis or pheochromocytoma are reasonable in patients presenting with HF, in whom there is a clinical suspicion of these diseases. **(Level of Evidence: C)**

### 6.3 Biomarkers: Recommendations

#### A. Ambulatory/Outpatient

##### Class I

- In ambulatory patients with dyspnea, measurement of BNP or N-terminal pro-B-type natriuretic peptide (NT-proBNP) is useful to support clinical decision-making regarding the diagnosis of HF, especially in the setting of clinical uncertainty. **(Level of Evidence: A)**
- Measurement of BNP or NT-proBNP is useful for establishing prognosis or disease severity in chronic HF. **(Level of Evidence: A)**

##### Class IIa

- BNP- or NT-proBNP-guided HF therapy can be useful to achieve optimal dosing of GDMT in select clinically euvolemic patients followed in a well-structured HF disease management program. **(Level of Evidence: B)**

##### Class IIb

- The usefulness of serial measurement of BNP or NT-proBNP to reduce hospitalization or mortality in patients with HF is not well established. **(Level of Evidence: B)**
- Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with chronic HF. **(Level of Evidence: B)**

#### B. Hospitalized/Acute

##### Class I

- Measurement of BNP or NT-proBNP is useful to support clinical judgment for the diagnosis of acutely decompensated HF, especially in the setting of uncertainty for the diagnosis. **(Level of Evidence: A)**
- Measurement of BNP or NT-proBNP or cardiac troponin is useful for establishing prognosis or disease severity in acutely decompensated HF. **(Level of Evidence: A)**

##### Class IIb

- The usefulness of BNP- or NT-proBNP-guided therapy for acutely decompensated HF is not well established. **(Level of Evidence: C)**
- Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with acutely decompensated HF. **(Level of Evidence: A)**

### 6.4. Non-Invasive Cardiac Imaging: Recommendations

##### Class I

- Patients with suspected or new-onset HF or those presenting with acute decompensated HF should undergo a chest X-ray to assess heart size and pulmonary congestion and to detect alternative cardiac, pulmonary and other diseases that may cause or contribute to the patient's symptoms. **(Level of Evidence: C)**



- A two-dimensional echocardiogram with Doppler should be performed during initial evaluation of patients presenting with HF to assess ventricular function, size, wall thickness, wall motion and valve function. **(Level of Evidence: C)**
- Repeat measurement of EF and measurement of the severity of structural remodeling are useful to provide information in patients with HF who have had a significant change in clinical status; who have experienced or recovered from a clinical event; who have received treatment, including GDMT, that might have had a significant effect on cardiac function; or who may be candidates for device therapy. **(Level of Evidence: C)**

#### Class IIa

- Non-invasive imaging to detect myocardial ischemia and viability is reasonable in patients presenting with de novo HF, who have known CAD and no angina, unless the patient is not eligible for re-vascularization of any kind. **(Level of Evidence: C)**
- Viability assessment is reasonable in select situations when planning re-vascularization in HF patients with CAD. **(Level of Evidence: B)**
- Radionuclide ventriculography or magnetic resonance imaging can be useful to assess LVEF and volume when echocardiography is inadequate. **(Level of Evidence: C)**
- Magnetic resonance imaging is reasonable when assessing myocardial infiltrative processes or scar burden. **(Level of Evidence: B)**

#### Class III: No Benefit

- Routine repeat measurement of LV function assessment in the absence of clinical status change or treatment interventions should not be performed. **(Level of Evidence: B)**

### 6.5. Invasive Evaluation: Recommendations

#### Class I

- Invasive hemodynamic monitoring with a pulmonary artery catheter should be performed to guide therapy in patients who have respiratory distress or clinical evidence of impaired perfusion, in whom the adequacy or excess of intra-cardiac filling pressures cannot be determined from clinical assessment. **(Level of Evidence: C)**

#### Class IIa

- Invasive hemodynamic monitoring can be useful for carefully selected patients with acute HF who have persistent symptoms despite empiric adjustment of standard therapies and:
  - Whose fluid status, perfusion, or systemic or pulmonary vascular resistance is uncertain;
  - Whose systolic pressure remains low, or is associated with symptoms, despite initial therapy;
  - Whose renal function is worsening with therapy;
  - Who require parenteral vasoactive agents; or
  - Who may need consideration for MCS or transplantation. **(Level of Evidence: C)**
- When ischemia may be contributing to HF, coronary arteriography is reasonable for patients eligible for re-vascularization. **(Level of Evidence: C)**
- Endomyocardial biopsy can be useful in patients presenting with HF when a specific diagnosis is suspected that would influence therapy. **(Level of Evidence: C)**

#### Class III: No Benefit

- Routine use of invasive hemodynamic monitoring is not recommended in normotensive patients with acute decompensated HF and congestion with symptomatic response to diuretics and vasodilators. **(Level of Evidence: B)**

#### Class III: Harm

- Endomyocardial biopsy should not be performed in the routine evaluation of patients with HF. **(Level of Evidence: C)**

## 11.1. Coordinating Care for Patients With Chronic HF: Recommendations

Class I

- Effective systems of care coordination with special attention to care transitions should be deployed for every patient with chronic HF that facilitate and ensure effective care that is designed to achieve GDMT and prevent hospitalization. **(Level of Evidence: B)**
- Every patient with HF should have a clear, detailed and evidence-based plan of care that ensures the achievement of GDMT goals, effective management of comorbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient's healthcare team. **(Level of Evidence: C)**
- Palliative and supportive care is effective for patients with symptomatic advanced HF to improve quality of life. **(Level of Evidence: B)**

### RECOMMENDATION STRENGTH RATIONALE

The 2013 ACCF/AHA Guidelines for the Management of Heart Failure received Levels of Evidence A, B and C.

### MINORITY OPINIONS

Consensus reached.

### Supporting Evidence

#### REFERENCES NOT GRADED IN ACADEMY OF NUTRITION AND DIETETICS EVIDENCE ANALYSIS PROCESS

Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013; 128: e240–e327.