



INSTITUTE FOR CLINICAL  
SYSTEMS IMPROVEMENT

## Health Care Guideline: Stable Coronary Artery Disease

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**Fourteenth Edition  
April 2011**

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- physicians, nurses, and other health care professional and provider organizations;
- health plans, health systems, health care organizations, hospitals and integrated health care delivery systems;
- health care teaching institutions;
- health care information technology departments;
- medical specialty and professional societies;
- researchers;
- federal, state and local government health care policy makers and specialists; and
- employee benefit managers.

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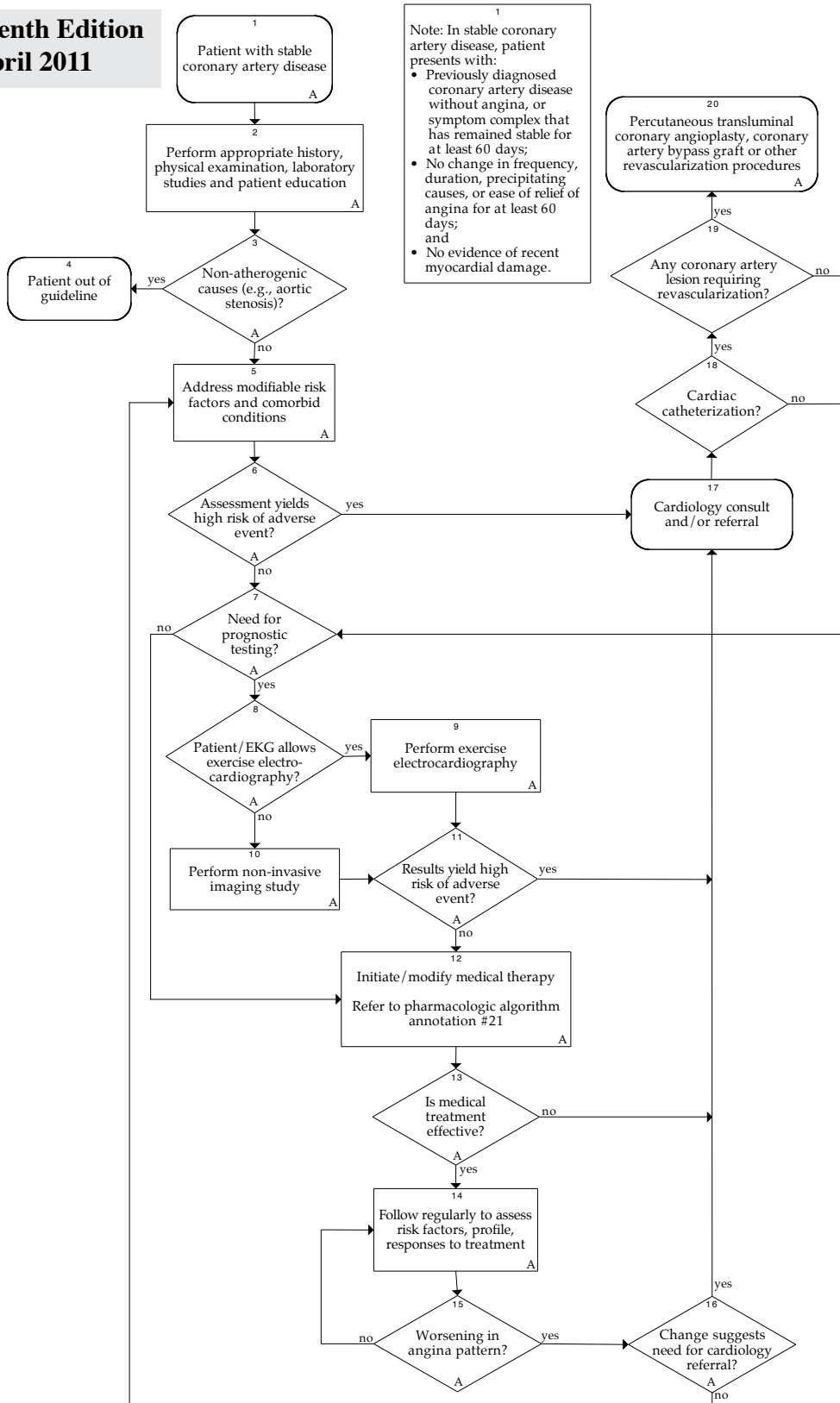
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### Main Algorithm

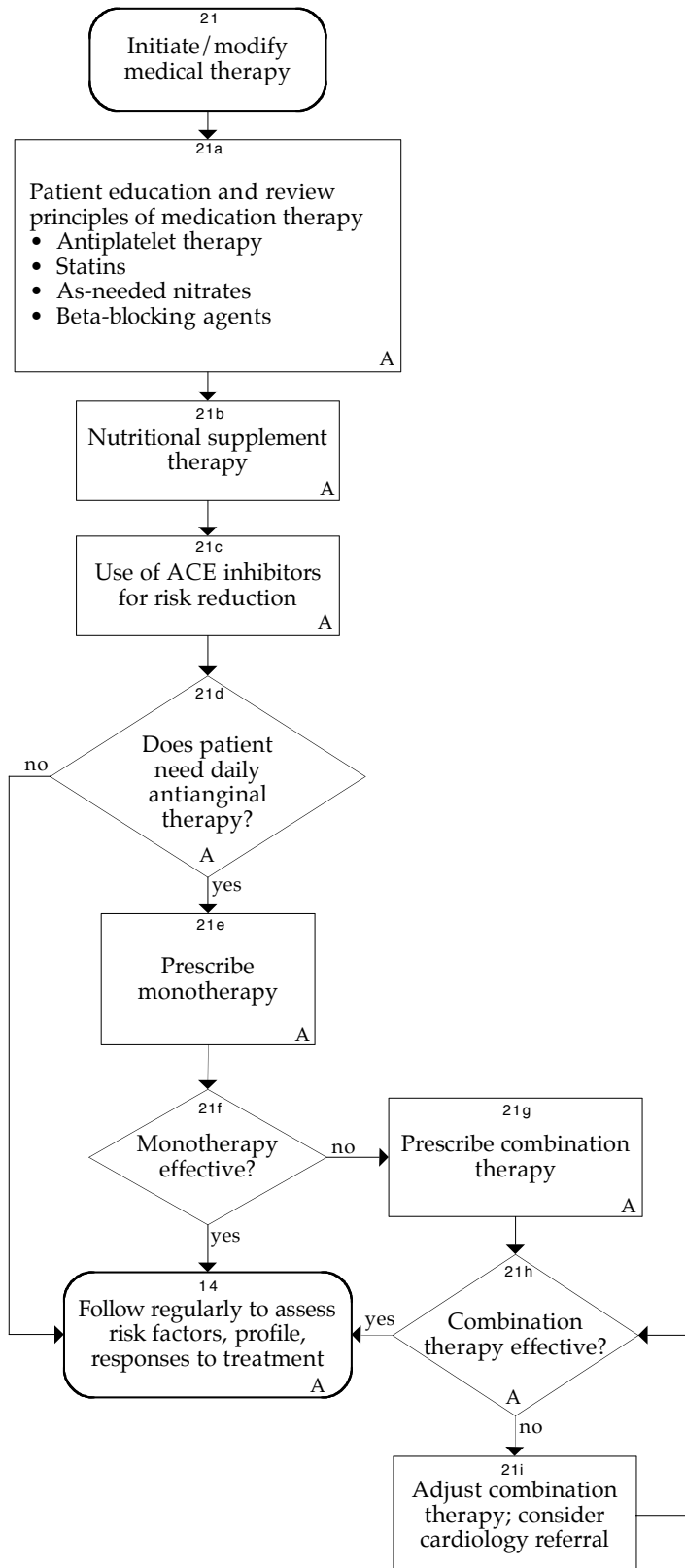


All algorithm boxes with an "A" and those that refer to other algorithm boxes link to annotation content.

Text in blue throughout the document also provides links.

A = Annotation

## Pharmacologic Algorithm



A = Annotation

All algorithm boxes with an "A" and those that refer to other algorithm boxes link to annotation content.

Text in blue throughout the document also provides links.

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### Work Group Leader

Greg Lehman, MD  
*Internal Medicine, Park  
Nicollet Clinic*

### Work Group Members Cardiology

Ganesh Raveendran, MD  
*University of Minnesota*

### Dietetics

Susan M. Hanson, RD, CD,  
CDE

*Park Nicollet Institute*  
Debra M. Sanders, RD  
*River Falls Medical Clinic*

### Family Medicine

Spencer Bershow, MD  
*Fairview Health Services*

Greg Goblirsch, MD  
*River Falls Medical Clinic*

### General Internist

Phil Kofron, MD, MPH  
*Park Nicollet Clinic*

### Nursing

Patricia Anderson, DNP,  
RN, ACNS-BC  
*Mayo Clinic*

Ann Carlson, RN  
*HealthPartners*

Shauna Schad, RN, CNS  
*Mayo Clinic*

Pamela Triplett, BSN  
*HealthPartners*

### Pharmacy

Yun Lu, PharmD, MS  
*Hennepin County Medical  
Center*

### Facilitators

Melissa Cella, MHA, MPA  
*ICSI*

Carmen Hansen, RN, BSN  
*ICSI*

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## Disclosure of Potential Conflict of Interest

In the interest of full disclosure, ICSI has adopted a policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline topic. It is not assumed that these financial interests will have an adverse impact on content. They are simply noted here to fully inform users of the guideline.

Debra Sanders, RD, CD, CDE has received fees for consulting at the Lutheran Homes as a nutritionist and has received honoraria for completing surveys on blood glucose meters.

No other work group members have potential conflicts of interest to disclose.

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## Evidence Grading

A consistent and defined process is used for literature search and review for the development and revision of ICSI guidelines. Literature search terms for the current revision of this document include angina; coronary artery disease; coronary artery disease and age, gender, ethnicity; amiodarone; beta-blockers; homocysteine; nitrates; ranidazine; refractory angina and simvastatin.

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

Evidence citations are listed in the document utilizing this format: (*Author, YYYY [report class]; Author, YYYY [report class] – in chronological order, most recent date first*). A full explanation of ICSI's Evidence Grading System can be found on the ICSI Web site at <http://www.icsi.org>.

Class	Description
<b>Primary Reports of New Data Collections</b>	
<b>A</b>	Randomized, controlled trial
<b>B</b>	Cohort-study
<b>C</b>	Non-randomized trial with concurrent or historical controls Case-control study Study of sensitivity and specificity of a diagnostic test Population-based descriptive study
<b>D</b>	Cross-sectional study Case series Case report
<b>Reports that Synthesize or Reflect upon Collections of Primary Reports</b>	
<b>M</b>	Meta-analysis Systematic review Decision analysis Cost-effectiveness analysis
<b>R</b>	Consensus statement Consensus report Narrative review
<b>X</b>	Medical opinion

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## Foreword

### Scope and Target Population

Adults who have a diagnosis of stable coronary artery disease. The criteria, as noted on the Main algorithm, includes patient presenting with:

- previously diagnosed coronary artery disease without angina, or symptom complex that has remained stable for at least 60 days;
- no change in frequency, duration, precipitating causes or ease of relief of angina for at least 60 days; and
- no evidence of recent myocardial damage.

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### Aims

1. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease (SCAD) who are prescribed aspirin and antianginal medications. (*Annotations #21a, 21c*)
2. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease who understand the self-management of their condition. (*Annotations #2, 21a*)
3. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease who receive an intervention for modifiable risk factors. (*Annotation #5*)
4. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease presenting with worsening angina symptoms who receive appropriate clinical evaluations. (*Annotations #15, 16*)
5. Increase the use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) in patients with stable coronary artery disease with systolic CHF (ejection fraction less than or equal to 40%), including those patients with a comorbidity diagnosis of chronic kidney disease and/or hypertension. (*Annotation #21c*)
6. Increase the percentage of patients with a diagnosis of stable coronary artery disease who receive education around nutritional supplement therapy. (*Annotation #21b*)
7. Increase appropriate stress imaging for stable coronary artery disease patients to determine risk stratification prior to decisions on medical therapy and revascularization. (*Annotation #7*)

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### Clinical Highlights

- Prescribe aspirin in patients with stable coronary artery disease if there are no medical contraindications. (*Annotations #2, 21a; Aim #1*)
- Evaluate and treat the modifiable risk factors, which include smoking, sedentary activity level, depression, hyperlipidemia, obesity, hypertension and diabetes. (*Annotation #5; Aim #3*)
- Patients with chronic stable coronary artery disease should be on statin therapy regardless of their lipid levels unless contraindicated. (*Annotation #21a; Aim #3*)

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- Perform prognostic testing in patients whose risk determination remains unclear. This may precede or follow an initial course of pharmacologic therapy. (*Annotation #7; Aim #7*)
- Refer the patient for cardiovascular consultation when clinical assessment indicates the patient is at high risk for adverse events, the non-invasive imaging study or electrocardiography indicates the patient is at high risk for an adverse event, or medical treatment is ineffective. (*Annotations #15, 16; Aim #4*)
- For relief of angina, prescribe beta-blockers as first-line medication. If beta-blockers are contraindicated, nitrates are the preferred alternative. Calcium channel blockers may be an alternative medication if the patient is unable to take beta-blockers or nitrates. (*Annotations #21a, 21e; Aim #1*)

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## Implementation Recommendation Highlights

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

1. Develop systems for providing patient education around:
  - Proper use of nitroglycerin
  - Consistent use of aspirin (unless contraindicated) or consistent use of clopidogrel as directed
  - When to call 911Education should also provide for patient to "teach back" in order to demonstrate their understanding of what they should do in an acute cardiac event.
2. Develop/provide patients education materials around use of aspirin (unless contraindicated) and interventions around modifiable risk factors.
3. Provide patient education around the use and benefits of angiotensin-converting enzymes (ACE inhibitors) and/or angiotensin II receptor blockers (ARBs).

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## Related ICSI Scientific Documents

### Guidelines

- [Diagnosis and Treatment of Chest Pain and Acute Coronary Syndrome \(ACS\)](#)
- [Heart Failure in Adults](#)
- [Hypertension Diagnosis and Treatment](#)
- [Lipid Management in Adults](#)
- [Major Depression in Adults in Primary Care](#)
- [Diagnosis and Management of Type 2 Diabetes Mellitus](#)
- [Preventive Services for Adults](#)
- [Prevention and Management of Obesity in Adults and Mature Adolescents](#)
- [Primary Prevention of Chronic Disease Risk Factors](#)

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# Algorithm Annotations

## Main Algorithm Annotations

### 1. Patient with Stable Coronary Artery Disease

This guideline applies to patients with coronary artery disease either with or without angina. Examples include patients with prior myocardial infarctions, prior revascularization (e.g., percutaneous transluminal coronary angioplasty [PTCA], coronary artery bypass graft [CABG]), angiographically proven coronary atherosclerosis, or reliable non-invasive evidence of myocardial ischemia.

A patient presenting with angina must meet all the following criteria (*Rutherford, 1992 [R]; Hurst, 1990 [R]; Shub, 1990 [R]*):

- Symptom complex has remained stable for at least 60 days
- No significant change in frequency, duration, precipitating causes or ease of relief of angina for at least 60 days
- No evidence of recent myocardial damage

The patient may already have undergone some diagnostic workup as a result of a prior presentation of chest pressure, heaviness and/or pain with or without radiation of the pain and/or shortness of breath. The clinician should have heightened awareness that many patients have atypical symptoms that reflect cardiac ischemia, especially women and the elderly. Initial care of such patients falls under the auspices of the ICSI [Diagnosis and Treatment of Chest Pain and Acute Coronary Syndrome \(ACS\)](#) guideline.

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### 2. Perform Appropriate History, Physical Examination, Laboratory Studies and Patient Education

Thorough history taking and physical examination, including medication and compliance reviews, are important to confirm diagnosis, to assist in risk stratification, and to develop a treatment plan (*Rutherford, 1992 [R]; Shub, 1990 [R]*). Important points to elicit on history taking are:

- recognition that women may have atypical symptoms of cardiac ischemia. These may include fatigue, shortness of breath (SOB) without chest pain, nausea and vomiting, back pain, jaw pain, dizziness and weakness (*Harvard Medical School, 2005 [R]; Kordella, 2005 [R]; Bell, 2000 [R]*);
- history of previous heart disease;
- possible non-atheromatous causes of angina pectoris (e.g., aortic stenosis);
- comorbid conditions affecting progression of coronary artery disease;
- symptoms of systemic atherosclerosis (e.g., claudication, transischemic attack [TIAs] and bruits); and
- severity and pattern of symptoms of angina pectoris.

The physical examination should include a thorough cardiovascular examination, as well as evaluation for evidence of hyperlipidemia, hypertension, peripheral vascular disease, heart failure, anemia, thyroid disease, and renal disease.

Initial laboratory studies should include an electrocardiogram and a fasting lipid profile (total cholesterol, HDL-cholesterol, calculated LDL-cholesterol and triglycerides). Further tests, based on history and physical

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examination findings, may include chest x-ray, measurement of hemoglobin, and tests for diabetes, thyroid function, and renal function.

An important aspect to treatment of stable coronary artery disease is education to help the patient understand the disease processes, prognosis, treatment options, and signs of worsening cardiac ischemia so that prompt medical assistance is sought when necessary and appropriate. Education may be accomplished in a number of ways among the various medical groups. It may be ongoing, occur in a formal class, and/or be done at the provider visit. Instruction on the proper use of aspirin and sublingual nitroglycerin, as needed, should also be reviewed at this time.

### Shared Decision-Making

Stable coronary artery disease patients can experience clinical situations, most often symptoms of angina or other signs of coronary ischemia, that lead to decision options they face with their family and clinicians. These decisions may involve stress imaging and coronary angiography; based on these results, further discussion involves the cardiologist, the primary care provider and sometimes a cardiovascular surgeon. All attempts should be made to clearly discuss and outline the different risks and benefits of medical therapy combined with or as an option to revascularization therapies. While the patient and primary care provider often depend greatly on the expertise of the specialists, every attempt should be made to share decision-making with the patient, especially when alternative treatment options yield similar clinical benefits. This can be done via personal care conferences involving the patient's family and providing relevant clinical data. Other tools, such as Web-based decision-making tools, may be useful in certain clinical situations.

An example of this is the Ottawa decision support tool, which helps the patient evaluate his or her decisions in light of personal values and other contributing factors; please go to: <http://decisionaid.ohri.ca/decguide.html> for the Ottawa Decision Aid guide.

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### 3. Non-Atherogenic Causes (e.g., Aortic Stenosis)?

Aortic stenosis is an important non-atherogenic cause of angina. This and any other non-atherogenic causes are considered to be outside the scope of this clinical guideline (*Shub, 1990 [R]*).

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### 5. Address Modifiable Risk Factors and Comorbid Conditions

Comorbid conditions that could affect myocardial ischemia may include hypertension, anemia, thyroid disease, hypoxemia and others.

Modifiable risk factors for coronary heart disease need to be evaluated and may include smoking, inadequate physical activity, depression, hyperlipidemia, obesity, hypertension and diabetes mellitus. Intervention involving any risk factor pertinent to the patient is encouraged and may include education, goal setting, and follow-up as necessary (*Rutherford, 1992 [R]*; *Shub, 1990 [R]*).

Please see [Appendix A, "Comorbid Conditions,"](#) for treatment recommendations in the presence of comorbid conditions.

#### Emerging Risk Factors

An association between homocysteine levels and cardiovascular disease has been demonstrated. The NORVIT trial and HOPE 2 trial found that folate and vitamins B6 and B12 did not reduce the risk of recurrent cardiovascular events in patients with vascular disease. These supplements cannot be recommended as routine treatment in patients with stable coronary artery disease (*Bønaa, 2006 [A]*; *HOPE 2 Investigators, 2006 [A]*).

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In select patients, clinicians may want to consider obtaining a lipoprotein (a) and highly sensitive C-reactive protein (hsCRP) (*Ridker, 2005 [A]*). Highly sensitive C-reactive protein and related markers of inflammation may provide useful prognostic information and help guide further therapy for patients with coronary artery disease.

### **Influenza**

Patients with cardiovascular disease should have an influenza vaccination as recommended by the American College of Cardiology/American Heart Association (ACC/AHA) Chronic Stable Coronary Artery Disease guideline (*Smith, 2006 [R]*).

### **Smoking**

Cigarette smoking may cause an acute cardiac ischemic event and may interfere with the efficacy of medications to relieve angina.

Please refer to the [ICSI Preventive Services for Adults](#) guideline for recommendations regarding smoking cessation.

### **Sedentary Activity Level**

An important aspect of the provider's role is to counsel patients regarding appropriate work, leisure activities, eating habits and vacation plans. Patients should be encouraged to exercise regularly to obtain cardiovascular benefit and to enhance their quality of life. The American College of Cardiology (ACC) endorses a minimum schedule of 30-60 minutes of aerobic activity (walking, jogging, etc.) three to four times per week, supplemented by an increase in daily lifestyle activities (walking breaks at work, gardening, etc.). Medically supervised programs are recommended for moderate- to high-risk patients. Exercise can be an important adjunct to modification of risk factors such as hypertension, hyperlipidemia and obesity. In addition, it can enhance patients' perception of their quality of life. Strenuous activities should be modified if they produce severe or prolonged angina; caution is needed to avoid consistent reproduction of ischemic symptoms or situations that may precipitate ischemic complications. Education is critical in achieving these goals. A study (*Hambrecht, 2005 [A]*) showed less progression of coronary artery disease and significantly fewer ischemic events in patients who regularly exercised.

### **Depression**

Depressive symptoms are common in patients with stable coronary artery disease patients, with prevalence estimates ranging from 15% to 30% (*Kop, 2001 [R]*). The American Heart Association recommends that depression be routinely screened for and appropriately treated in patients with coronary heart disease (*Lichtman, 2008 [R]*). A tool such as the PHQ-9 can be useful to support the patient in processing the changes they are experiencing (*Hansen, 2003 [R]*).

In The Heart and Soul Study, a prospective cohort study by Whooley, patients with depressive symptoms, defined as a PHQ-9 score of  $\geq 10$ , were significantly more likely to experience a cardiovascular event over a mean of 4.8 years. This difference was largely explained by behavioral factors, especially physical inactivity, that was greater in depressed patients (*Whooley, 2008 [B]*).

A study by Glassman using sertraline in SCAD patients with major depression found clinical efficacy without significant cardiac side effects. There was a trend toward fewer severe cardiac events in the sertraline-treated group (*Glassman, 2002 [A]*). Please see the [ICSI Major Depression in Adults in Primary Care](#) guideline for more information on the treatment of depression.

### **Hyperlipidemia**

A fasting lipid profile should be evaluated for appropriate patients with stable coronary artery disease. Secondary prevention is important in these patients, who should be treated aggressively for hyperlipidemia.

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Many patients will require both pharmacologic and non-pharmacologic interventions to reach target goals. Target goals for hyperlipidemic patients with coronary artery disease include:

LDL – less than 100 mg/dL for all patients, ideal less than 70 mg/dL especially for high-risk patients

HDL – 40 mg/dL or greater

Triglycerides – less than 150 mg/dL

Please refer to the ICSI [Lipid Management in Adults](#) guideline for recommendations on lowering lipid levels.

### Obesity

The American Heart Association considers obesity to be a major risk factor for coronary artery disease. Obesity is defined as a body mass index greater than or equal to 30. BMI provides a reasonable indicator of excess body fat that may lead to health problems. Obesity is a major risk factor for cardiovascular disease, certain types of cancer, dyslipidemia, hypertension and type 2 diabetes. Two-thirds of adults are overweight or obese (*National Institutes of Health, 1998 [R]*).

Waist circumference (WC) is also an important measurement because evidence suggests that abdominal fat is particularly a strong determinant of cardiovascular risk in those with a BMI of 25-34.9 kg/m<sup>2</sup>. Men are at high relative risk if they have a WC greater than 40 inches; women are at high risk if they have a WC > 35 inches.

The initial target goal of weight-loss therapy for overweight patients is to decrease body weight by about 10%. The rationale for this initial goal is that even moderate weight loss, e.g., 10% of initial body weight, can significantly decrease the severity of obesity-associated risk factors.

### Hypertension

General health measures include the treatment of hypertension, which is not only a risk factor for development and progression of atherosclerosis, but also causes cardiac hypertrophy, augments myocardial oxygen requirements, and thereby intensifies myocardial ischemia in patients with obstructive coronary disease.

Please refer to the ICSI [Hypertension Diagnosis and Treatment](#) guideline for recommendations regarding blood pressure management. The recommended target blood pressure is 140/90 mmHg or less. Based on current evidence, pursuing blood pressure goals lower than < 140/90 should be considered on an individual patient basis based on clinical judgment and patient preference (*ACCORD Study Group, 2010 [A]*, *Cooper-DeHoff, 2010 [M]*). Please see ICSI [Hypertension Diagnosis and Treatment](#) guideline for more information.

### Diabetes

Diabetes is associated with a marked increase in coronary artery disease. Patients with diabetes without known coronary artery disease have as high risk of a myocardial infarction as patients without diabetes with coronary artery disease. Therefore, patients with diabetes should have aggressive lipid and blood pressure management (similar to patients with coronary artery disease), and should be treated per the recommendations of the ICSI [Diagnosis and Management of Type 2 Diabetes Mellitus in Adults](#) guideline, ICSI [Lipid Management in Adults](#) guideline and ICSI [Hypertension Diagnosis and Treatment](#) guidelines.

Please refer to the ICSI [Management of Type 2 Diabetes Mellitus](#) guideline for recommendations regarding management of diabetes.

Every attempt should be made to achieve meticulous glucose control in patients with diabetes, because there is a clear relationship between lower hemoglobin A1c's and lower risk of myocardial infarction (*Haffner, 1998 [B]*). In the UKPDS (*United Kingdom Prospective Diabetes Study Group, 1998 [A]*), obese patients with type 2 diabetes who were treated with metformin showed a statistically significant reduction in rates

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of myocardial infarction, suggesting metformin as a possible therapy of choice for these patients. A meta-analysis (*Selvin, 2004 [M]*) showed a 20% increase in cardiovascular events and mortality for every 1% increase in HbA<sub>1c</sub> over 5%.

The Action to Control Cardiovascular Risk in Diabetes (ACCORD) trial showed an increase rate of mortality in the intensive treatment arm compared to the standard arm (hazard ratio of 1.22), and there was a similar increase in cardiovascular deaths (*ACCORD, 2008 [A]*). Many of these patients were treated with insulin and multiple oral agents, with a target of A1c < 6. There were more hypoglycemic reactions in the intensively treated group, and more weight gain compared to the standard treatment group. Compared to other trials of intensive control, patients in the ACCORD trial may have had diabetes for a longer period of time and started with a higher A1c before entering the intensive treatment arm. Implications for SCAD patients can be summarized in a joint paper published by the American Diabetes Association, the American College of Cardiology, and the American Heart Association (*Skyler, 2009 [R]*). In general, older, more frail SCAD patients with more comorbid disease (like chronic kidney disease) may be at greater risk for hypoglycemia and other complications of intensive diabetes therapy; perhaps patients such as these should be allowed higher A1c goals, such as maintaining A1c < 8.0. Other SCAD patients with a more recent diagnosis of diabetes, and those with less risk for hypoglycemia and other complications of intensive treatment will still warrant aggressive therapy to a target of < 7.0. For all patients, lifestyle modification, including exercise, smoking cessation, achieving and maintaining ideal body weight, and proven risk factor reduction (*Boden, 2007 [A]*) will continue to be the focus of primary and secondary cardiovascular disease prevention. The A1c goal ought to be individualized based on each patient's particular cardiovascular risk factors.

### Hormone Therapy (HT)

The HERS II trial showed no cardioprotective benefit from hormone therapy, and in fact showed an increase in risk of other complications (breast cancer, venous thromboembolism, etc.) (*Hulley, 1998 [A]*). Risk-benefit analyses unequivocally support NOT starting hormone therapy for primary prevention. Should a patient already on hormone therapy present with acute coronary syndrome or be at risk for venous thromboembolism (e.g., prolonged immobilization), hormone therapy should be discontinued immediately. Clinical judgement is required in making the decision whether to continue hormone therapy in other circumstances.

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## 6. Assessment Yields High Risk of Adverse Event?

Some patients are considered to be at high risk for infarction or death on the basis of history, physical examination and initial laboratory findings. Patients presenting with accelerating symptoms of angina (NYHA (New York Heart Association) Class III or IV, see [Appendix C, "Grading of Angina Pectoris"](#)), symptoms of peripheral vascular disease, or symptoms of left ventricular dysfunction should be referred to a cardiologist unless precluded by other medical conditions.

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## 7. Need for Prognostic Testing?

Prognostic testing is appropriate for patients in whom risk determination remains unclear after initial evaluations have been completed, or in whom cardiac catheterization is deemed inappropriate by the cardiologist. Prognostic testing may precede or follow an initial course of pharmacological therapy (*Shub, 1990 [R]*; *Frye 1989 [R]*). Please see ACC/AHA guideline on stress testing, which is an excellent resource for determining appropriate testing. Specific test depends on the expertise of your organization (*Balady, 2002 [R]*).

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## 8. Patient/Electrocardiogram Allows Exercise Electrocardiography?

Sensitivity of exercise electrocardiography (Masters 2-Step Exercise Test, Graded Exercise Test, Bicycle Test, Ergometry) may be reduced for patients unable to reach the level of exercise required for near maximal effort, such as:

- patients taking beta-blockers;
- patients in whom fatigue, dyspnea or claudication symptoms develop; and
- patients with vascular, orthopedic or neurological conditions who cannot perform leg exercises.

Reduced specificity may be seen in patients with abnormalities on baseline electrocardiography, such as those taking digitalis medications, and in patients with left ventricular hypertrophy or left bundle branch block (*Rutherford, 1992 [R]*).

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## 9. Perform Exercise Electrocardiography

Most patients with normal resting electrocardiograms who can exercise and are not taking digoxin can undergo standard treadmill exercise testing.

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## 10. Perform Non-Invasive Imaging Study

A non-invasive imaging study such as myocardial perfusion scintigraphy or stress echocardiography should best meet the patient's needs while providing the most clinical usefulness and cost effectiveness within the provider's institution. An imaging study should be selected through discussion with the cardiologist or imaging expert (*Frye, 1989 [R]*).

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## 11. Results Yield High Risk of Adverse Event?

Exercise electrocardiography and prognostic imaging studies may yield results that indicate high, intermediate or indeterminate or low risk of adverse clinical events. High-risk patients should have a cardiology consultation unless they are not considered to be potential candidates for revascularization. Patients who are at intermediate or indeterminate risk may benefit from cardiology consultation and/or further non-invasive imaging if an exercise electrocardiogram has been performed. Low-risk patients can generally be managed medically, with a good prognosis. Low-risk patients may benefit from angiography if the diagnosis remains unclear; however, angiography is unlikely to alter outcome in these patients (*Rutherford, 1992 [R]*).

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## 12. Initiate/Modify Medical Therapy

In 2007 the COURAGE (Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation) trial implemented a rigorous therapeutic program for what has become known as Optimal Medical Therapy (OMT). Over a median of 4.6 years, 2,207 patients with objective evidence of myocardial ischemia were randomized to either percutaneous coronary intervention (PCI) plus OMT, or OMT alone. The primary composite outcome (death from any cause or non-fatal MI) and secondary outcomes (death, MI, cardiovascular accident) were no different between the two treatment arms (*Maron, 2010 [B]*).

Subsequent editorials and articles have focused on the results of this important trial. What is most apparent is the study patients received intensive lifestyle and pharmacologic intervention in clinic settings involving a

## **Algorithm Annotations**

highly structured clinical team including nurses, dieticians, and pharmacists. Such a team approach will likely be necessary to implement the rigorous details of the COURAGE OMT. The medications used in the trials were provided at no cost to patients during the trial (*Maron, 2010 [B]*).

- The risk factors and goals used in the COURAGE trial are as follows (*Maron, 2010 [B]*):
  - For smoking, the goal was cessation.
  - For dietary and saturated fat, the goal was < 30% and < 7% of calories.
  - For dietary cholesterol, the goal was < 200 mg/day.
  - For physical activity, the goal was 30-45 minutes of moderate intensity five times a week.
  - For body weight by BMI: for those with a 24-27.5 BMI, the goal is < 25 BMI; for those with > 27.5 BMI, the goal is 10% relative weight loss.
  - For blood pressure, the goal was < 130/85\*.
  - For LDL cholesterol, the goal was < 70 mg/dL.
  - For HDL cholesterol, the goal was > 40 mg/dL.
  - For triglyceride, the goal was < 150 mg/dL.
  - For diabetes HbA1c, the goal was < 7.0%.

\* Please note this goal is different than the one recommended in this guideline. This guideline recommends 140/90.

The actual algorithms and examples of lifestyle modification programs used in OMT during the COURAGE trial can be accessed in the online appendix of the Maron article at <http://content.onlineacc.org/cgi/content/short/55/13/1348> (*Maron, 2010 [B]*).

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### **13. Is Medical Treatment Effective?**

Effectiveness of pharmacologic treatment is measured by whether the anginal pain is controlled within the definition of stable coronary artery disease as stated in [Annotation #1, "Patient with Stable Coronary Artery Disease."](#)

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### **14. Follow Regularly to Assess Risk Factors, Profile, Responses to Treatment**

There is no consensus in the literature regarding frequency of follow-up; ongoing management needs and follow-up should be individualized (*Nease, 1995 [D]*).

Patient perception of symptoms may impact the effect of the symptoms on quality of life and medical management.

Please refer to [Appendix C, "Grading of Angina Pectoris,"](#) for information on grading angina pectoris.

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### **15. Worsening in Angina Pattern?**

A new occurrence of angina or a worsening in the chronic stable angina pattern is considered to be present when any of the following occur:

- The symptom complex becomes less stable.

## Algorithm Annotations

- There is change in frequency, duration, precipitating causes or ease in relief of angina.
- There is evidence of recent myocardial damage.

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## 16. Change Suggests Need for Cardiology Referral?

When such change is no longer managed by alterations in the pharmacologic therapy prescribed, cardiology consultation or referral for possible invasive intervention may be appropriate (*Gibbons, 2002 [R]; Shub, 1990 [R]*).

Please see [Appendix C, "Grading of Angina Pectoris,"](#) for information on grading angina pectoris.

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## 20. Percutaneous Transluminal Coronary Angioplasty (PCTA), Coronary Artery Bypass Graft (CABG) or Other Revascularization Procedures

The relative benefits of revascularization compared with medical therapy are enhanced by an increase in absolute number of severely narrowed coronary arteries, the degree of left ventricular systolic dysfunction and the magnitude of myocardial ischemia. Among patients with lesser disease, percutaneous transluminal coronary angioplasty and coronary artery bypass graft have not been shown to reduce mortality or the risk of myocardial infarction, but do reduce the symptoms of angina and the intensity of antianginal therapy, as well as increase exercise capacity.

The COURAGE trial was a randomized controlled trial involving 2,287 patients with at least 70% stenosis in *at least one* coronary artery. They were randomized to either percutaneous transluminal coronary angiography (PTCA)/stenting or aggressive medical therapy. These patients were followed for a median of 4.6 years. The primary outcome was death from any cause and non-fatal myocardial infarction. Drug eluting stents weren't used, and some think that may make a difference.

(*Boden, 2007 [A]; Ryan, 1993 [R]; Kirklin, 1991 [R]; Frye, 1989 [R]; Bourassa, 1988 [R]*).

Although the actual intervention of an invasive modality such as angiography, percutaneous transluminal coronary angioplasty or coronary artery bypass graft is outside this guideline and may be found within another, those patients undergoing such procedures may, at best, be restored to a chronic stable anginal pattern, thus continuing to receive medical treatment under the purview of this guideline.

Aggressive modification of cardiac risk factors in the COURAGE trial should be pursued if similar clinical results are to be obtained.

These interventions include (when clinically appropriate):

- Metoprolol XL, amlodipine and/or isosorbide mononitrate, with lisinopril or losartan
- Aggressive statin therapy alone or in combination to target LDL of 70 mg per deciliter. Note: all statins were added in the COURAGE trial
- After LDL target achieved, attempt to raise HDL to > 40 mg/dL AND lower triglyceride to < 150 mg/dL with exercise, niacin SR, or fibrates, alone or in combination
- Antiplatelet therapy

(*Boden, 2007 [A]*)

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## Pharmacologic Algorithm Annotations

### 21a. Patient Education and Review Principles of Medication Therapy

#### Antiplatelet Therapy

The use of one aspirin tablet daily (81-162 mg) is strongly recommended unless there are medical contraindications (*Kurth, 2003 [A]*; *CAPRI, 1996 [A]*; *Antiplatelet Trialists' Collaboration, 1994 [A]*; *Fuster, 1993 [R]*; *Juul-Möller, 1992 [A]*; *Ridker, 1991 [A]*).

The *Antithrombotic Trialists' Collaboration* is a meta-analysis that analyzed 287 studies involving 135,000 patients for different aspects of antiplatelet therapy. When comparing the 500-1,500 mg versus 160-325 mg versus 75-150 mg daily regimens of aspirin in multiple trials, there was a trend of reduction in vascular events with decreased dose (odds reduction: 19% versus 26% versus 32%, respectively) (*Antithrombotic Trialists Collaboration; 2002 [M]*). Although the meta-analysis concludes that risk of gastrointestinal bleed was similar among doses 325 mg or less, other studies such as the CURE study showed increased bleeding risk with increasing the dose, without any increase in efficacy (*Peters, 2003 [A]*).

The authors conclude that aspirin dose in the range of 75-150 mg should be given for the long-term prevention of serious vascular events in high-risk patients, and that there may be a reduced benefit when increasing the dose over 150 mg daily. Doses available to most clinicians are in increments of 81 mg; therefore, the recommended dose range is 81-162 mg daily.

A multicenter case-controlled study by Kelly et al. on 550 incident cases of first-time major upper gastrointestinal bleed showed that the relative risks of bleeding in patients taking plain, enteric-coated and buffered aspirin at average daily dose of 325 mg or less were 2.6, 2.7 and 3.1, respectively (*Kelly, 1996 [C]*). The study cites few other endoscopic studies showing the opposite (gastro-protection of enteric-coated aspirin), but explains such differences by differences in trial design and population characteristics.

It remains difficult to conclude whether enteric-coated aspirin is gastro-protective or not, but clinicians should not assume that it is any safer than regular or buffered aspirin, and should treat it with the same level of caution.

Patients for whom aspirin is contraindicated (or insufficient) should be treated with clopidogrel 75 mg daily indefinitely (*Harrington, 2004 [R]*). The recently published CHARISMA trial involved 15,603 patients with vascular disease or multiple atherothrombotic risk factors who were randomized to clopidogrel (75 mg daily) plus low-dose aspirin (75-162 mg daily) or placebo plus low-dose aspirin.

After a median follow-up of 28 months, there was no difference between the two groups in the trial's primary composite end point of myocardial infarction, stroke or death from cardiovascular causes, with an increased risk of moderate bleeding in the clopidogrel group. Rate of hospitalization was lower in the clopidogrel group when compared with placebo. Subgroup analysis showed (marginally significant) reduction in primary end point in those with documented atherothrombotic disease on the clopidogrel protocol. In contrast, those without documented atherothrombotic disease and only risk factors on the clopidogrel protocol had higher incidence of death from all causes and from cardiovascular causes. Accordingly, addition of clopidogrel to aspirin in stable coronary artery disease patients comes with little benefit and some cost, and should not be recommended on routine basis. However, there may be proven benefits of clopidogrel such as in the setting of acute vascular injury (percutaneous transluminal coronary angioplasty or acute coronary syndromes) or in selected patients with ongoing ischemic events on aspirin therapy (*Bhatt, 2006 [A]*).

In appropriately selected patients, an aspirin dose of 81 mg is recommended for patients who are on chronic clopidogrel therapy. Different doses of aspirin may apply in the setting of acute coronary syndrome; refer to the [ICSI Diagnosis and Treatment of Chest Pain and Acute Coronary Syndrome \(ACS\)](#) guideline for aspirin dosing.

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[www.icsi.org](http://www.icsi.org)

## Algorithm Annotations

Examples of precautions/contraindications to aspirin are:

- Patients allergic to aspirin
  - Dose-related intolerance is not a contraindication for taking aspirin
- Patients with gastrointestinal disorders
  - Recent gastrointestinal bleeding and active treatment for peptic ulcer disease are contraindications.
  - The use of H-2 antagonists or proton pump inhibitor (PPI) is not a contraindication to aspirin use.
  - Consideration should be given for low-dose enteric-coated (81 mg) aspirin for patients with a questionable history of gastrointestinal disorders.
- Patients with recent intracranial bleeding
  - Intracranial bleeding within the past six weeks is a contraindication.
  - Any history of intracranial bleeding necessitates evaluation on a case-by-case basis.
- Patients with bleeding disorders or those receiving other anticoagulants
  - Certain patients receiving anticoagulants may justifiably be on aspirin, as well.
- Patients with uncontrolled hypertension
  - Systolic blood pressure is greater than 180 mmHg.
  - Diastolic blood pressure is greater than 110 mmHg.
- Patients regularly taking non-steroidal anti-inflammatory drugs (NSAIDs)
  - Combined use of aspirin and non-steroidal anti-inflammatory drugs may increase the risk of bleeding. Enteric-coated aspirin with careful monitoring for clinical signs of gastropathy may be an acceptable strategy for patients regularly taking non-steroidal anti-inflammatory drugs. Use of non-steroidal anti-inflammatory drugs and COX-2 inhibitors may reduce the cardioprotective benefits of aspirin. Regular, not intermittent, use of non-steroidal anti-inflammatory drugs inhibit the clinical benefits of aspirin. Caution should be used in prescribing COX-2 inhibitors to patients with coronary artery disease, because there is evidence of a class effect on cardiovascular risks (*U.S. Food and Drug Administration, 2006 [R]; Bresalier, 2005 [A]; Nussmeier, 2005 [A]; Solomon, 2005 [A]; Mukherjee, 2001 [R]*).

In patients who have undergone drug-eluting stent (DES) placement for treatment of coronary artery disease, continuation of dual antiplatelet therapy with aspirin and clopidogrel (75 mg each day) is strongly recommended for a period of at least one year in the absence of contraindications (*Grines, 2007 [R]*). The importance of continued dual antiplatelet therapy during this period should be discussed with patients in an effort to improve compliance, and instructions should be given to contact a health care provider prior to discontinuation of antiplatelet therapy for elective surgical or dental procedures. Due to the risk of catastrophic stent thrombosis, cessation of antiplatelet therapy should be carefully considered during the first year after drug-eluting stent (DES) implantation and particularly during the first three (post-sirolimus-eluting stent) or six months (paclitaxel-eluting stent). In combination with clopidogrel, the dose of aspirin should remain 325 mg each day for at least three months after sirolimus-eluting stent implantation or at least six months after paclitaxel-eluting stent implantation, after which time the dose can be lowered to 75-162 mg each day in combination with clopidogrel (*Grines, 2007 [R]*). Aspirin should be prescribed to all patients with stable

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## Algorithm Annotations

coronary disease. If the patient is aspirin intolerant, use clopidogrel. See the ICSI [Antithrombotic Therapy Supplement](#) for more information.

### Statins

Many patients will require both pharmacologic and non-pharmacologic interventions to reach target goals. Target goals for hyperlipidemic patients with coronary artery disease include:

LDL – less than 100 mg/dL for all patients, ideal less than 70 mg/dL especially for high-risk patients

HDL – 40 mg/dL or greater

Triglycerides – less than 150 mg/dL

There is now an *ideal* LDL-C goal of less than 70 mg/dL for patients considered to be very high risk. Several trials have shown clinical benefit using high-dose statins to treat to lower LDL levels. The Treat to Numbers Trial (TNT) assigned 10,001 patients with stable coronary artery disease to either 80 mg atorvastatin with achieved LDL level of 77 mg/dL or a 10 mg dose with LDL level of 101 mg/dL, and followed them for a median of 4.9 years. In the high-dose group there was a 22% relative reduction in the primary outcome of death from coronary heart disease, non-fatal myocardial infarction, cardiac arrest and stroke. There was no reduction in overall mortality due to a 25% increase in non-cardiovascular deaths in the high-dose atorvastatin group. Another concern was significantly higher rates of side effects in the high-dose group, including myalgias and elevated liver enzymes; this higher rate of side effects occurred even with a run-in period that excluded patients intolerant to the study drug (*LaRosa, 2005 [A]*). The Prove It TIMI-22 trial compared 4,162 patients with acute coronary syndrome treated with 80 mg of atorvastatin to 40 mg of pravastatin, and followed for a mean of 24 months. The atorvastatin group achieved an LDL level of 62 mg/dL, and the pravastatin group had an average LDL level of 95 mg/dL. There was a 16% reduction in the hazard ratio for the combined primary end point death, myocardial infarction, unstable angina, need for revascularization, and stroke. Most of the benefit occurred within 30 days of randomization and was unaccompanied by further incremental benefit through the end of the follow-up period (*Ridker, 2005 [B]*).

At present the clinician will need to individualize therapy with statins by the degree of risk in their patients, considering a target LDL of 70 or less, especially for patients at highest risks as described by Grundy (2004). Very high risk patients include patients with established cardiovascular disease plus any of the following: 1) multiple major risk factors, such as diabetes; 2) severe or poorly controlled risk factors, especially smoking; 3) metabolic syndrome associated risk factor (triglycerides greater than 200 mg/dL, HDL less than 40 mg/dL); and 4) patients with acute coronary syndromes. The benefits in reducing cardiac events with high-dose statin therapy will need to be weighed against the higher potential for side effects, and the potential for increased non-cardiac mortality as seen in the TNT trial, which is either real or due to chance. Further trials comparing different treatment intensities of statins should bring more clarity regarding which patients benefit most with the least side effects (*LaRosa, 2005 [A]*).

Benefit has been demonstrated in all stable coronary artery disease patients treated with statins, regardless of pretreatment cholesterol levels. This was well demonstrated in the MRC/BHF Heart Protection Study (*Heart Protection Study Collaborative Group, 2002 [A]*). Simvastatin was shown to reduce major cardiovascular events, including death, non-fatal myocardial infarction, and stroke by 15%-20% in the subgroup of patients with pretreatment levels of less than 100 mg/dL. A similar reduction in events was also observed in patients without documented coronary artery disease, but with peripheral vascular disease, diabetes or hypertension.

This recommendation reflects the analysis of the National Cholesterol (NCEP) report, the American College of Cardiology/American Heart Association (ACC/AHA) Chronic Stable Angina guideline, and compelling evidence of mortality reduction from multiple clinical trials (*Grundy, 2004 [R]*; *Gibbons, 2002 [R]*; *Heart Protection Study Group, 2002 [A]*; *Hunninghake, 1998 [A]*).

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## Algorithm Annotations

Please refer to the ICSI [Lipid Management in Adults](#) guideline for recommendations on cholesterol lowering.

Every effort should be made to ensure all patients with coronary artery disease receive optimal lipid therapy. Statin medications are strongly supported as first-line medications due to compelling evidence of mortality reduction from multiple clinical trials (*Hunninghake, 1998 [A]*; *Sacks, 1996 [A]*; *Scandinavian Simvastatin Survival Study Group, 1994 [A]*).

If patients are intolerant to a statin, clinicians are strongly encouraged to have the patient try other statins in reduced doses before ruling out all statins.

The PROSPER trial showed a significant risk reduction in myocardial infarction in the elderly; therefore, age alone should not preclude treatment. The Heart Protection Study also showed benefit in patients up to age 80 years (*Heart Protection Study Group, 2002 [A]*; *Shepherd, 2002 [A]*).

Patients with chronic stable coronary artery disease should be on statin therapy regardless of their lipid levels unless contraindicated.

### As-Needed Nitrates

In patients with mild, stable coronary artery disease, drug therapy may be limited to short-acting sublingual nitrates on an as-needed basis. Use of lower dose (e.g., 0.3 mg or one-half of a 0.4 mg tablet) may reduce the incidence of side effects such as headache or hypotension in susceptible patients.

For more information regarding drug selection, please see [Appendix B, "Medication Tables."](#)

### Beta-Blocking Agents

Beta-blockers should be used in all status post-myocardial infarction patients, based on studies showing mortality reduction. They are also the preferred first-line therapy for reducing symptoms of angina in patients with stable coronary artery disease. Drugs with intrinsic sympathomimetic activity should be avoided. Abrupt withdrawal of all beta-blockers should be avoided (*Cucherat, 1997 [A]*; *Shub, 1990 [R]*; *Frye, 1989 [R]*).

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## 21b. Nutritional Supplement Therapy

The American Heart Association (*Gibbons, 2002 [R]*) recommends inclusion of omega-3 fatty acids in patients with stable coronary artery disease because of evidence from randomized controlled trials. The GISSI study (*GISSI-Heyenzione Investigators, 1999 [A]*), using 850 mg of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) daily, showed a 20% overall mortality reduction, and a 45% reduction in sudden death. The JELIS trial used 1.8 grams EPA supplement daily and showed 19% relative reduction in major coronary events after mean follow-up of 4.6 years (*Yokoyama, 2007 [A]*). Other studies showing benefit include the DART trial and the Lyon trial, and data have been recently summarized by meta-analysis indicating significant reduction in risk of sudden death and overall mortality (*Bucher, 2002 [M]*; *Kris-Etherton, 2002 [R]*; *deLorgeril, 1999 [A]*; *Burr, 1989 [A]*).

The recommended daily amount of omega-3 fatty acids in patients with stable coronary artery disease is 1 gram of eicosapentaenoic acid (EPA) plus docosahexaenoic acid (DHA) by capsule supplement or by eating at least two 4-ounce servings per week of fatty fish. The amounts of omega-3 fatty acids in various foods are found in [Appendix D, "Omega-3 Fatty Acids."](#) To obtain the recommended daily amount of 1,000 mg EPA plus DHA per day, patients ought to be counseled in the proper way to interpret the supplement label. The goal is to consume 1,000 mg of EPA plus DHA, but not all omega-3 in a fish oil concentrate is EPA and DHA. The product label defines what constitutes a dose. Because there is variation in doses across products, it is necessary to calculate the EPA and DHA amount per dose, and consume the number of doses that together equate one gram (*Lee, 2008 [R]*). For example, if one serving size is two softgels, each serving

## Algorithm Annotations

containing 360 mg EPA plus 240 mg DHA, one would take two servings (four softgels) to attain the recommended dose of at least 1,000 mg of EPA plus DHA per day.

In addition to EPA and DHA supplements, patients with stable coronary artery disease should be encouraged to follow a diet rich in alpha-linolenic acid (ALA). According to published data, 1.5 gram-3 grams ALA per day appears to benefit the general population, and those at risk of heart disease also demonstrate benefit (based on level III evidence) (*Kris-Etherton, 2002 [R]*). Plant-based sources of omega-3 fatty acids would be ground flax seed, flax seed oil, walnuts, walnut oil, canola oil, soybeans and soybean oil. Fish meals can be difficult for patients to maintain, and there are issues of potential environmental contaminants including mercury, polychlorinated biphenyl (PCB), dioxin and others. Because of this, capsule supplements may be preferred, although there is no uniformity of EPA and DHA content or purity. Patients should consult their health providers or nutritionists regarding this issue.

Dietary and non-dietary intake of n-3 polyunsaturated fatty acids may reduce overall mortality, mortality due to myocardial infarction, and sudden death in patients with stable coronary artery disease (*DeFilippis, 2010 [R]*).

High doses of vitamin E supplement (greater than 400 IU/day) may increase or cause mortality and should be avoided (*Lee, 2005 [A]*; *Miller, 2005 [M]*).

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### 21c. Use of ACE Inhibitors for Risk Reduction

Among patients with stable angina, ACE inhibitors are most beneficial to patients with left ventricular dysfunction post-myocardial infarction, persistent hypertension and diabetes (*HOPE Study Investigators, 2000 [A]*). Patients with normal left ventricular function who also have hypertension, type II diabetes mellitus or chronic kidney disease should be on ACE inhibitors (*European Trial on Reduction of Cardiac Events with Perindopril in Stable Coronary Artery Disease Investigators 'EUROPA', 2003 [A]*; *HOPE Study Investigators, 2000 [A]*). If the patient cannot tolerate ACE inhibitors, a potential substitute would be angiotensin II receptor blockers (*Mann, 2008 [A]*). Results of the PEACE trial showed no statistically significant benefit for patients with stable coronary artery disease with preserved left ventricular function who are receiving "current standard" therapy, including statins (*PEACE Trial Investigators, 2004 [A]*).

A recent meta-analysis of five placebo randomized controlled trials involving different ACE inhibitors showed reduction in all-cause and cardiovascular mortality, as well as myocardial infarction, that were statistically significant. The degree of benefit needs to be assessed individually and may depend on patient characteristics (*Danchin, 2006 [M]*).

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### 21d. Does Patient Need Daily Antianginal Therapy?

The decision to initiate daily drug therapy for coronary artery disease is based upon the symptom complex of the patient in combination with findings from the history, physical examination, laboratory studies and prognostic testing (*ISIS-4, 1995 [A]*; *Gorlin, 1992 [R]*; *Rutherford, 1992 [R]*; *SOLVD Investigators, 1991 [A]*; *Shub, 1990 [R]*; *Frye, 1989 [R]*).

Ranolazine is not a first-line drug and should be used in conjunction with a cardiologist.

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## 21e. Prescribe Monotherapy

### Beta-Blocking Agents

Beta-blockers should be used in all status post-myocardial infarction patients, based on studies showing mortality reduction. They are also the preferred first-line therapy for reducing symptoms of angina in patients with stable coronary artery disease. Drugs with intrinsic sympathomimetic activity should be avoided. Abrupt withdrawal of all beta-blockers should be avoided (*Cucherat, 1997 [A]; Shub, 1990 [R]; Frye, 1989 [R]*).

### Long-Acting Nitrates

If beta-blockers cannot be prescribed as first-line therapy, nitrates are the preferred alternative first-line therapy because of efficacy, low cost and relatively few side effects. Tolerance to long-acting nitrates is an important clinical issue in some patients and can be avoided by appropriate daily nitrate-free intervals (*Cheitlin, 1999 [R]; Parker, 1998 [R]; Frye, 1989 [R]*).

### Adverse Interactions between Nitrates and Phosphodiesterase-5 Inhibitors

Patients with stable coronary artery disease should be advised that due to potentially life-threatening hypotension, phosphodiesterase-5 inhibitors (such as sildenafil, vardenafil and tadalafil) are absolutely contraindicated if they have used nitrates within the last 24 hours.

In any patient evaluated for acute coronary insufficiency, nitrates must also be avoided if there is a history of sildenafil or phosphodiesterase-5 inhibitor use in the previous 24-48 hours (avoid nitrates for 24 hours after sildenafil and vardenafil; avoid nitrates for 48 hours after tadalafil). All other interventions, including all non-nitrate antianginal medications may be used for these patients.

### Calcium Channel Blocker

For patients who are unable to take beta-blockers or long-acting nitrates, the use of calcium channel blockers has been shown to be clinically effective in decreasing symptoms of angina. Calcium channel blockers have not been proven to reduce mortality. Because beta-blockers have reduced mortality in the post-myocardial infarction period, they are the preferred agent for patients with stable coronary artery disease (*Shub, 1990 [R]*). Dihydropyridines as monotherapy may exacerbate angina.

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## 21g. Prescribe Combination Therapy

Combination therapy may be necessary in selected patients, but it increases side effects and cost. A combination of beta-blockers and long-acting nitrates is preferred because of cost, efficacy and reduced potential for adverse side effects (*Rutherford, 1992 [R]; Akhras, 1991 [A]; Tolins, 1984 [A]*). The following factors should be considered when beta-blockers and calcium channel blockers are combined (*Strauss, 1988 [R]*):

- This combination may not be better than either agent used alone in maximum tolerated doses.
- If angina persists at the maximum optimal dose of beta-blocker, addition of a calcium channel blocker is likely to reduce angina and improve exercise performance.
- Addition of verapamil or diltiazem to a beta-blocker does not usually enhance therapy and may precipitate symptomatic bradycardia, but addition of a beta-blocker to nifedipine can have enhanced effects.
- With left ventricular dysfunction, sinus bradycardia, or conduction disturbances, combination treatment with calcium channel blockers and beta-blockers should be avoided or initiated with caution. In patients with conduction system disease, the preferred combination is nifedipine and a beta-blocker.

**Algorithm Annotations**

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- The combination of dihydropyridines and long-acting oral nitrates is usually not optimal because both are potent vasodilators.
- If side effects prohibit increased doses but symptoms persist, selected patients may need low doses of multiple drug therapy.

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**21h. Combination Therapy Effective?**

If after several attempts at adjusting the medications, a therapeutic combination is not achieved for the patient, a cardiology consultation or referral may be appropriate.

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This section provides resources, strategies and measurement for use in closing the gap between current clinical practice and the recommendations set forth in the guideline.

The subdivisions of this section are:

- Aims and Measures
  - Measurement Specifications
- Implementation Recommendations
- Resources
- Resources Table

## Aims and Measures

1. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease (SCAD) who are prescribed aspirin and antianginal medications. (*Annotations #21a, 21c*)

Measure for accomplishing this aim:

- a. Percentage of patients with stable coronary artery disease who are prescribed aspirin (unless contraindicated).
2. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease who understand the self-management of their condition. (*Annotations #2, 21a*)

Measure for accomplishing this aim:

- a. Percentage of patients with stable coronary artery disease who have demonstrated an understanding of how to respond in an acute cardiac event by "teaching back" as to how they would respond in the case of acute cardiac event including the following:
    - Proper use of nitroglycerin
    - Consistent use of aspirin (unless contraindicated), or consistent use of clopidogrel as directed
    - When to call 911
3. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease who receive an intervention for modifiable risk factors. (*Annotation #5*)

Measures for accomplishing this aim:

- a. Percentage of patients who smoke with documentation in the medical record that advice to quit was provided and/or help to quit was provided.
- b. Percentage of patients with cardiovascular disease who receive an annual flu shot.
- c. Percentage of patients with documentation in the medical record of physical activity goal and when goal was met.
- d. Percentage of patients who were screened for depression using the PHQ-9 (see the ICSI Major Depression in Adults in Primary Care guideline).
- e. Percentage of patients with documentation in the medical record that an LDL was obtained within the last 12 months.
- f. Percentage of patients with documentation in the medical record with LDL less than 100 mg/dL\* within the last 12 months.  
\*Consider < 70 mg/dL for high-risk patients
- g. Percentage of patients with a body mass index (BMI) documented in the medical record within the last 12 months.
- h. Percentage of patients with a documented blood pressure in the medical record of 140/90 mmHg or less.

## **Aims and Measures**

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4. Increase the percentage of patients age 18 years and older with a diagnosis of stable coronary artery disease presenting with worsening angina symptoms who receive appropriate clinical evaluations. (*Annotations #15, 16*)

Measures for accomplishing this aim:

- a. Percentage of patients with documentation in the medical record of angina symptoms within the last 12 months.
  - b. Percentage of patients with accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indicating left ventricular function (LVF) dysfunction who were referred to a cardiologist (unless precluded by other medical conditions).
5. Increase the use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) in patients with stable coronary artery disease with systolic CHF (ejection fraction less than or equal to 40%), including those patients with a comorbidity diagnosis of chronic kidney disease and/or hypertension. (*Annotation #21c*)

Measures for accomplishing this aim:

- a. Percentage of patients with a diagnosis of SCAD with systolic CHF (ejection fraction less than or equal to 40%) who are prescribed an ACE inhibitor or ARB.
  - b. Percentage of patients with a diagnosis of stable coronary artery disease and chronic kidney disease who are prescribed an ACE inhibitor or ARB.
  - c. Percentage of patients with a diagnosis of stable coronary artery disease and hypertension who are prescribed an ACE inhibitor or ARB.
6. Increase the percentage of patients with a diagnosis of stable coronary artery disease who receive education around nutritional supplement therapy. (*Annotation #21b*)

Measure for accomplishing this aim:

- a. Percentage of patients with documentation in the medical record indicating that education was provided around the benefits of omega-3, and recommended daily amount of omega-3 fatty acids in patients with SCAD.
7. Increase appropriate stress imaging for stable coronary artery disease patients to determine risk stratification prior to decisions on medical therapy and revascularization.

Measure for accomplishing this aim:

- a. Percentage of patients with documentation in the medical record of prognostic testing preceding or following a course of pharmacologic therapy.

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## **Measurement Specifications**

### **Measurement #1a**

Percentage of patients with stable coronary artery disease who are prescribed aspirin (unless contraindicated).

### **Population Definition**

All patients age 18 and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients prescribed aspirin (unless contraindicated)}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

**Numerator:** Number of stable coronary artery disease patients who are prescribed aspirin (unless contraindicated).

Contraindications to aspirin use are not defined in the guideline (Annotation #12), but left to the provider's discretion. Some commonly found contraindications are allergy to the drug and history of bleeding ulcer or gastric hemorrhage. When contraindications are present, they need to be noted in the patient's record.

**Denominator:** Number of stable coronary artery disease patients. Patients with documented contraindications to aspirin should be excluded from the denominator of this measure.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis and would be eligible for aspirin prescription. Patients with contraindications to aspirin should be excluded from review. Review medical records to determine whether aspirin was prescribed unless contraindicated.

### **Time Frame Pertaining to Data Collection**

Data may be collected monthly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #2a**

Percentage of patients with stable coronary artery disease who have demonstrated an understanding of how to respond in an acute cardiac event by "teaching back" as to how they would respond in the case of acute cardiac event, including the following:

- Proper use of nitroglycerin
- Consistent use of aspirin (unless contraindicated), or consistent use of clopidogrel as directed
- When to call 911

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients who have demonstrated an understanding of how to respond in an acute cardiac event}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who have demonstrated an understanding of how to respond in an acute cardiac event by "teaching back" as to how they would respond in the case of acute cardiac event, including the following:

- Proper use of nitroglycerin
- Consistent use of aspirin (unless contraindicated), or consistent use of clopidogrel as directed
- When to call 911

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they demonstrated an understanding of how to respond in an acute cardiac event by "teaching back" as to how they would respond in the case of acute cardiac event, including the following:

- Proper use of nitroglycerin
- Consistent use of aspirin (unless contraindicated), or consistent use of clopidogrel as directed
- When to call 911

### **Time Frame Pertaining to Data Collection**

Data may be collected monthly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3a**

Percentage of patients who smoke with documentation in the medical record that advice to quit was provided and/or help to quit was provided.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis and smokers.

### **Data of Interest**

$$\frac{\text{\# of patients who received quit smoking advice}}{\text{\# of patients with stable coronary artery disease and smokers}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients and smokers who received an advice to quit and/or help to quit was provided.

Denominator: Number of stable coronary artery disease patients and smokers.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they were smokers and received an advice to quit and/or help to quit was provided.

### **Time Frame Pertaining to Data Collection**

Data may be collected monthly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3b**

Percentage of patients who received an annual flu shot.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients who received an annual flu shot}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who received an annual flu shot.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they received flu shot within last year.

### **Time Frame Pertaining to Data Collection**

Data may be collected monthly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3c**

Percentage of patients with documentation in the medical record of physical activity goal and when goal was met.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\# \text{ of patients with physical activity goal and when goal was met in the record}}{\# \text{ of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had documented physical activity goal and when goal was met.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had documented physical activity goal and when goal was met.

### **Time Frame Pertaining to Data Collection**

Data may be collected monthly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3d**

Percentage of patients who were screened for depression using the PHQ-9 (see the ICSI Major Depression in Adults in Primary Care guideline).

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with PHQ-9}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who were screened for depression using the PHQ-9 tool. For more information on PHQ-9 tool, see ICSI [Major Depression in Adults in Primary Care](#) guideline.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had PHQ-9 done.

### **Time Frame Pertaining to Data Collection**

Data may be collected semi-annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3e**

Percentage of patients with documentation in the medical record that an LDL was obtained within the last 12 months.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with LDL screening in the last 12 months}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had LDL screening within the last 12 months.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had LDL screening done within the last 12 months.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3f**

Percentage of patients with documentation in the medical record with LDL less than 100 mg/dL\* within the last 12 months.

\*Consider < 70 mg/dL for high-risk patients

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with LDL < 100 mg/dL}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had less than 70 mg/dL within the last 12 months.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had LDL < 70 mg/dL within the last 12 months.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #3g**

Percentage of patients with a body mass index (BMI) documented in the medical record within the last 12 months.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with BMI documented}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had BMI documented within the last 12 months.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had BMI documented within the last 12 months.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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**Aims and Measures**

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**Measurement #3h**

Percentage of patients with a documented blood pressure in the medical record of 140/90 mmHg or less.

**Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

**Data of Interest**

$$\frac{\text{\# of patients with blood pressure of 140/90 mmHg or less}}{\text{\# of patients with stable coronary artery disease}}$$

**Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had blood pressure of 140/90 mmHg or less.

Denominator: Number of stable coronary artery disease patients.

**Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had blood pressure of 140/90 mmHg or less within the last 12 months.

**Time Frame Pertaining to Data Collection**

Data may be collected annually.

**Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #4a**

Percentage of patients with documentation in the medical record of angina symptoms within the last 12 months.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with documentation of angina symptoms}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of stable coronary artery disease patients who had documentation of angina symptoms within the last 12 months.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had documentation of angina symptoms in the last 12 months.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #4b**

Percentage of patients with accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indicating left ventricular function (LVF) dysfunction who were referred to a cardiologist (unless precluded by other medical conditions).

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis, and accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indicating left ventricular function (LVF) dysfunction.

### **Data of Interest**

$$\frac{\text{\# of patients with referral to a cardiologist}}{\text{\# of patients with stable coronary artery disease and accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indication LVF dysfunction}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of patients who were referred to a cardiologist.

Denominator: Number of stable coronary artery disease patients and accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indicating left ventricular function (LVF) dysfunction.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis and accelerated symptoms of angina, symptoms or peripheral vascular disease, or symptoms indicating left ventricular function (LVF) dysfunction. Review medical records to determine whether they were referred to cardiologist.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #5a**

Percentage of patients with stable coronary artery disease with systolic CHF (ejection fraction less than or equal to 40%) who are prescribed an ACE inhibitor or ARB.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with prescription for an ACE inhibitor or ARB}}{\text{\# of patients with stable coronary artery disease with systolic CHF (ejection fraction less than or equal to 40%)}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of patients who had a prescription for an ACE inhibitor or ARB.

Denominator: Number of stable coronary artery disease patients with systolic CHF (ejection fraction less than or equal to 40%).

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis with systolic CHF (ejection fraction less than or equal to 40%). Review medical records to determine whether they had a prescription for an ACE inhibitor or ARB.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #5b**

Percentage of patients with a diagnosis of stable coronary artery disease and chronic kidney disease who are prescribed an ACE inhibitor or ARB.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis, and chronic kidney disease.

### **Data of Interest**

$$\frac{\text{\# of patients with prescription for an ACE inhibitor or ARB}}{\text{\# of patients with stable coronary artery disease and chronic kidney disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of patients who had a prescription for an ACE inhibitor or ARB.

Denominator: Number of stable coronary artery disease patients and chronic kidney disease.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis and chronic kidney disease. Review medical records to determine whether they had a prescription for an ACE inhibitor or ARB.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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**Aims and Measures**

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**Measurement #5c**

Percentage of patients with a diagnosis of stable coronary artery disease and hypertension who are prescribed an ACE inhibitor or ARB.

**Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis, and hypertension.

**Data of Interest**

$$\frac{\text{\# of patients with prescription for an ACE inhibitor or ARB}}{\text{\# of patients with stable coronary artery disease and hypertension}}$$

**Numerator/ Denominator Definitions**

Numerator: Number of patients who had a prescription for an ACE inhibitor or ARB.

Denominator: Number of stable coronary artery disease patients and hypertension.

**Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis and hypertension. Review medical records to determine whether they had a prescription for an ACE inhibitor or ARB.

**Time Frame Pertaining to Data Collection**

Data may be collected annually.

**Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #6a**

Percentage of patients with documentation in the medical record indicating that education was provided around the benefits of omega-3, and recommended daily amount of omega-3 fatty acids in patients with stable coronary artery disease.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with education on omega-3 and recommended daily intake of omega-3 fatty acids}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of patients who had education on the benefits of omega-3 and recommended daily intake amount of omega-3 fatty acids.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had education on the benefits of omega-3 and recommended daily intake amount of omega-3 fatty acids.

### **Time Frame Pertaining to Data Collection**

Data may be collected annually.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## **Aims and Measures**

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### **Measurement #7a**

Percentage of patients with documentation in the medical record of prognostic testing preceding or following a course of pharmacologic therapy.

### **Population Definition**

All patients age 18 years and older with stable coronary artery disease diagnosis.

### **Data of Interest**

$$\frac{\text{\# of patients with prognostic testing preceding or following a course of pharmacologic therapy}}{\text{\# of patients with stable coronary artery disease}}$$

### **Numerator/ Denominator Definitions**

Numerator: Number of patients who had prognostic testing preceding or following a course of pharmacologic therapy.

Denominator: Number of stable coronary artery disease patients.

### **Method/Source of Data Collection**

Review medical records for all patients who have stable coronary artery disease diagnosis. Review medical records to determine whether they had prognostic testing preceding or following a course of pharmacologic therapy.

### **Time Frame Pertaining to Data Collection**

Data may be collected quarterly.

### **Notes**

This is a process measure, an improvement is noted as increase in the rate.

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## Implementation Recommendations

Prior to implementation, it is important to consider current organizational infrastructure that address the following:

- System and process design
- Training and education
- Culture and the need to shift values, beliefs and behaviors of the organization

The following system changes were identified by the guideline work group as key strategies for health care systems to incorporate in support of the implementation of this guideline.

1. Develop systems for providing patient education around:
  - Proper use of nitroglycerin
  - Consistent use of aspirin (unless contraindicated) or consistent use of clopidogrel as directed
  - When to call 911

Education should also provide for patient to "teach back" in order to demonstrate their understanding of what they should do in an acute cardiac event.

2. Develop/provide patients education materials around use of aspirin (unless contraindicated) and interventions around modifiable risk factors.
3. Provide patient education around the use and benefits of angiotensin-converting enzymes (ACE inhibitors) and/or angiotensin II receptor blockers (ARBs).

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## Resources

### Criteria for Selecting Resources

The following resources were selected by the guideline work group as additional resources for providers and/or patients. The following criteria were considered in selecting these resources.

- The site contains information specific to the topic of the guideline.
- The content is supported by evidence-based research.
- The content includes the source/author and contact information.
- The content clearly states revision dates or the date the information was published.
- The content is clear about potential biases, noting conflict of interest and/or disclaimers as appropriate.

### Resources Available to ICSI Members Only

ICSI has a wide variety of knowledge resources that are **only** available to ICSI members (these are indicated with an asterisk in far left-hand column of the Resources table). In addition to the resources listed in the table, ICSI members have access to a broad range of materials including tool kits on CQI processes and Rapid Cycling that can be helpful. To obtain copies of these or other Resources, go to [http://www.icsi.org/improvement\\_resources](http://www.icsi.org/improvement_resources). To access these materials on the Web site, you must be logged in as an ICSI member.

The resources in the table on the next page that are not reserved for ICSI members are available to the public free-of-charge.

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## Resources Table

*	Author/Organization	Title/Description	Audience	Web sites/Order Information
	AMA Foundation	Health information translation: provides a number of medical conditions translated in a variety of languages.	Patients and Families; Health Care Professionals	<a href="http://www.healthinfotranslations.com">http://www.healthinfotranslations.com</a>
	American College of Cardiology	The American College of Cardiology is a trusted source of up-to-date clinical cardiovascular and health policy information.	Health Care Professionals	<a href="http://www.acc.org/media/media.htm">http://www.acc.org/media/media.htm</a>
	American Diabetes Association	The American Diabetes Association is leading the fight against the deadly consequences of diabetes and fighting for those affected by diabetes. The association funds research to prevent, cure and manage diabetes; delivers services to hundreds of communities; provides objective and credible information; and gives voice to those denied their rights because of diabetes.	Patients and Families	<a href="http://www.diabetes.org">http://www.diabetes.org</a>
	American Heart Association	The American Heart Association is a national voluntary health agency whose mission is "building healthier lives, free of cardiovascular diseases and stroke."	Patients and Families	<a href="http://my.americanheart.org/portal/professional/ourmission">http://my.americanheart.org/portal/professional/ourmission</a>
	National Heart, Lung and Blood Institute	The institute plans, conducts, fosters and supports an integrated and coordinated program of basic research, clinical investigations and trials, observational studies, and demonstration and education projects.	Patients and Families; Health Care Professionals	<a href="http://www.nhlbi.nih.gov/">http://www.nhlbi.nih.gov/</a>
	National Institutes of Health	Helping to lead the way toward important medical discoveries that improve people's health and save lives, NIH scientists investigate ways to prevent disease as well as the causes, treatments and even cures for common and rare diseases.	Patients and Families; Health Care Professionals	<a href="http://www.nih.gov/">http://www.nih.gov/</a>
	Park Nicollet Health Services	Understanding Lipids (Brochure)	Health Care Professionals	<a href="http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/">http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/</a>
	Park Nicollet Health Services	Understanding Hypertension (Brochure)	Health Care Professionals	<a href="http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/">http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/</a>

\* Available to ICSI members only.

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**Resources Table**

<b>*</b>	<b>Author/Organization</b>	<b>Title/Description</b>	<b>Audience</b>	<b>Web sites/Order Information</b>
	Park Nicollet Health Services	Coronary Artery Disease: Steps to Stay Healthy (brochure)	Health Care Professionals	<a href="http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/">http://www.icsi.org/guidelines_and_more/patient_education_resources/cardiovascular_8490/</a>
	Society for Medical Decision Making	Society for Medical Decision Making	Health Care Professionals	<a href="http://www.smdm.org">http://www.smdm.org</a>
	U.S. Food and Drug Administration	What You Need to Know About Mercury in Fish and Shellfish (trifold brochure)	Health Care Professionals	<a href="http://www.fda.gov">http://www.fda.gov</a>

\* Available to ICSI members only.

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The subdivisions of this section are:

- References
- Appendices

## References

Links are provided for those new references added to this edition (author name is highlighted in blue).

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[www.icsi.org](http://www.icsi.org)

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## Appendix A – Comorbid Conditions

### Medical Conditions

Condition	Recommended Treatment (and alternative)	Avoid
Systemic hypertension	Beta-blockers (calcium antagonists)	
Migraine or vascular headaches	Beta-blockers (verapamil or diltiazem)	
Asthma or COPD w/ bronchospasm	Verapamil or diltiazem	Gradual titration with low initial doses may allow some patients to tolerate beta-blockers; careful monitoring is required.
Hyperthyroidism	Beta-blockers	
Raynaud's syndrome	Long-acting, slow-release calcium antagonists	Beta-blockers
Diabetes mellitus	ACE inhibitors, beta-blockers (particularly if prior myocardial infarction) or long-acting, slow-release calcium antagonists  Optimize medical therapy per the ICSI <a href="#">Management of Type 2 Diabetes Mellitus</a> guideline	
Mild peripheral vascular disease	Beta-blockers or calcium antagonists	
Severe peripheral vascular disease with rest ischemia	Calcium antagonists	Beta-blockers

### Cardiac Arrhythmias and Conduction Abnormalities

Sinus bradycardia	Long-acting, slow-release calcium antagonists that do not decrease heart rate	Beta-blockers, diltiazem, verapamil
Sinus tachycardia (not due to heart failure)	Beta-blockers	
Supraventricular tachycardia	Verapamil, diltiazem or beta-blockers	
Atrioventricular block	Long-acting, slow-release calcium antagonists that do not slow A-V conduction	Beta-blockers, verapamil, diltiazem
Rapid atrial fibrillation (with digitalis)	Verapamil, diltiazem, or beta-blockers	
Ventricular arrhythmias	Beta-blockers	

### Special Conditions

Hypertrophic cardiomyopathy	Beta-blockers, non-dihydropyridine calcium antagonists	Nitrates, dihydropyridine calcium antagonists
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## Appendix B – Medication Table

The table below highlights only those selected drugs and selected information that may be otherwise challenging to locate. This is not intended to be an inclusive listing of medication treatment. The work group assumes that clinicians will supplement this information from standard pharmaceutical sources. All drugs are listed in alphabetical order, not in order of work group preference.

<b>Antiplatelet Medication Therapies</b>		
<b>Generic name</b>	<b>Usual dosage</b>	<b>Comments</b>
Aspirin	81-162 mg daily	Everyday administration is preferable, but 325 mg every other day is acceptable. Enteric-coated tablets or dosing with meals can minimize stomach upset. Patients on warfarin may take low-dose aspirin (81 mg). Patients using aspirin should avoid regular use of NSAIDs.
Clopidogrel	75 mg daily	Clopidogrel is recommended for all patients with coronary artery disease who are truly intolerant of aspirin.
<b>As-Needed Nitrates</b>		
Sublingual nitroglycerin	0.3-0.6 mg SL, may repeat x3.	If pain worsens or is not relieved after five minutes of first dose, call 911. Some patients take nitroglycerin regularly and should consult their physician about when to call 911.

See prescribing information for complete details. For the most up-to-date medication information consider the following sources: [www.epocrates.com](http://www.epocrates.com), [www.micromedex.com](http://www.micromedex.com), [uptodate.com](http://uptodate.com), [www.pdr.net](http://www.pdr.net).

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## **Appendix C – Grading of Angina Pectoris**

### **Grading of Angina Pectoris by the New York Heart Association Classification System**

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#### **Class I**

Cardiac disease without resulting limitation of physical activity.

#### **Class II**

Slight limitation of physical activity – comfortable at rest, but ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.

#### **Class III**

Marked limitations in physical activity – comfortable at rest, but less than ordinary physical activity causes fatigue, palpitation, dyspnea, or anginal pain.

#### **Class IV**

Inability to carry on any physical activity without discomfort – or symptoms at rest.

Source: ACC/AHA/ACP-ASIM Chronic Stable Angina Guidelines

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## Appendix D – Omega-3 Fatty Acids

Omega-3 fatty acids are found in fish oil and in some vegetable oils, nuts, seeds and soy. You can get omega-3 fatty acids from some foods or from over-the-counter and prescription supplements. Fish oil contains two important omega-3 fatty acids: **EPA** (eicosapentanoic acid) and **DHA** (docosahexanoic acid). Plant sources provide **ALA** (alpha-linolenic acid). Studies of EPA and DHA suggest that:

- doses of up to 1,000 mg per day reduce risk of heart attacks in high-risk patients; and
- doses of 2,000 mg-4,000 mg per day lower serum triglyceride levels, particularly for patients with triglyceride levels over 500 mg/L.

### **Tips for Getting More Omega-3 Fatty Acids**

- Select fish from the chart below and eat at least 7 ounces per week. Prepare fish by grilling, baking, broiling or poaching.
- Omega-3 fatty acid supplements should be refrigerated and eaten with food. This will reduce the possibility of a mild fishy aftertaste.
- For those who cannot or will not consume fish-based products, an alternate source of omega-3 in the form of ALA from may be found in plant sources (level III evidence).
- Use vegetable oils that are high in omega-3 fatty acids. Examples are canola oil, soybean oil, flaxseed oil and walnut oil.
- Add walnuts or ground flaxseed to cereals, yogurt and salads. Whole flaxseeds will not work as well – they simply pass through the body undigested.
- Snack on edamame (steamed soybeans, sold fresh or frozen).

*(Kris-Etherton, 2002 [R])*

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## Appendix D – Omega-3 Fatty Acids

## Amounts of EPA+DHA in Fish and Fish Oils and the Amount of Fish Consumption Required to Provide ~1 g of EPA+DHA Per Day

	EPA+DHA Content, g/3-oz Serving Fish (Edible Portion) or g/g Oil	Amount Required to Provide ~1 g of EPA+DHA per Day, oz (Fish) or g (Oil)
Fish		
Tuna		
Light, canned in water, drained	0.26	12
White canned, in water, drained	0.73	4
Fresh	0.24-1.28	2.5-12
Sardines	0.98-1.70	2-3
Salmon		
Chum	0.68	4.5
Sockeye	1.05	2.5
Pink	1.09	2.5
Chinook	1.48	2
Atlantic, farmed	1.09-1.83	1.5-2.5
Atlantic, wild	0.9-1.56	2-3.5
Mackerel	0.34-1.57	2-8.5
Herring		
Pacific	1.81	1.5
Atlantic	1.71	2
Trout, rainbow		
Farmed	0.98	3
Wild	0.84	3.5
Halibut	0.4-1.0	3-7.5
Cod		
Pacific	0.24	12.5
Atlantic	0.13	23
Haddock	0.2	15
Catfish		
Farmed	0.15	20
Wild	0.2	15
Flounder/Sole	0.42	7
Oyster		
Pacific	1.17	2.5
Eastern	0.95	3
Farmed	0.37	8
Lobster	0.07-0.41	7.5-42.5
Crab, Alaskan King	0.35	8.5
Shrimp, mixed species	0.27	11
Clam	0.24	12.5
Scallop	0.17	17.5
Capsules		
Cod liver oil*	0.19	5
Standard fish body oil	0.30	3
Omega-3 fatty acid concentrate	0.50	2
Omacor (Pronova Biocare) †	0.85	1

Data from the USDA Nutrient Data Laboratory. The intakes of fish given above are very rough estimates because oil content can vary markedly (> 300%) with species, season, diet, and packaging and cooking methods.

\* This intake of cod liver oil would provide approximately the Recommended Dietary Allowance (RDA) of vitamin A and twice the RDA for vitamin D.

† Not currently available in the United States.

Permission granted by Wolters Kluwer, Kris-Etherton PM, Harris WS, Appel LJ. Consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. *Circulation* 2002;106:2747-57.

**Appendix D – Omega-3 Fatty Acids**

***α*-Linolenic Acid Content of Selected Vegetable Oils, Nuts and Seeds**

	<b><i>α</i>-Linolenic Acid Content, g/tbsp</b>
Olive oil	0.1
Walnuts, English	0.7
Soybean oil	0.9
Canola oil	1.3
Walnut oil	1.4
Flaxseeds	2.2
Flaxseed (linseed) oil	8.5

Permission granted by Wolters Kluwer, Kris-Etherton PM, Harris WS, Appel LJ. Consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. *Circulation* 2002;106:2747-57.

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<b>Document Drafted</b> July – Oct 1993
<b>First Edition</b> Jul 1994
<b>Second Edition</b> Nov 1995
<b>Third Edition</b> Jan 1997
<b>Fourth Edition</b> Feb 1998
<b>Fifth Edition</b> Feb 1999
<b>Sixth Edition</b> Mar 2000
<b>Seventh Edition</b> Feb 2001
<b>Eighth Edition</b> Feb 2002
<b>Ninth Edition</b> Dec 2003
<b>Tenth Edition</b> May 2005
<b>Eleventh Edition</b> May 2006
<b>Twelfth Edition</b> May 2007
<b>Thirteenth Edition</b> May 2009
<b>Fourteenth Edition</b> Begins May 2011

<b>Original Work Group Members</b>		
Dan Anderson <i>Measurement Advisors</i> <b>HealthPartners</b>	Dale J. Duthoy, MD <i>Family Practice</i> <b>MinnHealth Family Physicians</b>	Trish Lester-Rux, RN <i>Adult Medicine</i> <b>North Region Group Practice Org</b>
Fritz Arnason, MD <i>General Internist</i> <b>Park Nicollet Clinic</b>	Marilyn Eelkema, RPh <i>Pharmaceutics</i> <b>HealthPartners</b>	Todd Mestad <i>Business Health Care Action Group</i> <b>IDS Financial Services</b>
Steve Benton, MD <i>Cardiology</i> <b>HealthPartners</b>	Susan M. Hanson, RD <i>Health Education</i> <b>Park Nicollet Medical Foundation</b>	Hugh Smith, MD <i>Cardiology</i> <b>Mayo Clinic</b>
Bryon Dockter, RN, MSA <i>Facilitator</i> <b>The Bryter Group</b>	Greg Lehman, MD <i>General Internist, Work Group Leader</i> <b>HealthPartners</b>	Anthony Spagnolo, MD <i>Family Practice</i> <b>Park Nicollet Clinic</b>

Released in April 2011 for Fourteenth Edition.  
*The next scheduled revision will occur within 24 months.*

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**Contact ICSI at:**

8009 34th Avenue South, Suite 1200; Bloomington, MN 55425; (952) 814-7060; (952) 858-9675 (fax)  
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## **ICSI Document Development and Revision Process**

### **Overview**

Since 1993, the Institute for Clinical Systems Improvement (ICSI) has developed more than 60 evidence-based health care documents that support best practices for the prevention, diagnosis, treatment or management of a given symptom, disease or condition for patients.

### **Document Development and Revision Process**

The development process is based on a number of long-proven approaches. ICSI staff first conducts a literature search to identify pertinent clinical trials, meta-analysis, systematic reviews, regulatory statements and other professional guidelines. The literature is reviewed and graded based on the ICSI Evidence Grading System.

ICSI facilitators identify gaps between current and optimal practices. The work group uses this information to develop or revise the clinical flow and algorithm, drafting of annotations and identification of the literature citations. ICSI staff reviews existing regulatory and standard measures and drafts outcome and process measures for work group consideration. The work group gives consideration to the importance of changing systems and physician behavior so that outcomes such as health status, patient and provider satisfaction, and cost/utilization are maximized.

Medical groups, who are members of ICSI, review each guideline as part of the revision process. The medical groups provide feedback on new literature, identify areas needing clarification, offer recommended changes, outline successful implementation strategies and list barriers to implementation. A summary of the feedback from all medical groups is provided to the guideline work group for use in the revision of the guideline.

### **Implementation Recommendations and Measures**

Each guideline includes implementation strategies related to key clinical recommendations. In addition, ICSI offers guideline-derived measures. Assisted by measurement consultants on the guideline development work group, ICSI's measures flow from each guideline's clinical recommendations and implementation strategies. Most regulatory and publicly reported measures are included but, more importantly, measures are recommended to assist medical groups with implementation; thus, both process and outcomes measures are offered.

### **Document Revision Cycle**

Scientific documents are revised every 12-24 months as indicated by changes in clinical practice and literature. Each ICSI staff monitors major peer-reviewed journals every month for the guidelines for which they are responsible. Work group members are also asked to provide any pertinent literature through check-ins with the work group mid-cycle and annually to determine if there have been changes in the evidence significant enough to warrant document revision earlier than scheduled. This process complements the exhaustive literature search that is done on the subject prior to development of the first version of a guideline.

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