- Heart Failure

Heart Failure

Heart Failure (HF) Guideline (2008)

Welcome to the **2008 Heart Failure Evidence-Based Nutrition Practice Guideline site**. The guideline information is divided into several sections:

- Executive Summary - major recommendations and ratings by Nutrition Care Process category.
- Introduction - Guideline Overview; Scope, Statement of Intent and Patient Preference, Guideline Methods, Implementation of the Guideline; Benefits and Harms of Implementing the Recommendations
- Major Recommendations - Guideline recommendations with conditional statements and strength rating
- Algorithms - Diagrams showing a flow of treatment for a disease or condition
- Background Inforamtion, Appendices and References - additional information

Use the links on the left to access the guideline material.

Printing Guideline Materials

You can print each page of the guideline by clicking on the print icon in the upper right-hand corner. To print entire sections of a guideline in PDF format, please click below:

- HF: Heart Failure 2008 Guideline Introduction and Executive Summary
- HF: Heart Failure 2008 Major Recommendations
- HF: Heart Faillure 2008 Algorithms

The report will be generated in PDF format. We recommend Adobe Reader 7.0 or greater (available as a free download www.adobe.com).

General Information and Disclaimer
This nutrition practice guideline is meant to serve as a general framework for handling clients with particular health problems. The independent skill and judgment of the health care provider must always dictate treatment decisions.

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HF: Major Recommendations (2008)

Heart Failure Evidence-Based Nutrition Practice Guideline

Below, you will find a list of Heart Failure (HF) Recommendations listed by topic. You can print the guideline in PDF format

Heart Failure (HF) Recommendations

Medical Nutrition Therapy

HF: Medical Nutrition Therapy and Heart Failure

Nutrition Assessment

HF: Protein Needs and Heart Failure

HF: Energy Needs and Heart Failure

Nutrition Intervention

HF: Sodium and Fluid Restriction and Heart Failure

HF: Folate, B_{12} and Heart Failure

HF: Thiamine Supplementation and Heart Failure

HF: Magnesium Supplementation and Heart Failure

HF: Alcohol and Heart Failure

HF: CoEnzyme Q10, L-Arginine, Carnitine and Hawthorn Berry and Heart Failure

The recommendations listed below were originally developed for other ADA Evidence-Based Nutrition Practice Guidelines and are commonly associated with heart failure.

Diabetes (DM) Type 1 and 2 Evidence-Based Nutrition Practice Guideline for Adults

DM: Medical Nutrition Therapy

DM: Intervention Options

DM: Monitor and Evaluate Diabetes

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Recommendations Summary

Heart Failure (HF) Medical Nutrition Therapy and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

  HF: MNT and Heart Failure

  Referral to a registered dietitian for Medical Nutrition Therapy (MNT) is recommended whenever an individual has heart failure. A planned initial visit lasting at least 45 minutes and at least one to three planned follow-up visits (at least 30 minutes each) can lead to improved dietary pattern and quality of life and decreases in edema and fatigue. Along with optimal pharmacological management, MNT may also reduce hospitalizations.

  Rating: Strong
  Imperative

  - Risks/Harms of Implementing This Recommendation

    None

  - Conditions of Application

    None

  - Potential Costs Associated with Application

    At this time MNT for heart failure is not reimbursed by insurance companies.

  - Recommendation Narrative

    - One three-year longitudinal study of RD-delivered MNT for HF patients found that an initial individualized nutrition assessment lasting 45 minutes and two to three follow-up visits lasting 30 minutes each, found significant decreases in sodium and fluid intakes and improved QOL. In addition, MNT reduced hospitalizations.
    - A randomized control trial of RD-delivered MNT for HF patients that received an initial visit (45 minutes) and a follow-up visit (30 minutes) found sodium intake was reduced.
    - A randomized control trial studying the impact of nutrition education by an RD found decreases in sodium and fluid intake.

  - Recommendation Strength Rationale

    - Studies found consistent results.
    - Two studies were RCT.
    - Conclusion statement was a grade II.

  - Minority Opinions

    None.

- 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).

  For optimum management of a patient with heart failure, what is the benefit of individualized medical nutrition therapy provided by a registered dietitian?

  - 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.

    Kuehneman T, Saulsbury D, Splett P, Chapman DB, Demonstrating the impact of nutrition intervention in a heart

failure program. *J Am Diet Assoc.* 2002; 102: 1,790-1,794.

Ramirez EC, Martinez LC, et al. Effects of a Nutritional Intervention on Body Compositiion, Clinical Status, and Quality of Life in Patients with Heart Failure. *Nutrition,* 2004; 20: 890-895.

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Recommendations Summary

Heart Failure (HF) Protein Needs in Heart Failure Patients

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

HF: Protein Needs

In assessing protein needs for patients with heart failure, clinically stable depleted patients should have a daily intake of at least 1.37 g protein/kg and normally nourished patients should have a daily intake 1.12 g protein/kg in order to preserve their actual body composition or limit the effects of hypercatabolism. Research indicates that HF patients have significantly higher protein needs than those without HF, as measured by negative nitrogen balance.

Rating: Fair
Imperative

- Risks/Harms of Implementing This Recommendation

In the decompensated (fluid overload, shortness of breath) patient be cautious of fluid levels, interpretation of albumin and renal insufficiency. If you are basing calories on weight only, excess fluid may overestimate calorie needs. Excess fluid could cause albumin levels to appear lower than actual resulting in an overestimation of protein needs. Diuretic use and fluid restriction may contribute to acute renal insufficiency, therefore limiting protein may not be warranted.

- Conditions of Application

None.

- Potential Costs Associated with Application

None.

- Recommendation Narrative

Two papers were identified that address the protein needs in clinically stable HF patients at all ranges of BMI. Studies were of varying ages and NYHA classifications.

  - One postive quality study (**Aquilani, et. al., 2003**) found while protein intake was equal for HF patients and controls, nitrogen excretion was higher and nitrogen balance was lower in HF patients.
  - One neutral quality study (**Pasini, et. al**., 2004) found a significant negative nitrogen balance in HF patients versus controls.

- Recommendation Strength Rationale
  - Limited number of studies addressed protein levels in HF patients.
  - Conclusion statement is a Grade III.

- Minority Opinions

None.

- 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).

For the clinically stable HF patient, what is the protein level needed to maintain lean body mass in underweight (BMI<19), appropriate body weight (BMI 19-24.9) and overweight (BMI>24.9) individuals?

- References

Aquilani R, Opasich C, Verri M, Boschi F, Febo O, Pasini E, Pastoris O. Is Nutritional Intake Adequate in Chronic Heart Failure Patients? *J Am Coll Cardiol.* 2003, 42 (7): 1,218-1,223.

Pasini E, Opasich C, Pastoris O, Aquilani R. Inadequate Nutritional Intake for Daily Life Activity of Clinically Stable Patients with Chronic Heart Failure, *Am J Cardiol.* 2004, 93 (Suppl): 41A-43A.

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Recommendations Summary

Heart Failure (HF) Energy Needs in Heart Failure Patients

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

HF: Energy Needs in Heart Failure Patients

In assessing energy needs for patients with heart failure, the majority of studies indicate that use of indirect calorimetry best determines energy needs. When indirect calorimetry is not possible consider starting with usual predictive equations and adjusting for increased catabolic state.

Rating: Fair
Imperative

- Risks/Harms of Implementing This Recommendation

  - In the decompensated (fluid overload, shortness of breath) patient be cautious of fluid levels, interpretation of albumin and renal insufficiency. If you are basing calories on weight only, excess fluid may overestimate calorie needs. Excess fluid could cause albumin levels to appear lower than actual resulting in an overestimation of protein needs. Diuretic use and fluid restriction may contribute to acute renal insufficiency, therefore limiting protein may not be warranted.
  - Two studies (Aquilani et al, 2003 and Pasini et al, 2004) suggests that great caution should be paid in prescribing a hypocaloric diet in overweight/obese heart failure patients.

- Conditions of Application

  None

- Potential Costs Associated with Application

  None

- Recommendation Narrative

  Five papers were identified that address the calorie and/or protein needs in clinically stable HF patients at all ranges of BMI. Studies were of varying ages and NYHA classifications.

  - One high-quality study found HF patients had a higher REE and TEE vs controls. In addition, the malnourished HF patients had a higher REE and TEE vs malnourished controls.
  - One neutral-quality study found HF patients had a higher REE vs controls.
  - One high-quality study found that REE and DEE were lower in cachetic vs noncachetic HF patients and controls.
  - One high-quality study found HF patients had a lower DEE vs controls. Predictive equations developed from healthy controls inaccurately measured energy needs (measured DEE) in the HF patients by -10 to 30%.
  - One neutral-quality study found predictive equations underestimated energy needs (measured REE) in the HF patients by 2-11%.

- Recommendation Strength Rationale

- Studies of varying quality found inconsistent results
- Conclusion statement is a Grade III

- Minority Opinions

  None.

- 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).

For the clinically stable HF patient, what is the calorie level needed to maintain lean body mass in underweight (BMI<19), appropriate body weight (BMI 19-24.9) and overweight (BMI>24.9) individuals?

- References

Aquilani R, Opasich C, Verri M, Boschi F, Febo O, Pasini E, Pastoris O. Is Nutritional Intake Adequate in Chronic Heart Failure Patients? *J Am Coll Cardiol.* 2003, 42 (7): 1,218-1,223.

Obisesan TO, Toth MJ, Poehlman ET. Prediction of resting energy needs in older men with heart failure. *Eur J Clin Nutr.* 1997 Oct; 51 (10): 678-681.

Pasini E, Opasich C, Pastoris O, Aquilani R. Inadequate Nutritional Intake for Daily Life Activity of Clinically Stable Patients with Chronic Heart Failure. *Am J Cardiol.* 2004, 93 (Suppl): 41A-43A.

Toth MJ, Gottlieb SS, Fisher ML, Poehlman ET. Daily energy requirements in heart failure patients. *Metabolism.* 1997; 46 (11): 1,294-1,298.

Toth MJ, Gottlieb SS, Goran MI, Fisher ML, Poehlman ET. Daily energy expenditure in free-living heart failure patients. *Am J Physiol.* 1997; 272 (*Endocrinol Metab.* 35): E469-E475.

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Recommendations Summary

Heart Failure (HF) Sodium and Fluid Restriction and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

HF: Fluid Intake

For patients with heart failure, fluid intake should be between 1.4 and 1.9 L (48-64 oz.) per day, depending on clinical symptoms (i.e. edema, fatigue, shortness of breath). Fluid restriction will improve clinical symptoms and quality of life.

Rating: Fair
Imperative

HF: Sodium Intake

For patients with heart failure, sodium intake should be less than 2000 mg (2 g) per day. Sodium restriction will improve clinical symptoms (i.e. edema, fatigue) and quality of life.

Rating: Fair
Imperative

- Risks/Harms of Implementing This Recommendation

  One potential risk of a fluid and sodium restricted diet is elevated BUN and creatinine. If these parameters are elevated, the patient may be hypovolemic and alterations in diuretics, fluid and sodium intake should be considered.

- Conditions of Application

  - Use caution when a patient has an elevated BUN or creatinine
  - Consider a lower range of fluid restriction in NYHA stage IV patients

- Potential Costs Associated with Application

  None

- Recommendation Narrative

  Four studies found that sodium restriction with or without fluid restriction improved at least one of the following: quality of life, NYHA functional class, sleep disturbance, physical activity, edema, BNP and blood pressure.

- Recommendation Strength Rationale

  - Three RCT and one prospective study found consistent results
  - Conclusion statement is a Grade II

- Minority Opinions

None.

- 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).

For the patient with heart failure, is there an optimal level of fluid and/or sodium restriction which will reduce heart failure symptomology and morbidity/mortality in heart failure?

- References

Alvelos, M, Ferreira, A, Bettencourt P, et al. The effect of dietary sodium restriction on neurohumoral activity and renal dopaminergic response in patients with heart failure. *Eur J Heart Failure.* 2004; 6: 593-599.

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.

Damgaard M, Norsk P et al. Hemodynamic and neuroendocrine responses to changes in sodium intake in compensated heart failure, *Am J Physiol Regul Integr Comp Physiol.* 2006, 290: R1294-R1301.

Kuehneman T, Saulsbury D, Splett P, Chapman DB. Demonstrating the impact of nutrition intervention in a heart failure program. *J Am Diet Assoc.* 2002; 102: 1,790-1,794.

Ramirez EC, Martinez LC, et al. Effects of a Nutritional Intervention on Body Compositiion, Clinical Status, and Quality of Life in Patients with Heart Failure. *Nutrition,* 2004; 20: 890-895.

- References not graded in Academy of Nutrition and Dietetics Evidence Analysis Process

1. Task Force for the Diagnosis and Treatment of Chronic Heart Failure, European Society of Cardiology. Guidelines for the diagnosis and treatment of chronic heart failure. *Eur Heart J.* 2001;22:1527-60.

2. American College of Cardiology/American Heart Association. 2005 Guideline Update for the Diagnosis and Management for CHF in the Adult. *Circulation*. 2005;Sept 20:1-28.

3. Heart Failure Society of America 2006 Comprehensive Heart Failure Practice Guideline. *Journal of Cardiac Failure.* 2006; 12.

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Recommendations Summary

Heart Failure (HF) Folate, B12, and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

HF: Folate and heart failure

The practitioner should encourage patients with HF to consume at least the DRI for folate through food and/or a combination of B6, B12, and folate supplementation. Folate supplementation given with other vitamins/minerals has been shown to have beneficial clinical HF outcomes.

Rating: Fair
Imperative

HF: B12 and heart failure

A multi-vitamin/mineral containing B12 or a combination of B6, B12 and folate could be recommended in HF patients. This level of B12 supplementation (200-500 mcg daily), given with other vitamins/minerals, has been shown to have beneficial clinical heart failure outcomes.

Rating: Fair
Imperative

- Risks/Harms of Implementing This Recommendation

CAD patients, not necessarily with heart failure, that have had a recent MI or coronary stenting may have increased risk of restenosis with doses of:

Folic acid: 0.8-1.2 mg per day when given with other vitamins. More research is warranted.

Vitamin B12: 0.06-0.4 mg per day when given with other vitamins. More research is warranted.

- Conditions of Application

  None

- Potential Costs Associated with Application

  None

- Recommendation Narrative

  - Two positive-quality studies (Andresson et. al. 2005 and Witte et. al. 2005) found beneficial effects of folic acid given as part of a multivitamin/mineral or with B12 and B6 on heart failure outcomes.

- Recommendation Strength Rationale

  - Small sample sizes and short duration
  - Two positive quality studies
  - Conclusion statement Grade II

- Minority Opinions

  None.

- 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).

  For the patient with heart failure, does supplementing with folate and/or B12 provide beneficial outcomes?

  - References

    Andersson SE, Edvinsson ML, Edvinsson L. Reduction of Homocysteine in Elderly with Heart Failure Improved Vascular Function and Blood Pressure Control but Did Not Affect Inflammatory Activity. *Basic & Clin Pharm & Toxicol.* 2005; 97: 306-310.

    Witte K, Nikitin NP, et al. The effect of micronutrient supplementation on quality-of-life and left ventricular function in elderly patients with chronic heart failure.*Eur Heart J.* 2005; 26: 2,238-2,244.

    Andersson SE, Edvinsson ML, Edvinsson L. Reduction of Homocysteine in Elderly with Heart Failure Improved Vascular Function and Blood Pressure Control but Did Not Affect Inflammatory Activity. *Basic & Clin Pharm & Toxicol.* 2005; 97: 306-310.

    Witte K, Nikitin NP, et al. The effect of micronutrient supplementation on quality-of-life and left ventricular function in elderly patients with chronic heart failure.*Eur Heart J.* 2005; 26: 2,238-2,244.

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Recommendations Summary

Heart Failure (HF) Thiamine Supplementation and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

  HF: Thiamine Supplementation

  Since diurectic use can lead to thiamine deficiency in patients with heart failure (HF), then the practitioner should evaluate thiamine status. The practitioner should encourage the patient to consume at least the DRI through food and/or supplements. The practitioner should stay alert to future research involving thiamine.

  Rating: Fair
  Conditional

  - Risks/Harms of Implementing This Recommendation

    The two studies reviewed reported none to mild adverse events (nausea and insomnia) in the subjects taking thiamine supplements. Details regarding side-effects can be found in the worksheets and evidence summaries.

Practitioners should use additional resources in conjunction with the evidence analysis documents for information regarding further potential side-effects of thiamine supplementation.

- Conditions of Application
- Potential Costs Associated with Application
- Recommendation Narrative

  - Two randomized controlled trials of subjects with heart failure found taking 200 mg thiamine (IV , IM and/or oral) increased plasma thiamine levels. One study found benefit in clinical symptoms.

- Recommendation Strength Rationale

  - Both studies were randomized controlled trials
  - Studies were of small sample sizes
  - Although both studies were of heart failure patients, one study was of elderly subjects (76-95 yr old)
  - Conclusion statement was a grade III

- Minority Opinions

  None.

- 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).

For the patient with heart failure,does supplementing with thiamine provide beneficial outcomes?

- References

  Pfitzenmeyer et al, *Internat J Vit Nutr Res.* 1994 64: 113-118.

  Shimon et al, Improved left ventricular function after thiamine supplementation in patients with congestive heart failure receiving long-term furosemide therapy. *Am J Med.* 1995 May; 98 (5): 485-490.

- References not graded in Academy of Nutrition and Dietetics Evidence Analysis Process

  Hunt SA, Abraham WT et. al. ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult: summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing Committee to Update the 2001 Guidelines for the Evaluation and Management of Heart Failure). *Circulation*. 2005; 112.

  Natural Medicines Comprehensive Database. http://naturaldatabase.com/(utnmbd455fcmuuiuzbmvtz55)/home.aspx?li=0&st=0&cs=&s=nd

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Recommendations Summary

Heart Failure (HF) Magnesium Supplementation and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

  HF: Magnesium Supplementation

  The practitioner should encourage patients with heart failure (HF) to consume at least the DRI for magnesium through food and/or supplements. Low levels of magnesium may be present in patients with heart failure and irregular heart rhythms may occur. The practitioner should stay alert to future research involving magnesium.

  Rating: Fair
  Conditional

  - Risks/Harms of Implementing This Recommendation

    The two studies reviewed reported none to mild adverse events (transient flushing, burning at the intravenous site, transient paresthesia) during the magnesium supplementation. Details regarding side-effects can be found in the worksheets and evidence summaries.

    Practitioners should use additional resources in conjunction with the evidence analysis documents for information regarding further potential side-effects of magnesium supplementation.

- Conditions of Application
- Potential Costs Associated with Application
- Recommendation Narrative

  - Two high-quality studies of heart failure patients found beneficial affects of IV magnesium supplementation on heart failure outcomes.

- Recommendation Strength Rationale

  - Studies were high-quality
  - Studies had consistent findings
  - Studies were of small sample sizes
  - Conclusion statement was a grade II

- Minority Opinions

  None.

- 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).

  For the patient with heart failure, does correcting magnesium deficiencies provide beneficial outcomes?

  - References

    Ceremuzynski L, Gebalska J, Wolk R, Makowska E. Hypomagnesemia in heart failure with ventricular arrhythmias. Beneficial effects of magnesium supplementation. *Journal of Internal Medicine,* 2000; 247: 78-86.

    Sueta CA, Clarke SW, Dunlap SO, Jensen L, Blauwet MB, Koch G, Patterson JH, Adams KF. Effect of acute magnesium administration on the frequency of ventricular arrhythmias in patients with heart failure. *Circulation,* 1994; 89: 660-666.

  - References not graded in Academy of Nutrition and Dietetics Evidence Analysis Process

    Davey MJ, et. al. A Randomized Controlled Trial of Magnesium Sulfate, in Addition to Usual Care, for Rate Control in Atrial Fibrillation. Ann Emerg Med. 2005;45:347-353.

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Recommendations Summary

Heart Failure (HF) Alcohol and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

  HF: Alcohol and Heart Failure

  Current limited evidence does not justify encouraging those who do not drink alcohol to start doing so. 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.

  Rating: Fair
  Conditional

  - Risks/Harms of Implementing This Recommendation

    Possible adverse effects of alcohol use:

    - Fetal alcohol syndrome
    - Hypertension
    - Cardiac arrhythmia
    - Sudden death
    - Long-term consumption of 60g alcohol per day (approximately 4-5 drinks) is associated with risk for strokes of all types
    - Increases in serum triglyceride and VLDL cholesterol, resulting in increased risk for pancreatitis in some individuals

- Increased risk of automobile accident, trauma, and suicide.

- Conditions of Application

  Recommendation applies only to those who drink alcohol.

  One drink is equal to 12 oz beer, 4-5 oz. wine or 1.5 oz. distilled spirits.

  Contraindications include:

  - Suspicion or history of alcohol abuse
  - Liver failure
  - Pregnancy

- Potential Costs Associated with Application

  None

- Recommendation Narrative

  - A retrospective analysis of high-quality found light-to-moderate drinkers with left ventricular (LV) dysfunction had decreased risk of all-cause mortality, fatal myocardial infarction and noncardiovascular death ($p<0.01$) in patients with ischemic LV dysfunction versus abstainers.
  - A longitudinal study of high-quality found no difference in survival and hospitalization rates, symptoms, physical and social function, and quality of life in HF patients who were abstainers and low-moderate drinkers.
  - Other studies in the analysis were not applicable to the question either because they were of alcohol abusers or comparing men and women.

- Recommendation Strength Rationale

  Rationale:

  - A large well designed study was included in the analysis
  - Studies were of similar patients (primarily NYHA stage I, II and III)
  - Consistent findings of no harm from alcohol consumption in patients with heart failure
  - Conclusion statement is a grade II

  Areas of uncertainty:

  - Although studies included a small group of NYHA stage IV patients, practitioners should be cautious with this population.

- Minority Opinions

  None.

- 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).

  For the patient with heart failure, does alcohol intake affect heart function?

  - References

    Cooper HA, Exner DV, Domanski MJ. Light-to-Moderate Alcohol Consumption and Prognosis in Patients With Left Ventricular Systolic Dysfunction, *J Am Coll Cardiol*. 2000, 35: 1,753-1,759.

    Fernandez-Sola J, Estruch R, Nicolas, J, Pare J, Saconella E, Antunez E, Urbano-Marquez A. Comparison of alcoholic cardiomyopathy in women versus men. *Am J Cardiol.* 1997, 80: c481-c485.

    Gavazzi A, De Maria R, Parolini M, Porcu M. Alcohol Abuse and Dilated Cardiomyopathy in Men, *Am J Cardiol.* 2000; 85: 1,114-1,118.

    Salisbury AC, House JA, Conard MW, Krumholz HM, Spertus JA. Low-to-Moderate Alcohol Intake and Health Status in Heart Failure Patients, *J Cardiac Failure.* 11 (5): 323-328, 2005.

  - References not graded in Academy of Nutrition and Dietetics Evidence Analysis Process

    Dietary Guidelines for Americans, 2005
    http://www.health.gov/dietaryguidelines/dga2005/report/HTML/D8_Ethanol.htm

    American Heart Association Guidelines, http://americanheart.org/presenter.jhtml?

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Recommendations Summary

Heart Failure (HF) L-Arginine, Carnitine, Coenzyme Q10 and Hawthorn and Heart Failure

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

HF: L-Arginine, Carnitine, Coenzyme Q10 and Hawthorn

If a patient inquires about or is currently taking L-arginine, carnitine, coenzyme Q_{10} or hawthorn supplements, then the practitioner may discuss the limited evidence available regarding clinical heart failure outcomes. Research is inconclusive. The practitioner should stay alert to future research involving these supplements.

Rating: Weak
Conditional

- Risks/Harms of Implementing This Recommendation

A nonsignificant number of subjects in the studies reported mild adverse reactions taking these supplements:

Supplements	Adverse Reactions
L-Arginine	none specified
Carnitine	nausea, minor GI problems
Coenzyme Q_{10}	transient nausea, maculopapular rash, epigastric pain, dizziness, photophobia, irritability
Hawthorn	dizziness, vertigo

As with any supplement, caution is required regarding the risks and harms of taking supplements in different disease states and with various medications.

Contraindications
Practitioners should use additional resources in conjunction with the evidence analysis documents for information regarding further potential side effects of these supplements. See the Food and Drug Administration more information on the drugs listed below.

Conenzyme Q_{10}

Use caution in patients taking warfarin (Coumadin), as CoQ_{10} is chemically similar to vitamin K and can decrease the effectiveness of warfarin.

Hawthorn

Use caution in patients taking beta-blockers and calcium channel blockers, as hawthorn may decrease blood pressure. Hawthorn in combination with digoxin or may increase the serum digoxin levels and increase the risk of side effects. Taking hawthorn with nitrates which increase blood flow may cause dizziness and lightheadedness.

- Conditions of Application

None.

- Potential Costs Associated with Application

None.

- Recommendation Narrative

L-Arginine

- Four trials found improvement in heart failure outcomes with L-arginine. Study results are preliminary because the range in doses and delivery methods varied between studies. In addition, all studies were of small sample sizes. Three studies were high and one was neutral quality.

Carnitine

- Two neutral quality randomized controlled studies found beneficial outcomes with oral supplementation of carnitine.

CoEnzyme Q10

- A high-quality systematic review, which included five randomized placebo-controlled studies plus a meta-analysis reported that heart failure patients may benefit from using CoEnzyme Q_{10}. One other high-quality RCT found no benefit.
- Six studies found positive results but these were primarily neutral quality studies and contained small sample sizes.

Hawthorn

- A high quality meta-analysis that included eight randomized double-blind placebo controlled trials found a beneficial effect in favor of hawthorn for maximal workload, pressure-heart rate products and improved symptoms (fatigue and dyspnia).

- Recommendation Strength Rationale

  - Studies of varying quality have not confirmed benefit with these supplements.
  - Conclusion statements were Grade III with the expection of Coenzyme Q10, which was a Grade II.
  - The American Heart Association and American College of Cardiology 2005 Practice Guidelines for Heart Failure found similar findings and stated, "use of nutritional supplements to treat structural heart disease or to prevent the development of symptoms of heart failure is not recommended."

- Minority Opinions

  None.

- 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).

For the patient with heart failure, does L-arginine provide beneficial outcomes?

For the patient with heart failure, does carnitine provide beneficial outcomes?

For the patient with heart failure, does the hawthorn provide beneficial outcomes?

For the patient with heart failure, does CoEnzyme Q10 provides beneficial outcomes?

- References

Bednarz B, Jaxa-Chamiec T, Gebalska J, Herbaczynska-Cedro K, Ceremuzynski L. L-arginine supplementation prolongs exercise capacity in congestive heart failure. *Kardiol Pol.* 2004, Apr; 60 (4): 348-353.

Kanaya Y, Nakamura M, Kobayashi N, Hiramori K. Effects of L-arginine on lower limb vasodilator reserve and exercise capacity in patients with chronic heart failure. *Heart.* 1999; 81: 512-517.

Koifman B, Wollman Y, Bogomolny N, Chernichowsky T, Finkelstein A, Peer G, Scherez J, Blum M, Laniado S, Iaina A, Keren G. Improvement of cardiac performance by intravenous infusion of L-arginine in patients with moderate congestive heart failure. *J Am Coll Cardiol.* 1995 Nov 1; 26 (5): 1,251-1,256.

Prior DL, Jennings GLR, Chin-Dusting JPF. Transient improvement of acetylcholine responses after short-term oral L-argininen in forearms of human heart failure. *J Cardiovascular Pharmacology.* 2000; 36: 3-37.

Anand I, Chandrashekhan Y, De Giuli F, Pasini E, Mazzoletti A, Confortini R, Ferrari R. *Cardiovasc Drugs Ther.* 1998; 12: 291-299.

Rizos I. Three-year survival of patients with heart failure caused by dilatedcardiomyopathy and L-carnitine administration. *Am Heart J.* 2000 Feb; 139 (2 Pt. 3): S120-123.

Pittler MH, Schmidt K and Ernst E. Hawthorn extract for treating chronic heart failure: meta-analysis of randomized trials. *Am J Med*. 2003 Jun 1; 114 (8): 665-674.

Baggio E, Gandini R, Plancher AC, Passeri M, Carmosino G. Italian multicenter study on the safety and efficacy of coenzyme Q10 as adjunctive therapy in heart failure. CoQ10 Drug Surveillance Investigators. *Molec Aspects Med* . 1994, 15 (Suppl): s287-s294.

Berman M, Erman A, Ben-Gal T, Dvir D, Georghiou GP, Stamler A, Vered Y, Vidne BA, Aravot D. Coenzyme Q10 in patients with end-stage heart failure awaiting cardiac transplantation: a randomized, placebo-controlled study. Clin Cardiol. 2004, 27: 295-299.

Khatta M, Alexander BS, Krichten CM, Fisher ML, Freudenberger R, Robinson SW, Gottlieb SS. The effect of coenzyme Q10 in patients with congestive heart failure. *Ann Intern Med.* 2000,132: 636-640.

Langsjoen H, Langsjoen P, Langsjoen P, Willis R, Folkers K. Usefulness of coenzyme Q10 in clinical cardiology: a long-term study. *Molec Aspects Med.* 1994; 15 (Suppl): s165-s175.

Ma A, Zhang W, Liu Z. Effect of protection and repair of injury of mitochondrial membrane-phospholipid on prognosis in patients with dilated cardiomyopathy.Blood Pressure 5 (Suppl 3):53-55, 1996.

Shekelle P, Morton S, Hardy M. Effect of Supplemental Antioxidants Vitamin C, Vitamin E, and Coenzyme Q10 for the Prevention and Treatment of Cardiovascular Disease. Evidence Report/Technology Assessment No. 83 (Prepared by Southern California–RAND Evidence Based Practice Center, under Contract No 290-97-0001). *AHRQ Publication No. 03-E043*. Rockville, MD: Agency for Healthcare Research and Quality. July 2003.

Munkholm H, Hansen HH, Rasmussen K. Coenzyme Q10 treatment in serious heart failure. Biofactors. 1999;9(2-4):285-9

Sacher HL, Sacher ML, Landau SW, Kersten R, Dooley F, Sacher A, Sacher M, Dietrick K, Ichkhan K. The clinical and hemodynamic effects of coenzyme Q10 in congestivecardiomyopathy. Am J Ther. 1997 Feb-Mar;4(2-3):66-72

- References not graded in Academy of Nutrition and Dietetics Evidence Analysis Process

Hunt SA, Abraham WT et. al. ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult: summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing Committee to Update the 2001 Guidelines for the Evaluation and Management of Heart Failure). *Circulation*. 2005; 112.

Natural Medicines Comprehensive Database.

http://naturaldatabase.com/(utnmbd455fcmuuiuzbmvtz55)/home.aspx?li=0&st=0&cs=&s=nd

U.S. Food and Drug Administration, Center for Drug Evaluation and Research, Drugs@FDA FDA Approved Drug Products. http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Search.DrugDetails

- Heart Failure
- Heart Failure (HF) Guideline (2008)

Quick Links

Recommendations Summary

DM: Medical Nutrition Therapy 2008

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

DM: MNT and Number/Length of Initial Series of Encounters

Medical nutrition therapy (MNT) provided by a registered dietitian (RD) is recommended for individuals with type 1 and type 2 diabetes. An initial series of three to four encounters each lasting from 45 to 90 minutes is recommended. This series, beginning at diagnosis of diabetes or at first referral to an RD for MNT for diabetes, should be completed within three to six months. The RD should determine if additional MNT encounters are needed after the initial series based on the nutrition assessment of learning needs and progress towards desired outcomes. Studies based on a range in the number (1-5 individual sessions or a series of 6-12 group sessions) and length (45-90 minutes) report sustained positive outcomes at one year and longer. Studies implementing a variety of nutrition interventions report a reduction in A1C levels, and some studies also report improved lipid profiles, improved weight management, adjustments in medications, and reduction in the risk for onset and progression of comorbidities.

Rating: Strong
Imperative

DM: MNT Long-Term Follow-up Encounters

At least one follow-up encounter is recommended annually to reinforce lifestyle changes and to evaluate and monitor outcomes that impact the need for changes in MNT or medication. The RD should determine if additional MNT encounters are needed. Studies involving regular lifestyle intervention sessions (up to 1 per month) report sustained positive outcomes at one year and longer.

Rating: Strong
Imperative

- Risks/Harms of Implementing This Recommendation

  None.

- Conditions of Application

  None.

- Potential Costs Associated with Application

  - Although costs of MNT sessions and reimbursement vary, medical nutrition therapy sessions are essential for improved outcomes.

- Recommendation Narrative

  - MNT has its greatest impact at diagnosis of diabetes (Monk et al, 1995; Delahanty et al, 1998).
  - Eight studies (Franz et al, 1995; DAFNE Study Group, 2002; Graber et al, 2002; Miller et al, 2002; Goldhaber-Fiebert et al, 2003; Wilson et al, 2003; Lemon et al, 2004; Gaetke et al, 2006), evaluating the effectiveness of diabetes MNT at three to six months, reported reductions in A1C, ranging from 0.25% to 2.9%, depending on the type and duration of diabetes. Individual sessions ranging from one to five or a series of 10 to 12 group sessions were employed.
  - A variety of nutrition therapy interventions, such as a reduced energy and fat intake, carbohydrate counting, simplified meal plans, healthy food choices, individualized meal planning strategies, exchange lists, insulin-to-carbohydrate ratios and behavioral strategies were implemented.
  - The number of initial and follow-up sessions varies in all the studies.
  - Studies reporting on effectiveness of MNT from six to twelve months (Lemon et al, 2004; DAFNE Study Group, 2002; Franz et al, 1995; Wolf et al, 2004; Banister et al, 2004; Chima et al, 2005; Bray et al, 2005) report a variety in the number and type of MNT sessions that lead to improved outcomes. Therefore, the RD needs to determine what is appropriate for individual clients.
  - Seven studies (DCCT, 1993; Laitinen et al, 1993; Maislos et al, 2002; Banister et al, 2004; Wolf et al, 2004; Bray et al, 2005; Chima et al, 2005) report sustained improvements in A1C at 12 months and longer. All involved regular sessions with an RD, ranging from monthly to three sessions per year.
  - Seven studies (DCCT, 1993; Franz et al, 1995; Goldhaber-Fieber et al, 2003; Banister et al, 2004; Lemon

et al, 2004; Wolf et al, 2004; Gaetke et al, 2006) report improvements in other outcomes, such as improved lipid profiles, weight management, decreased need for medications and reduced risk for onset and progression of comorbidities.

- Recommendation Strength Rationale
  - Conclusion statement was Grade I
- 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).

How effective is MNT provided by Registered Dietitians in the management of persons with type 1 and type 2 diabetes?

- References

Ash S, Reeves MM, Yeo S, Morrison G, Carey D, Capra S. Effect of intensive dietetic interventions on weight and glycaemic control in overweight men with Type II diabetes: a randomised trial. *International Journal of Obesity*. 2003; 27:797-802.

Banister NA, Jastrow ST, Hodges V, Loop R, Gillham MB. Diabetes self-management training program in a community clinic improves patient outcomes at modest cost. *J Am Diet Assoc* 2004;104(5):807-10.

Bray P, Thompson D, Wynn JD, Cummings DM, Whetstone L. Confronting Disparities in Diabetes Care: The clinical effectiveness of redesigning care management for minority patients in rural primary care practices. J Rural Health 2005; 21(4):317-21.

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The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993; 329:977-986.

Franz MJ, Monk A, Barry B, McClain K, Weaver T, Cooper N, Upham P, Bergenstal R, Mazze RS. Effectiveness of medical nutrition therapy provided by dietitians in the management of non-insulin-dependent diabetes mellitus: a randomized controlled clinical trial. *J Am Diet Assoc* 1995;95:1009-1017.

Gaetke LM, Stuart MA, Truszczynska H. A single nutrition counseling session with a registered dietitian improves short-term clinical outcomes for rural Kentucky patients with chronic disease. *J Am Diet Assoc* 2006;106(1):109-112.

Goldhaber-Fiebert JD, Goldhaber-Fiebert SN, Tristan ML, Nathan DM. Randomized controlled community-based nutrition and exercise intervention improves glycemia and cardiovascular risk factors in type 2 diabetic patients in rural Costa Rica. *Diabetes Care* 2003; 26:24-29.

Graber AL, Elasy TA, Quinn D, Wolff K, Brown A. Improving glycemic control in adults with diabetes mellitus: shared responsibility in primary care practices. South Med J 2002; 95(7):684-90.

Laitinen JH, Ahola IE, Sarkkinen ES, Winberg RL, Harmaakorpi-Livonen PA, Uusitupa MI. Impact of intensified dietary therapy on energy and nutrient intakes and fatty acid composition of serum lipids in patients with recently diagnosed non-insulin-dependent diabetes mellitus. *J Am Diet Assoc* 1993;93(3):276-283.

Lemon CC, Lacey K, Lohse B, Hubacher DO, Klawitter B, Palta M. Outcomes monitoring of health, behavior, and quality of life after nutrition intervention in adults with type 2 diabetes. *J Am Diet Assoc* 2004; 104(12):1085-15.

Maislos M, Weisman D, Sherf M. Western Negev Mobile Diabetes Care Program: a model for interdisciplinary diabetes care in a semi-rural setting. Acta Diabetol 2002; 39(1):49-53.

Miller CK, Edwards L, Kissling G, Sanville L. Nutrition education improves metabolic outcomes among older adults with diabetes mellitus:results from a randomized controlled trial. *Prev Med* 2002;34(2):252-9.

Wilson C, Brown T, Acton K, Gilliland A. Effects of clinical nutrition education and educator discipline on glycemic control outcomes in the Indian Health Service. Diabetes Care 2003; 26(6):2500-04.

Wolf AM, Conaway MR, Crowther JQ, Hazen KY, Nadler JL, Oneida B, Bovbjerg VE. Translating Lifestyle Intervention to Practice in Obese Patients with Type 2 Diabetes: Improving Control with Activity and Nutrition (ICAN) study. *Diabetes Care*, 2004; 27 (7): 1,570-1,576.

Delahanty LM, et al. Clinical Significance of medical nutrition therapy in achieving diabetes outcomes and the importance of the process.*J Am Diet Assoc.* 1998; 98: 28-30.

Monk A, Barry B, McClain K, Weaver T, Cooper N, Franz MJ. Practice guidelines for medical nutrition therapy provided by dietitians for persons with non-insulin-dependent diabetes mellitus. *J Am Diet Assoc* 1995;95:999-1006.

- Heart Failure

- Heart Failure (HF) Guideline (2008)

Quick Links

Recommendations Summary

DM: Intervention Options 2008

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

DM: Intervention Options

The RD should implement MNT selecting from a variety of interventions (reduced energy and fat intake, carbohydrate counting, simplified meal plans, healthy food choices, individualized meal planning strategies, exchange lists, insulin-to-carbohydrate ratios, physical activity and behavioral strategies). Nutrition education and counseling should be sensitive to the personal needs, willingness to change, and ability to make changes of the individual with diabetes. Studies reporting on effectiveness of MNT report a variety in the number and type of MNT sessions that lead to improved outcomes.

Rating: Strong
Imperative

- Risks/Harms of Implementing This Recommendation

  None.

- Conditions of Application

  None.

- Potential Costs Associated with Application

  - Although costs of MNT sessions and reimbursement vary, medical nutrition therapy sessions are essential for improved outcomes.

- Recommendation Narrative

  - MNT has its greatest impact at diagnosis of diabetes (Monk et al, 1995; Delahanty et al, 1998).
  - Eight studies (Franz et al, 1995; DAFNE Study Group, 2002; Graber et al, 2002; Miller et al, 2002; Goldhaber-Fiebert et al, 2003; Wilson et al, 2003; Lemon et al, 2004; Gaetke et al, 2006), evaluating the effectiveness of diabetes MNT at three to six months, reported reductions in A1C, ranging from 0.25% to 2.9%, depending on the type and duration of diabetes. Individual sessions ranging from one to five or a series of 10 to 12 group sessions were employed.
  - A variety of nutrition therapy interventions, such as a reduced energy and fat intake, carbohydrate counting, simplified meal plans, healthy food choices, individualized meal planning strategies, exchange lists, insulin-to-carbohydrate ratios and behavioral strategies were implemented.
  - The number of initial and follow-up sessions varies in all the studies.
  - Studies reporting on effectiveness of MNT from six to twelve months (Lemon et al, 2004; DAFNE Study Group, 2002; Franz et al, 1995; Wolf et al, 2004; Banister et al, 2004; Chima et al, 2005; Bray et al, 2005) report a variety in the number and type of MNT sessions that lead to improved outcomes. Therefore, the RD needs to determine what is appropriate for individual clients.
  - Seven studies (DCCT, 1993; Laitinen et al, 1993; Maislos et al, 2002; Banister et al, 2004; Wolf et al, 2004; Bray et al, 2005; Chima et al, 2005) report sustained improvements in A1C at 12 months and longer. All involved regular sessions with an RD, ranging from monthly to three sessions per year.
  - Seven studies (DCCT, 1993; Franz et al, 1995; Goldhaber-Fieber et al, 2003; Banister et al, 2004; Lemon et al, 2004; Wolf et al, 2004; Gaetke et al, 2006) report improvements in other outcomes, such as improved lipid profiles, weight management, decreased need for medications and reduced risk for onset and progression of comorbidities.
  - American Diabetes Association Recommendation: Nutrition counseling should be sensitive to the personal needs, willingness to change, and ability to make changes of the individual with pre-diabetes or diabetes (Grade E).

- Recommendation Strength Rationale

  - Conclusion Statement was given Grade I

- 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).

How effective is MNT provided by Registered Dietitians in the management of persons with type 1 and type 2 diabetes?

- References

Ash S, Reeves MM, Yeo S, Morrison G, Carey D, Capra S. Effect of intensive dietetic interventions on weight and glycaemic control in overweight men with Type II diabetes: a randomised trial. *International Journal of Obesity*. 2003; 27:797-802.

Banister NA, Jastrow ST, Hodges V, Loop R, Gillham MB. Diabetes self-management training program in a community clinic improves patient outcomes at modest cost. *J Am Diet Assoc* 2004;104(5):807-10.

Bray P, Thompson D, Wynn JD, Cummings DM, Whetstone L. Confronting Disparities in Diabetes Care: The clinical effectiveness of redesigning care management for minority patients in rural primary care practices. J Rural Health 2005; 21(4):317-21.

Chima CS, Farmer-Dziak N, Cardwell P, Snow S. Use of technology to track outcomes in a diabetes self-management program. J Am Diet Assoc 2005; 105(12):1933-8.

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Gaetke LM, Stuart MA, Truszczynska H. A single nutrition counseling session with a registered dietitian improves short-term clinical outcomes for rural Kentucky patients with chronic disease. *J Am Diet Assoc* 2006;106(1):109-112.

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Laitinen JH, Ahola IE, Sarkkinen ES, Winberg RL, Harmaakorpi-Livonen PA, Uusitupa MI. Impact of intensified dietary therapy on energy and nutrient intakes and fatty acid composition of serum lipids in patients with recently diagnosed non-insulin-dependent diabetes mellitus. *J Am Diet Assoc* 1993;93(3):276-283.

Lemon CC, Lacey K, Lohse B, Hubacher DO, Klawitter B, Palta M. Outcomes monitoring of health, behavior, and quality of life after nutrition intervention in adults with type 2 diabetes. *J Am Diet Assoc* 2004; 104(12):1085-15.

Maislos M, Weisman D, Sherf M. Western Negev Mobile Diabetes Care Program: a model for interdisciplinary diabetes care in a semi-rural setting. Acta Diabetol 2002; 39(1):49-53.

Miller CK, Edwards L, Kissling G, Sanville L. Nutrition education improves metabolic outcomes among older adults with diabetes mellitus:results from a randomized controlled trial. *Prev Med* 2002;34(2):252-9.

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Wilson C, Brown T, Acton K, Gilliland A. Effects of clinical nutrition education and educator discipline on glycemic control outcomes in the Indian Health Service. Diabetes Care 2003; 26(6):2500-04.

Wolf AM, Conaway MR, Crowther JQ, Hazen KY, Nadler JL, Oneida B, Bovbjerg VE. Translating Lifestyle Intervention to Practice in Obese Patients with Type 2 Diabetes: Improving Control with Activity and Nutrition (ICAN) study. *Diabetes Care*, 2004; 27 (7): 1,570-1,576.

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American Diabetes Association. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. *Diabetes Care* 2007;30 Suppl 1:S48-65.

Wylie-Rosett J, Albright AA, Apovian C, Clark NG, Delahanty L, Franz MJ, Hoogwerf B, Kulkarni K, Lichtenstein AH, Mayer-Davis E, Mooradian AD, Wheeler M. 2006-2007 American Diabetes Association Nutrition Recommendations: issues for practice translation. *J Am Diet Assoc* 2007;107(8):1296-304.

- Heart Failure
- Heart Failure (HF) Guideline (2008)

Quick Links

Recommendations Summary

DM: Monitor & Evaluate and Diabetes 2008

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

DM: Monitoring and Evaluation

The RD should monitor and evaluate food intake, medication, metabolic control (glycemia, lipids, and blood pressure), anthropometric measurements and physical activity. Research reports sustained improvements in A1C at 12 months and longer with long-term follow-up encounters with an RD.

Rating: Strong
Imperative

DM: Evaluation of Glycemic Control

The RD should primarily use blood glucose monitoring results in evaluating the achievement of goals and effectiveness of MNT. Glucose monitoring results can be used to determine whether adjustments in foods and meals will be sufficient to achieve blood glucose goals or if medication additions or adjustments need to be combined with MNT.

Rating: Consensus
Imperative

- Risks/Harms of Implementing This Recommendation

  None.

- Conditions of Application

  None.

- Potential Costs Associated with Application

  - Although costs of MNT sessions and reimbursement vary, medical nutrition therapy sessions are essential for improved outcomes.

- Recommendation Narrative

  - MNT has its greatest impact at diagnosis of diabetes (Monk et al, 1995; Delahanty et al, 1998).
  - Eight studies (Franz et al, 1995; DAFNE Study Group, 2002; Graber et al, 2002; Miller et al, 2002; Goldhaber-Fiebert et al, 2003; Wilson et al, 2003; Lemon et al, 2004; Gaetke et al, 2006), evaluating the effectiveness of diabetes MNT at three to six months, reported reductions in A1C, ranging from 0.25% to 2.9%, depending on the type and duration of diabetes. Individual sessions ranging from one to five or a series of 10 to 12 group sessions were employed.
  - A variety of nutrition therapy interventions, such as a reduced energy and fat intake, carbohydrate counting, simplified meal plans, healthy food choices, individualized meal planning strategies, exchange lists, insulin-to-carbohydrate ratios and behavioral strategies were implemented.
  - The number of initial and follow-up sessions varies in all the studies.
  - Studies reporting on effectiveness of MNT from six to twelve months (Lemon et al, 2004; DAFNE Study Group, 2002; Franz et al, 1995; Wolf et al, 2004; Banister et al, 2004; Chima et al, 2005; Bray et al, 2005) report a variety in the number and type of MNT sessions that lead to improved outcomes. Therefore, the RD needs to determine what is appropriate for individual clients.
  - Seven studies (DCCT, 1993; Laitinen et al, 1993; Maislos et al, 2002; Banister et al, 2004; Wolf et al, 2004; Bray et al, 2005; Chima et al, 2005) report sustained improvements in A1C at 12 months and longer. All involved regular sessions with an RD, ranging from monthly to three sessions per year.
  - Seven studies (DCCT, 1993; Franz et al, 1995; Goldhaber-Fieber et al, 2003; Banister et al, 2004; Lemon et al, 2004; Wolf et al, 2004; Gaetke et al, 2006) report improvements in other outcomes, such as improved lipid profiles, weight management, decreased need for medications and reduced risk for onset and progression of comorbidities.
  - American Diabetes Association Recommendation: Plasma glucose monitoring can be used to determine whether adjustments in foods and meals will be sufficient to achieve blood glucose goals or if medication(s) needs to be combined with MNT (Grade E).

- Recommendation Strength Rationale

  - Conclusion Statement for MNT given Grade I

- 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).

How effective is MNT provided by Registered Dietitians in the management of persons with type 1 and type 2 diabetes?

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Ash S, Reeves MM, Yeo S, Morrison G, Carey D, Capra S. Effect of intensive dietetic interventions on weight and glycaemic control in overweight men with Type II diabetes: a randomised trial. *International Journal of Obesity*. 2003; 27:797-802.

Banister NA, Jastrow ST, Hodges V, Loop R, Gillham MB. Diabetes self-management training program in a community clinic improves patient outcomes at modest cost. *J Am Diet Assoc* 2004;104(5):807-10.

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Lemon CC, Lacey K, Lohse B, Hubacher DO, Klawitter B, Palta M. Outcomes monitoring of health, behavior, and quality of life after nutrition intervention in adults with type 2 diabetes. *J Am Diet Assoc* 2004; 104(12):1085-15.

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Delahanty LM, et al. Clinical Significance of medical nutrition therapy in achieving diabetes outcomes and the importance of the process.*J Am Diet Assoc.* 1998; 98: 28-30.

Monk A, Barry B, McClain K, Weaver T, Cooper N, Franz MJ. Practice guidelines for medical nutrition therapy provided by dietitians for persons with non-insulin-dependent diabetes mellitus. *J Am Diet Assoc* 1995;95:999-1006.

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- Heart Failure
- Heart Failure (HF) Guideline (2008)

Quick Links

Recommendations Summary

DLM: Referral to a Registered Dietitian for Medical Nutrition Therapy (MNT) 2005

Click here to see the explanation of recommendation ratings (Strong, Fair, Weak, Consensus, Insufficient Evidence) and labels (Imperative or Conditional). To see more detail on the evidence from which the following recommendations were drawn, use the hyperlinks in the Supporting Evidence Section below.

- Recommendation(s)

DLM: MNT and Referral to a Registered Dietitian

Referral to a registered dietitian for Medical Nutrition Therapy (MNT) is recommended whenever an individual has an abnormal lipid profile, based on ATPIII Risk category and LDL-C goals, or has CHD. A planned initial visit lasting from 45-90 minutes and at least two to six planned follow-up visits (30-60 minutes each, with an RD) can lead to improved dietary pattern; improved lipid profile; reduced plasma total cholesterol, LDL-C, and triglycerides; and improved weight status.

Rating: Strong
Conditional

DLM: MNT Number and Duration of Visits

The number and duration of visits in the course of Medical Nutrition Therapy will need to be greater if the client is in a higher risk category, if there is a large number of Therapeutic Lifestyle Changes (TLC) that need to be made, and if the individual is not motivated to make TLC changes. Increasing the number of visits and length of time spent with a dietitian can improve serum lipid levels and CVD risk.

Rating: Fair
Conditional

DLM: Lipid-Lowering Medication Re-evaluation

Re-evaluate the dosage and necessity of lipid-lowering medications throughout the course of Medical Nutrition Therapy. Medical Nutrition Therapy may successfully improve the lipid levels to the point where medication doses can be lowered or discontinued.

Rating: Fair
Imperative

- Risks/Harms of Implementing This Recommendation

  None.

- Conditions of Application

  None specified.

- Potential Costs Associated with Application

  None specified.

- Recommendation Narrative

  - Seven studies (four RCT, two retrospective chart reviews, and one nonrandomized trial with use of historic controls) describe individualized Medical Nutrition Therapy that results in improved cardioprotective dietary pattern changes and/or subsequent plasma lipid changes, thereby decreasing cardiac heart disease risks. Reductions in total fat and saturated fat intake were seen in three studies (two high- and one neutral-quality). Decreases in TC and LDL-C were reported in five studies (three high- and two neutral-quality). Three of these studies found reductions in body weight. Four studies looked at the impact on TG and HDL-C and found varying results.
  - Two studies (one neutral-quality retrospective chart review and one neutral-quality RCT) found that decreases in total cholesterol correlated with time spent with a dietitian. A third high-quality RCT found that individuals who went to three or four MNT sessions had lower LDL-C compared to those that attended fewer than three sessions.
  - Two retrospective chart reviews (one high- and one neutral-quality) found that MNT obviated the need for lipid-lowering medications in some patients
  - One study identified a trend that the dietitian group had lower attrition compared to the control group (MD counseling), possibly indicating preferences for services provided by a dietitian.

- Recommendation Strength Rationale

  - Studies were of a variety of populations. Studies represented individuals (21-75 years of age) who had ischemic heart disease, hypercholesterolemia, hyperlipidemia (high LDL-C), combined hyperlipidemia (high LDL-C and TG), or hypertriglyceridemia; but excluded *familial* hypertriglyceridemia (FH).
  - Sufficient time was provided to see outcomes (six weeks was the shortest intervention, with the longest intervention lasting more than six months).
  - Consistent findings across a variety of study designs.
  - Conclusion statements were Grade I, III and V.

- 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 disorders of lipid metabolism, does medical nutrition therapy (MNT) given by a registered dietitian result in changes in levels of dietary fat, saturated fat, serum cholesterol, and cardiac risk factors?

Do additional medical nutrition therapy (MNT) visits with a registered dietitian (RD) result in further reductions in total and LDL cholesterol in adults?

(2005) What is the optimal duration and frequency of follow-up visits for an adult patient by a registered dietitian using medical nutrition therapy (MNT)?

In patients with disorders of lipid metabolism, does MNT result in reduced need for lipid lowering medications?

- References

Dalgard et. al. Saturated fat intake is reduced in patients with ischemic heart disease 1 year after comprehensive counseling but not after brief counseling. J Am Diet Assoc.. 2001;101:1420-1424, 1429.

Dallongeville J, Leboeuf N, Blais C, Touchette J, Gervais N, Davignon J. Short-term response to dietary counseling of hyperlipidemic outpatients of a lipid clinic. *JADA*. 1994;94:616-621.

Delahanty LM, Sonnenberg LM, Hayden D, Nathan DM. Clinical and cost outcomes of medical nutrition therapy for hypercholesterolemia: A controlled trial. *J Am Diet Assoc.* 2001 Sep; 101(9): 1,012-1,023.

Elson RB, Splett PL, Bostick RM, Aeppli D, Haberman M. Dietitian practices for adult outpatients with hypercholesterolemia referred by physicians. The Minnesota Dietitians Survey. *Arch Fam Med.* 1994; 3: 1,073-1,080.

Geil P, Anderson JW, Gustafson NJ. Women and men with hypercholesterolemia respond similarly to an American Heart Association step 1 diet. *JADA.* 1995; 95: 436-441.

Hebert JR, Ebbeling CB, Ockene IS, Ma Y, Rider L, Merriam PA, Ockene JK, Saperia G. A dietitian-delivered group nutrition program leads to reductions in dietary fat, serum cholesterol and body weight: The Worcester area trial for counseling in hyperlipidemia (WATCH). *J Am Diet Assoc.* 1999; 99: 544-552.

Henkin Y, Shai I, Zuk R, Brickner D, Zuilli I, Neumann L, Shany S. Dietary treatment of hypercholesterolemia: Do dietitians do it better? *Am J Med.* 2000: 109: 549-555.

McGehee MM, Johnson EQ, Rasmussen HM, Salryoun N, Lynch MM, Carey M. Benefits and costs of medical nutrition therapy by registered dietitians for patients with hypercholesterolemia. *JADA.* 1995; 95: 1,041-1,043.

Plous S, Chesne RB, McDowell AV. Nutrition knowledge and attitudes of cardiac clients. *JADA.* 1995; 95: 442-446.

Prosser LA, Stinnett AA, Goldman PA, Williams LW, Hunink MGM, Goldman L, Weinstein MC. Cost-effectiveness of cholesterol-lowering therapies according to selected patient characteristics. *Ann Intern Med.* 2000; 132: 769-779.

Sheils JF, Rubin R, Stapleton DC. The estimated costs and savings of medical nutrition therapy: The Medicare population. *J Am Diet Assoc.* 1999; 99: 428-435.

Sikand G, Kashyap ML, Yang I. Medical nutrition therapy lowers serum cholesterol and saves medication costs in men with hypercholesterolemia. *JADA*. 1998; 98: 889-894.

Sikand G, Kashyap ML, Wong ND, Hsu JC. Dietitian intervention improves lipid values and saves medication costs in men with combined hyperlipidemia and a history of niacin noncompliance. *JADA.* 2000; 100: 218-224.

Thompson RL, Summerbell CD, Hooper L, Higgins JPT, Little PS, Talbot D, Ebrahim S. Dietary advice given by a dietitian versus other health professional or self-help resources to reduce blood cholesterol (Cochrane Review). In: *The Cochrane Library,* Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.