Quality Indicators for the Management of Ischemic Heart Disease in Vulnerable Older Persons

Matthew J. Budoff
Catherine H. MacLean
Paul G. Shekelle

WR-181
August 2004
QUALITY INDICATORS FOR THE MANAGEMENT OF ISCHEMIC HEART DISEASE IN VULNERABLE OLDER PERSONS

Matthew J. Budoff, M.D.\textsuperscript{1}; Catherine H. MacLean, M.D., Ph.D.\textsuperscript{2,3}; Paul G. Shekelle, M.D., Ph.D.\textsuperscript{2,4}

\textsuperscript{1}Division of Cardiology, Harbor-UCLA Research and Education Institute, Torrance, California; \textsuperscript{2} Rand Health, Santa Monica, California; \textsuperscript{3} UCLA Department of Medicine, Los Angeles, California; \textsuperscript{4} Greater Los Angeles VA Healthcare System.

This study was supported by a contract from Pfizer Inc to RAND.

Corresponding author is Dr. Budoff at Harbor-UCLA Research and Education Institute, 1124 West Carson Street, Torrance, CA 90502. Telephone: (310) 222-4107. Fax: (310) 787-0448. Email: budoff@flash.net

Word Count: 3942

Number of Tables: 1
INTRODUCTION

Ischemic heart disease is the number one cause of death in elderly persons, affecting 16% of people over 65 years of age. Acute myocardial infarction (AMI) and unstable angina, which occur in >1.5 million persons per year nationally, are predominantly diseases of older persons, with 60% of AMIs occurring among individuals age >65. Studies of cardiovascular mortality consistently find that age represents the strongest predictor of post-AMI survival. These studies demonstrate a 10-fold increase in post-AMI mortality from the youngest cohort (age <40) to the oldest cohort (age >80).

There are many studies that evaluate the efficacy of interventions to treat IHD, but few have been conducted specifically among vulnerable elders. Individuals over age 65 with ischemic heart disease are less likely than younger ones to receive effective therapies. This finding suggests that improving quality of care for the vulnerable elderly population could substantially reduce their morbidity and mortality.

METHODS

The methods for developing these quality indicators, including literature review and expert panel consideration, are detailed in a preceding paper. For ischemic heart disease, the structured literature review identified 5,588 titles, from which abstracts and articles were identified that were relevant to this report. Based on the literature and the authors’ expertise, 18 potential quality indicators were proposed.
RESULTS

Of the 18 potential quality indicators, 13 were judged valid by the expert panel process (see Quality Indicator Table), two were merged into other conditions and 3 were not accepted. The literature summaries that support each of the indicators judged to be valid by the expert panel process are described below.

Quality Indicator #1.
Assessment of Left Ventricular Function Following Acute Myocardial Infarction

IF a vulnerable elder is hospitalized with an acute myocardial infarction (AMI), THEN he or she should be offered assessment of left ventricular function before discharge or within 3 days after hospital discharge BECAUSE left ventricular function is one of the strongest predictors of subsequent cardiac death, and identification of poor LVEF may lead to therapy (pharmacological and/or revascularization) that can improve left ventricular function and survival.

Supporting Evidence: We found no direct evidence that evaluation of LVEF results in improved outcomes after AMI. However, we did find evidence that LVEF is a strong predictor of death after MI and that therapies that improve LVEF improve cardiac outcomes including death. The evidence supporting the measurement of LVEF and therapy for patients with decreased LVEF is detailed in the manuscript “Quality Indicators for the Management of Heart Failure in Vulnerable Elders.” (10) We describe the evidence that LVEF predicts outcomes after AMI.

Multiple cohort studies have documented that left ventricular ejection fraction (LVEF) is one of the best predictors of adverse events after AMI. In one cohort study
(mean follow-up 3.3 years), ejection fraction was the strongest predictor of death among 550 medically treated patients and was the second strongest predictor after ventricular arrhythmia among 913 surgically treated patients. (11) Another cohort study of 8619 patients found that LVEF predicted six-month mortality and congestive heart failure (p<0.01). (12) Likewise, a study of 6,676 patients with AMI demonstrated that patients with LVEF < 35% had a one month mortality of 18.3%, compared with 5.2% for patients with LVEF > 35%(P<0.001). (13) Four smaller cohort studies also reported that reduced LVEF was the strongest predictor of 12-18 month mortality. (14-17)

One study specifically assessed the relationship between LVEF and mortality among older adults. (18) In this large cohort study, age was the most important predictor of cardiac mortality after a first AMI, followed by LVEF. Among patients over 70 years, LVEF was the best predictor of mortality after AMI (one-year mortality: overall=22%, reduced LVEF=38%, p<0.01).

**Quality Indicator #2.**

**Non-Invasive Stress Testing**

**IF** a vulnerable elder has an acute myocardial infarction or unstable angina (USA), did not undergo angiography, and does not have contraindications to revascularization, **THEN** he or she should be offered non-invasive stress testing 4-21 days after the infarction or anginal event, **BECAUSE** this will stratify patients by future cardiac risk and allow physicians to modify treatment to improve survival.

**Supporting Evidence:** We found no direct evidence that performance of non-invasive stress testing results in improved outcomes after AMI. However, we did find
evidence that non-invasive stress testing can predict future cardiac risk and that treatment directed by these results can improve survival.

One meta-analysis and numerous observational studies suggest that post-AMI stress testing can predict subsequent cardiac outcomes, although most patients studied were under 80 years of age. The meta-analysis (54 studies including 19,874 patients) assessed the relationship between pre-discharge stress testing and outcomes in post-AMI patients. (19) The odds ratio for predicting death was 1.7 for exercise ST depression, 4.1 for impaired blood pressure response, and 4.0 for limited exercise capacity.

A cohort study of exercise testing for USA examined the pre-discharge bicycle performance of 740 men admitted with USA or AMI. (20) Patients with ST depression on exercise testing had a higher rate of AMI or death after 1-year (18%) than did those without ST depression (9%, p<.01).

Another cohort study of 963 patients (mean age 70) assessed the value of pre-discharge exercise testing. (21) Responses to exercise testing were divided into low, intermediate, and high-risk, with 5-month rates of cardiac death or AMI of 1%, 7% and 20%, respectively. Exercise response was the only variable predictive of AMI or cardiac death (p<0.001). Five additional observational studies, ranging in size from 112 to over 6000 patients, further support the value of non-invasive stress testing after AMI for predicting subsequent mortality. (16,22-26)
Quality Indicator #3.

Early Aspirin Therapy

IF a vulnerable elder has an acute myocardial infarction or unstable angina, THEN he or she should be given aspirin therapy within 1 hour of presentation, BECAUSE this will lead to substantial reductions in nonfatal MI, nonfatal stroke, and death.

Supporting Evidence: Multiple randomized, placebo-controlled trials have documented the benefit of aspirin in elderly patients with acute coronary syndromes. In the International Study of Infarct Survival, patients with suspected AMI were randomized to receive aspirin or placebo, in combination with streptokinase or placebo.(27) Among 3,411 patients over age 70, aspirin use was associated with a 21% reduction in vascular deaths, independent of streptokinase therapy (p<0.01).

In a second randomized clinical trial, 796 men with unstable angina or AMI were randomized to placebo or aspirin, and/or 5 days of intravenous heparin.(28) The relative risk for the combined outcome of mortality or new AMI was 0.36 (95% CI=0.23-0.57) favoring aspirin therapy. Numerous other randomized clinical trials and retrospective studies have also demonstrated significant reductions in nonfatal AMI, stroke, and death with aspirin therapy.(29,30) Experts recommend aspirin therapy for patients of any age as soon as possible after presentation.(26,31)
Quality Indicator #4.

Early Beta-Blocker Therapy

**IF** a vulnerable elder has USA or AMI, **THEN** he or she should be offered beta-blocker therapy within 12 hours of presentation, **BECAUSE** this will reduce morbidity and mortality, the magnitude of infarction, and the rate of reinfarction and recurrent ischemia.

**Supporting Evidence.** Four large, randomized, double-blind, placebo-controlled trials demonstrated a mortality reduction with early beta-blocker therapy after AMI.

A meta-analysis of three of the trials (32-34) showed that beta-blocker use resulted in a 23% mortality reduction (p<0.0001) among 8,513 patients over age 65, which was significantly greater than the 5% mortality reduction found among the 14,687 younger patients.(35)

In the TIMI-II trial, 1,434 patients with AMI were treated with alteplase and then randomized to receive either intravenous metoprolol or placebo.(36) Although there was no difference in six-week mortality rates, patients receiving metoprolol had a lower incidence of reinfarction (2.7% versus 5.1%, p=0.02) and recurrent chest pain (18.8% versus 24.1%, p<0.02). An observational study of 58,165 patients over age 65 reported that beta-blocker therapy was associated with a lower in-hospital mortality rate (odds ratio 0.81;95% CI 0.75-0.87).(37)
Quality Indicator #5.

Reperfusion Therapy

IF a vulnerable elder has an AMI measurable by electrocardiography and does not have contraindications to reperfusion therapy, THEN he or she should be offered treatment with reperfusion therapy, BECAUSE this will improve survival.

Supporting Evidence: The mortality rate from AMI in older patients is high, with or without therapy. Randomized clinical trials that have included older patients have reported decreased mortality following reperfusion therapy, with elders experiencing benefits equivalent to or greater than younger patients.

Thrombolytic Therapy

Numerous large randomized trials have compared the benefit of thrombolytics with those of other medical therapy for the treatment of AMI. These trials are summarized in 3 meta-analyses. All three meta-analyses support a benefit for patients over age 65 treated with thrombolytic therapy. However, one meta-analysis failed to show a statistically significant benefit for patients over the age of 75.

The first meta-analysis pooled 5 large randomized trials (5,30,38-41) and reported that absolute mortality after AMI was 3.5% lower with thrombolytic than with standard medical therapy in patients over age 65 (p<0.0001) and 2.2% lower in younger patients (p<0.0001).(35)

The second meta-analysis pooled nine randomized, placebo-controlled trials (58,600 patients) of thrombolytic therapy for AMI (42), and reported persons age 65-74 experienced the greatest absolute mortality benefit (fibrinolytic mortality=13.5%, control mortality=16.1%, p<0.001). Although absolute mortality among those over age 75 was
reduced by 10 lives per 1,000 patients treated, the difference was not statistically significant.

The third meta-analysis used data from national hospital databases and published clinical trials on 119,000 patients over age 75(43) and reported an AMI mortality rate of 29% with no thrombolytics versus 25% for combined thrombolytic-aspirin therapy, a risk reduction of 14% (95% CI=10%-27%). The absolute reduction in overall mortality was 37 lives per 1,000 patients treated.

To date, few thrombolytic trials have reported any significant increase in overall stroke rate or major bleeding in patients receiving thrombolytic therapy.(42,43) An increase in the incidence of hemorrhagic stroke has apparently been partially counter-balanced by a reduction in thromboembolic stroke.

**Percutaneous Transluminal Coronary Angioplasty (PTCA)**

Uncontrolled studies of the use of coronary angioplasty among those over age 70 have described clinical success rates of 90% (vessel patency with improvement in symptoms), which compares favorably to thrombolytic therapy.(44-46) However, older patients with AMI who receive immediate treatment with PCTA experience higher complication rates than do younger patients, including emergent revascularization (5%), AMI (3-4%), and higher mortality rates (3-18%).(47)

Two studies, one randomized and one observational, compared PTCA to no reperfusion in patients with AMI. In a 5-year follow-up trial of PTCA for AMI, 83 patients (mean age 62) were randomized to PTCA or no reperfusion; cardiac events were significantly reduced with PTCA (10% vs. 48%, p<0.0001).(48) A prospective observational study compared AMI patients who had contraindications to thrombolytics...
and were treated with PTCA to those who did not undergo revascularization (mean age 68). Hospital mortality was significantly lower in patients who received PTCA (univariate: 2.2% vs. 24.7%, p=0.001).(49)

Two randomized studies compared primary angioplasty to thrombolytic therapy for patients with AMI. The Primary Angioplasty in Myocardial Infarction study included 395 AMI patients randomized to PTCA or intravenous tissue plasminogen activator (t-PA).(50) The study found a significant difference in combined death and nonfatal reinfarction between PTCA and thrombolysis (5.1% versus 12.0%, p=0.02), but no significant mortality difference. Among patients over age 70, mortality was 2% for PTCA versus 10% for thrombolysis (p=0.01). The second study was a five-year trial of 395 patients with AMI randomized to angioplasty or streptokinase revealed a significant mortality reduction in patients undergoing angioplasty (risk ratio 0.54;95% CI 0.36-0.87).(51)

In a retrospective cohort study of 80,356 elderly patients with AMI (52), PTCA was associated with improved 1-year survival after adjusting for baseline characteristics (Hazard ratio [HR] 0.88, 95% CI 0.73-0.94).

**Quality Indicator #6.**

**Early Coronary Catheterization**

**IF** a vulnerable elder without contraindications to revascularization has AMI or unstable angina with one or more of the following:

- pain refractory to medical therapy (over 1 hour on aggressive medical therapy)

- recurrent angina/ischemia at rest or with low-level activities
- ischemia accompanied by symptoms of heart failure,

**THEN** he or she should be offered urgent catheterization, **BECAUSE** this will lead to appropriate revascularization, which will reduce future hospitalizations, reinfarctions, and mortality.

**Supporting Evidence:** At the time these indicators were developed, there were no randomized trials of urgent catheterization for patients with AMI complicated by ongoing ischemia or heart failure. Evidence for this indicator came from three randomized studies of an early invasive strategy following AMI.(53-55) Since these indicators were developed there has been published a clinical trial that randomized patients (mean age 66) with AMI complicated by shock to emergency revascularization (152 patients) or initial medical therapy (150 patients). Enrolled patients had a mean age of 66, 32% of patients had a history of prior myocardial infarction, 46% of patients had hypertension, and 31% of patients had diabetes mellitus. Most patients in both groups also received intraaortic balloon counterpulsation. Overall mortality at 30 days did not differ statistically, however six-month mortality was lower in the revascularization group than in the medical-therapy group (50.3% vs. 63.1%, p=0.027). In a subgroup analysis, patients 75 or older did not benefit from revascularization, although the 95% confidence limits were very wide.(56)

Additional support for this indicator comes from two observational studies. In an observational study of 1,122 patients (mean age 70.4 years) with AMI complicated by shock, early revascularization was independently associated with reduced in-hospital mortality (odds ratio 0.20, p=0.0001).(57) Similarly, in the GUSTO-1 Trial there were 1,321 patients who had AMI complicated by shock (mean age = 65 years old). Of these,
44% had revascularization within 30 days of AMI at the discretion of their physicians. Multivariable analysis controlling for other clinical factors showed that, compared to patients who did not receive revascularization within 30 days, those patients that were revascularized were more likely to be alive at 1 year (adjusted odds ratio 0.6, 95% CI 0.4 – 0.9)(58)

Quality Indicator #7.

Coronary Artery Bypass Surgery

IF a vulnerable elder has significant left main or significant three-vessel coronary artery disease with left ventricular ejection fraction less than 50%, THEN he or she should be offered coronary artery bypass graft (CABG) surgery, BECAUSE this is associated with improved functional capacity, symptoms, left ventricular function, and prognosis.

Supporting Evidence: A meta-analysis compared seven randomized-clinical trials of CABG surgery to medical management. The odds ratio for mortality at 5-years favored surgery for patients with left main disease (odds ratio=0.32, p=0.004), three-vessel disease (odds ratio=0.58, p<0.0001), and abnormal LVEF (odds ratio=0.59, p=0.02). However, only 7% of the patients in these trials were over age 60.(59).

No randomized clinical trials comparing CABG surgery to medical therapy have reported results specific to older adults. Observational studies, however, support the use of CABG in the elderly. A retrospective analysis of the effect of medical versus surgical therapy among 177 patients age >80 with significant left main disease or reduced left ventricular function favored three-year survival for surgical-patients over medical-patients (77.4% versus 55.2%, p=0.03).(60)
Another study observed 1,491 patients over age 75 with significant left main disease or reduced left ventricular function. Adjusted six-year survival was 79% for surgically-treated patients versus 64% for medically-treated (p<0.001). A third observational study of 100 patients over age 80 with unstable angina demonstrated 37% mortality among medically-treated patients versus 16% among those undergoing revascularization (p<0.05).

Quality Indicators #8 and #9.

Cholesterol-Lowering Medications

**IF** a vulnerable elder has established CHD and his or her cholesterol level is not known, **THEN** he or she should undergo a fasting cholesterol evaluation including total LDL and HDL cholesterol, **BECAUSE** treatment of high cholesterol will reduce the risk of MI, stroke, and death.

**IF** a vulnerable elder has established CHD and LDL cholesterol over 130 mg/dl and a trial of step II diet therapy was not offered or was ineffective, **THEN** he or she should be offered cholesterol-lowering medication, **BECAUSE** this will significantly reduce future cardiovascular events and death.

**Supporting Evidence:** Measurement of serum cholesterol is a necessary prerequisite for identifying elevated cholesterol, an important risk factor for CVD. In a study of older patients (6006 subjects aged >55), the relative risk for MI comparing the highest to lowest cholesterol level quartile was 1.9 in men (95%CI=1.1-3.3) and 3.2 in women (95%CI=1.5-6.4). In men and women over age 70 years, total cholesterol
remained an important risk factor for AMI (risk ratio=3.2, 95%CI=1.3-7.7; and 2.9, 95%CI=1.3-6.6; respectively).(63)

Evidence that medical treatment to reduce cholesterol reduces the risk for future cardiac events and mortality comes from three large, placebo-controlled, randomized-clinical trials of subjects with established CHD.(64-66, Table) The relative risk reductions in the older patients were equal to those of the younger cohorts, and the absolute risk reductions were greater in patients over age 65 years than in younger cohorts. Quality indicator #9 recognizes that physicians may elect to try dietary therapy prior to initiating cholesterol lowering medications; a cholesterol lowering medication is required for an LDL cholesterol level over 130 mg/dl, unless a dietary intervention is underway. The National Cholesterol Education Program III Guidelines specifically state, “If baseline LDL cholesterol is >130 mg/dL, intensive lifestyle therapy and maximal control of other risk factors should be started. Moreover, for most patients, an LDL-lowering drug will be required to achieve an LDL cholesterol < 100 mg/dL; thus an LDL cholesterol lowering drug can be started simultaneously with lifestyle changes to attain the goal of therapy.”(67)

Quality Indicator #10.

Antiplatelet Therapy

IF a vulnerable elder has established CHD and is not on warfarin, THEN he or she should be offered antiplatelet therapy, BECAUSE this will lead to significant reductions in the risk for stroke, non-fatal MI, and mortality.
**Supporting Evidence:** The effect of antiplatelet therapy on the risk for cardiovascular events has been studied in numerous randomized clinical trials. A meta-analysis of 96,000 patients in 145 randomized clinical trials conducted prior to 1990 evaluated the effect of anti-platelet therapy on risk for vascular events (MI, stroke, or death)(68). Vascular events were 9.5% in the antiplatelet group and 11.9% in the control group (relative risk reduction 25%, p<0.0001). Stratified analyses demonstrated similar reductions in vascular events among all age groups.

Krumholz and colleagues assessed antiplatelet therapy in a retrospective observational study of 5,490 consecutive Medicare beneficiaries who survived an AMI (mean age 76).(69) Six month mortality was 23% lower in the aspirin group than in the group that received no therapy (odds ratio=0.77,95% CI=0.61-0.98).

**Quality Indicator #11.**

**Counseling on Smoking Cessation**

IF a vulnerable elder with established CHD smokes, THEN he or she should be offered counseling for smoking cessation at least annually and have this documented in the medical record, BECAUSE this should reduce rates of reinfarction and death within the first year of quitting.

**Supporting evidence:** No direct evidence exists that counseling smokers to quit smoking results in reduced rates of reinfarction and death. However, counseling smokers to stop smoking reduces the rate of smoking, and smoking cessation reduces the rate of subsequent reinfarction and death, therefore counseling smokers to quit smoking should reduce the rate of reinfarction and death.
Numerous randomized clinical trials and observational studies have demonstrated that counseling to stop smoking reduces the rate of smoking. Results of these trials are detailed in the ACOVE article, “Screening and Prevention”.(70)

Evidence that tobacco use increases cardiovascular mortality and that smoking cessation reduces mortality derives from observational studies that evaluated the effect of smoking on cardiac outcomes. The 10 year survival rate among CHD patients who smoked at entry but stopped (quitters) was 80%, compared to a survival rate of 69% among those who continued smoking (p=0.025).(71)

In another study, the effect of smoking cessation on cardiac morbidity and mortality was assessed among 1,893 subjects age >55.(72) The six-year mortality rate was greater among continuing smokers than among those who quit smoking and abstained throughout the study (risk ratio=1.7, 95% CI=1.4-2.0). This benefit did not diminish with increasing age.

The 12,866 men in the Multiple Risk Factor Intervention Trial were assessed for CHD mortality and smoking cessation. The risk ratio for CHD mortality decreased significantly for the quitters as compared to non-quitters (one-year cessation, risk ratio=0.63; three-year cessation, risk ratio=0.38).(73)

Quality Indicator #12:

Cardiac Rehabilitation

IF a vulnerable elder has had a recent myocardial infarction or recent coronary bypass graft surgery, THEN he or she should be offered cardiac rehabilitation, BECAUSE this will improve functional capacity, and reduce risk of future cardiovascular events
Supporting Evidence: Cardiac rehabilitation is a prescriptive exercise-training program for patients with heart disease. Randomized clinical trials involving elderly patients undergoing cardiac rehabilitation have demonstrated significant improvement in the functional capacity of elders,(74) promoted compliance, decreased emotional distress and depression,(75) improved quality of life,(76,77) mitigated ischemic symptoms,(78) improved exercise capacity and lipid profiles,(79) promoted reversal of atherosclerosis and reduced the risk of subsequent coronary events.(80)

A meta-analysis of 4,347 patients (median age 64) in ten randomized-controlled trials showed that cardiac rehabilitation significantly decreased all-cause mortality (odds ratio=0.76;95% CI=0.63-0.92).(81)

Another meta-analysis of 22 randomized controlled trials of cardiac rehabilitation after MI showed that after an average of 3 years, the odds ratios were significantly lower in the rehabilitation group than in the comparison group for the following end-points: total mortality (odds ratio=0.80, 95% CI=0.66-0.96); cardiovascular mortality (odds ratio=0.78, 95% CI=0.63-0.96); fatal reinfarction (odds ratio=0.75, 95% CI=0.59-0.95); and sudden death (odds ratio=0.63, 95% CI=0.41-0.97).(82)

Quality Indicator #13:

Beta-Blocker Therapy

IF a vulnerable elder has had a myocardial infarction, THEN he or she should be offered a beta-blocker, BECAUSE this will reduce the chance of death.
Supporting Evidence: Randomized clinical trial evidence supports the use of beta-blockers in patients up to age 75. Observational data for patients over age 80 indicates that beta-blocker use is beneficial.

Three randomized controlled trials have demonstrated reductions in mortality after myocardial infarction among patients ages 60 to 69(83) 65 to 75(84) and 65-74(33), with a consistent 30% relative reduction in mortality. One randomized trial failed to show a benefit for beta-blocker utilization in the elderly. This study reported a 40% increase in mortality among patients over age 65 receiving alprenolol(84) but a reduction in mortality among patients under age 65 (beta-blocker mortality=9%, control mortality=20%, p<0.05).(85)

Several observational studies also have demonstrated reductions in mortality after myocardial infarction among older patients. A retrospective two-year study of beta-blocker use among older post-infarction patients (age 60-89) reported an age-adjusted mortality reduction of 76% (risk ratio=0.24,95% CI=0.11-0.54, p<0.001) with beta-blocker therapy.(29) Another large, retrospective cohort study analyzed mortality rates among 5,332 elderly AMI survivors.(6) Controlling for other predictors of survival, the mortality rate among beta-blocker recipients was 43% lower than that of non-recipients (risk ratio=0.57, 95% CI=0.47-0.69). Reductions in mortality with beta-blocker therapy were substantial among all age strata (ages 65-74, 75-84, and over 85). The Cooperative Cardiovascular Project, a national cohort of 115,015 patients over 65 years, demonstrated a 14% lower risk of mortality (p<0.001) among beta-blocker recipients at 1 year after discharge for AMI.(86)
Although limited, observational data suggest that diabetic patients also benefit from beta-blocker use. A retrospective cohort study abstracted medical records of 45,308 Medicare beneficiaries with AMI.(87) Of these, 7.4% were insulin-treated and 18.5% were non-insulin-treated diabetics. After adjusting for potential confounders, researchers observed a lower one-year mortality for insulin-treated diabetics (HR=0.87, 95% CI=0.72-1.07), non-insulin-treated diabetics (HR=0.77, 95% CI=0.67-0.88), and non-diabetics (HR =0.87, 95% CI 0.80-0.94) who received beta-blockers.

DISCUSSION

Those trials that have enrolled older adults have generally demonstrated equal or greater benefit for therapies to treat coronary heart disease among older as compared to younger adults. Despite this, several studies have documented underuse of medications and procedures among older patients.(37,88-90)

This paper presents quality indicators for vulnerable elders that were developed using the scientific literature and expert opinion. Implementation of the indicators will help identify and correct deficiencies in care. Given the significant morbidity and mortality from ischemic heart disease among older persons, this could substantially improve the health and quality of life for vulnerable elders.
ACKNOWLEDGEMENTS

The authors thank Peter M. Guzy, MD, PhD, Michael W. Rich, MD and Cheryl B. Pegus, MD for their review of an earlier version of the monograph containing the full set of proposed quality indicators and Patricia Smith for technical assistance.
Table. Major Placebo-controlled Trials of HMG-CoA Reductase Inhibitors in Patients with known Coronary Artery Disease (Secondary Prevention)

<table>
<thead>
<tr>
<th>Study (Reference)</th>
<th>Cholesterol Medication Studied</th>
<th>Mean Follow-up Period</th>
<th>Number (Number of Elderly)</th>
<th>Relative Reduction in Risk (RRR) and Risk Ratios (RR) for patients on treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARE (64)*</td>
<td>Pravastatin</td>
<td>5 Years</td>
<td>4,059 (1,283)</td>
<td>Coronary Events (32%, 95% CI 4-13%) CHD Mortality (45%, 95% CI 1.9-6.5%)</td>
</tr>
<tr>
<td>SSSS (65)*</td>
<td>Simvastatin</td>
<td>4.4 Years</td>
<td>4,444 (1,021)</td>
<td>Overall Mortality (0.66, 95% CI 0.48-0.90) CHD Mortality (0.57, 95% CI 0.39-0.83) Revascularization (0.59, 95% CI 0.41-0.84)</td>
</tr>
<tr>
<td>LIPID (66)**</td>
<td>Pravastatin</td>
<td>6.1 Years</td>
<td>9,014 (3,300)</td>
<td>CHD Mortality (24%, 95% CI 12-35) Overall Mortality (22%, 95% CI 13-31) Acute MI (29%, p &lt;0.001) Nonfatal MI (24%, p &lt;0.001) Stroke (19%, p = 0.048) Revascularization (20%, p &lt;0.001)</td>
</tr>
</tbody>
</table>

* Results represent subset analysis of patients age 65 and older

** The effects of treatment were similar for all predefined subgroups, including those age 65 and older (3,300 persons).

CHD – Coronary heart disease
MI – myocardial infarction
RR – Risk Ratios
RRR – Relative Reductions in Risk.
REFERENCES:


26. ACC/AHA Guidelines for the Management of Patients with Acute Myocardial


46. Fein SA, Breisblatt W, Doyle JT, Singh A. Approach to ischemic heart disease, coronary care, and severe heart failure (including cardiogenic shock). Clin Geriatr


77. Stahle A, Norlander R, Ryden L, Mattsson E. Effects of organized aerobic group training in elderly patients discharged after an acute coronary syndrome. A


83. Bondestam E, Breikss A, Hartford M. Effects of early rehabilitation on consumption of medical care during the first year after acute myocardial infarction in patients > or


90. Bradford WD, Chen J, Krumholz HM. Under-utilisation of beta-blockers after acute
1999;15:257-68.