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Clinical Cardiology [ALERT]

Critical analysis of the latest clinical research in cardiovascular medicine

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ABSTRACT & COMMENTARY

Utility of the New Cholesterol Guidelines

By Michael H. Crawford, MD, Editor

SOURCE: Yeboah J, et al. Implications of the new American College of Cardiology/American Heart Association cholesterol guidelines for primary atherosclerotic cardiovascular disease event prevention in a multi ethnic cohort: Multi-Ethnic Study of Atherosclerosis (MESA). *Am Heart J* 2015;169:387-395.

The American College of Cardiology/American Heart Association (ACC/AHA) released new guidelines for the use of statin drugs to prevent atherosclerotic cardiovascular disease (CVD) in 2013. Because these guidelines increase the number of apparently healthy people who are eligible for stain therapy, there is concern among practitioners that the potential adverse effects of statins may outweigh the imputed benefits. Since any randomized trial to test this hypothesis is years away from completion, these investigators analyzed the Multi Ethnic Study of Atherosclerosis (MESA) database to assess the impact of the new guidelines on the number of patients eligible for statin therapy. Also, using randomized trial data for statin therapy, they analyzed primary prevention statin trials to estimate the reduction in CVD risk for these patients and the risk of adverse effects of using moderate- or high-intensity statins. MESA subjects aged 40-75 years at baseline enrollment who were not on a statin were selected, which resulted in a population of 5437; mean age was 61 years.

Using the 2001 National Cholesterol Education Program/adult treatment panel III (NCEP/ATP III) guidelines, 25% of these patients would have been eligible for statin therapy. This increased to 56% under the new guidelines and 66% if the optional category was added. Only 5% who were eligible under the old guidelines were no longer eligible under the new guidelines. Among the newly eligible 1742 patients, 127 (7%) had a CVD event during 10 years of follow-up. If you assume 10 years of moderate statin therapy, the absolute reduction in events would be 2%, number needed to treat (NNT) 49, the absolute increase in diabetes would be 0.9%, and the number needed to harm (NNH) 111. If high-intensity statins were chosen, the absolute reduction would be 3% (NNT 38), with a diabetes increase of 3% (NNH 39). Under the old guidelines, the reduction in events would be 3% (NNT 32) and new diabetes 1% (NNH 94). The

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incidence of rhabdomyolysis estimated to occur in the MESA cohort with the new guidelines is < 1%. The authors concluded that under the new statin treatment for primary prevention guidelines, the risk:benefit ratio is much better for moderate- than high-intensity statins.

■ COMMENTARY

The lack of supportive data for the new guidelines and the estimation that more subjects will be eligible for statin therapy, which is often a tough sell in asymptomatic individuals, has led to reluctance on some practitioners' part to embrace these guidelines. Thus, the data presented in this analysis of the MESA database and recent primary prevention statin trials are informative.

As predicted, the number of patients eligible for statin therapy doubled. Based on statin primary prevention trial data, with moderate-intensity statin therapy, CVD events would decrease and new diabetes rates would increase. With high-intensity statin use, CVD events would decrease more but diabetes rates would be higher; rhabdomyolysis rates would be negligible. Other adverse events were not studied such as cognitive impairment, liver abnormalities, and muscle aches. Thus, under the new guidelines, those with a predicted 10 event rate of > 7.5% should be treated with moderate-intensity statins.

These estimates assume high statin compliance, but the literature suggests it is 50-65% in primary prevention patients. Most patients stop statins because of muscle aches and liver function test abnormalities, even though routine liver blood tests are no longer recommended in asymptomatic patients. These side effects were not studied, and the rate of statin discontinuation is not known in this study. If the adherence rate were lower, then the assumed overall benefit would be reduced, but so would the incidence of diabetes.

The strengths of this study are the large size of the MESA database, the knowledge of 10-year event rates, and the multiethnic make-up of the population. Weaknesses include that MESA is an observational community-based study and the statin trials are a more select group of patients that may not be comparable. Also, MESA doesn't include all the ethnicities seen in the United States, but comes closer than most studies. One difference between the new guidelines and the old is that the old guidelines were based on hard endpoints only (death and myocardial infarction). The cutoff for considering statin therapy was a predicted 10-year incidence of hard endpoints of > 20%. The new guidelines include stroke, which is perhaps more relevant since trials have shown reduced stroke rates in some patient groups with statins, and uses a 10-year incidence cutoff of > 7.5%. This design fact alone increases the number of patients in whom statin therapy should be considered. Although this analysis supports the conclusions of the new guidelines, only prospective, randomized trials will confirm this approach. ■

ABSTRACT & COMMENTARY

Atrial Fibrillation Risk Scores and Anticoagulation Treatment

By Michael H. Crawford, MD, Editor

SOURCES: Chao TF, et al. Should atrial fibrillation patients with 1 additional risk factor of the CHA2DS2-VASc score (beyond sex) receive oral anticoagulation? *J Am Coll Cardiol* 2015;65:635-642; Calkins H. Data strengthen to support recommending anticoagulant therapy for all atrial fibrillation patients with a CHA2DS2-VASc score ≥ 1. *J Am Coll Cardiol* 2015;65:643-644.

Several guidelines recommend using the CHA2DS2-VASc score for determining the risk of stroke in patients with atrial fibrillation (AF), but the treatment recommendations are not the same in all guidelines. The controversy arises

at scores between 0-1 and the effect of female sex. Thus, the objective of this study was to assess the risk of stroke in both sexes with one risk factor being female sex, which is a one-point risk factor in the CHA2D52-VASc score. The study was conducted in Taiwan and was a retrospective analysis of their national health system database of more than 23 million enrollees. From 1996-2013, 354,649 patients with AF were identified, their risk score calculated, and their pharmacy records examined. Patients receiving antithrombotic medications (warfarin and any antiplatelet agents) were excluded, for a final population of 186,570, among which 12,935 men had a risk score of 1 and 7900 women had a score of 2. The primary endpoint was ischemic stroke confirmed by brain imaging. Among the men with a score of 1, 14% experienced a stroke over a 5-year follow-up, for an annual rate of 2.75%. Not all risk factors carried equal rates, ranging from 1.96% per year with vascular disease to 3.5% per year for ages 65-74 years. In the women with a risk score of 2, 15% experienced a stroke, for an annual rate of 2.6%, ranging from 1.9% per year for hypertension to 3.3% per year for ages 65-75 years. The authors concluded that oral anticoagulants are recommended for anyone with AF and one risk factor beyond female sex, given the increased risk of stroke observed.

■ COMMENTARY

This study is potential game changer. The American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA/HRS) guidelines state that a patient with a CHA2D52-VASc score of 1 can be treated with antiplatelet agents (APA), oral anticoagulants (OAC), or nothing depending on consideration of other risks for stroke, bleeding, and patient preference (IIb). This study should move the recommendation for OAC in these patients to a IIa. The authors point out that the risk of stroke in patients with one risk factor beyond female sex (2-3% per year) far outweighed the risk of major bleeding (0.25-1.45% per year) or intracranial hemorrhage (0.23-0.5% per year) on one of the new OACs. Hence, they recommended that OACs be considered in everyone with one risk factor beyond female sex.

They also analyzed the predictive power of each risk factor in the CHA2D52-VASc score. Interestingly, in both sexes, ages 65-74 years was the most potent individual risk factor and diabetes was the second. Hypertension, heart failure, and vascular disease were less predictive. This is not surprising because these risks are not simple binary factors. Mild, well-controlled hypertension is not the same as severe untreated hypertension.

The major strengths of this study are that they identified a large number of patients with AF, with one risk factor beyond sex, who were not on APA or OAC therapy and were followed for an average of 5 years. There are weaknesses with this study. Since it was a retrospective database study, we don't know what the bleeding risk would be in the patients if they were treated with APA or OAC. Also, we don't know if the AF was permanent, persistent, or paroxysmal, which could make a difference. There is no imaging data on the left atrium. A patient with a few occurrences of AF per year and normal left atrial size would probably have a different risk profile than someone with permanent AF and a left atrium that was severely enlarged. In addition, it is not known if the patients had other vascular diseases that could have caused their stroke such as aortic or carotid or intracerebral artery disease. Finally, we are not given these patient's HAS-BLED score, which might explain why they were not on APA or OAC therapy.

The editorial accompanying this report states that the guidelines should not be changed for one retrospective study, but that physicians should incorporate this data into the discussion with the patient. I would certainly want patients with AF and one risk factor beyond sex on APA and would strongly suggest they consider OAC. ■

ABSTRACT & COMMENTARY

Unintended Consequences of Public Reporting of Procedure Outcomes

By Jeffrey Zimmet, MD, PhD

Associate Professor of Medicine, University of California, San Francisco, Director, Cardiac Catheterization Laboratory, San Francisco VA Medical Center

Dr. Zimmet reports no financial relationships relevant to this field of study.

SOURCE: Waldo SW, et al. Association between public reporting of outcomes with procedural management and mortality for patients with acute myocardial infarction. *J Am Coll Cardiol* 2015;65:1119-1126.

Public reporting of clinical outcomes associated with cardiovascular care has been touted as a means to improve health care delivery and patient outcomes. Three states (New York, Massachusetts, and Pennsylvania) have instituted reporting of outcomes associated with percutaneous coronary intervention (PCI), and additional states are considering this practice. Much has been discussed regarding the potential costs of such measures, but little data thus far have supported putative harms of public reporting.

In the recent issue of the *Journal of the American College of Cardiology* (JACC), Waldo and colleagues add substantially to this debate. They mined the Nationwide Inpatient Sample for patients with a discharge diagnosis of acute myocardial infarction (AMI) in Massachusetts and New York between 2005 and 2011, restricting the data set to hospitals with on-site PCI. These data were compared with those from geographically similar states without public reporting. Demographics were available for each patient, as were high-risk characteristics such as cardiac arrest and cardiogenic shock. Revascularization procedural management and in-hospital mortality were compared between reporting and non-reporting states.

After multivariate adjustment, patients presenting with AMI in public reporting states were significantly less likely to undergo percutaneous coronary revascularization than those in non-reporting states (odds ratio [OR], 0.81; 95% confidence interval [CI], 0.67-0.96). This difference was enhanced among patient subsets with higher-risk profiles, including those over age 65 (OR, 0.75; 95% CI, 0.62-0.91), those presenting with ST elevation (OR, 0.63; 95% CI, 0.56-0.71), and those with cardiac arrest or cardiogenic shock (OR, 0.58; 95% CI, 0.47-0.70). Rates of surgical revascularization by coronary artery bypass graft surgery (CABG) was similar between reporting and non-reporting states. There was no difference between the two public reporting states with regard to likelihood of undergoing PCI.

In-hospital mortality among patients in the study group presenting with AMI was 6% overall; breaking this down by reporting status, the mortality rate was 6% in reporting states vs 5% in non-reporting states. The adjusted risk for in-hospital mortality was consequently higher for patients in reporting states than for those in non-reporting states (OR, 1.21; 95% CI, 1.06-1.37). The mortality difference was most prominent in those presenting with non-ST segment elevation myocardial infarction (NSTEMI).

When broken down by whether or not patients underwent percutaneous revascularization, the adjusted risk for mortality was actually lower in public reporting states among patients who underwent PCI (OR, 0.71; 95% CI, 0.62-0.83) and higher in those who did not (OR, 1.30; 95% CI, 1.13-1.50; *P* for interaction < 0.001). The authors interpreted this in the following way: Public reporting changes operator behavior such that critically ill patients are offered percutaneous intervention less often. This results in a lower mortality for those patients who actually undergo PCI, a higher mortality among those managed without intervention, and a higher mortality overall.

■ COMMENTARY

At the most basic level, public reporting for procedures is designed to alter physician and hospital system behavior in ways that improve patient outcomes. When considering procedures such as PCI, it is clear that the patients at greatest risk for mortality are those presenting with AMI as opposed to elective PCI patients. When the mortality numbers are relatively low to start with (in-hospital mortality was reported at 6% for AMI patients in the current study), every unfavorable outcome has the potential to adversely affect one's statistics. In this light, the results of the current study offer no surprises.

In states with public reporting, as compared with those that do not engage in reporting, patients with AMI are less likely to undergo potentially lifesaving percutaneous revascularization. This effect is most striking in those with higher-risk profiles, and is greatest among those who are most likely to die. Unfortunately, these are the same patients who are most likely to benefit — patients who have experienced cardiac arrest or cardiogenic shock. The observed effect on mortality is precisely what one might predict a priori: that reporting results in a reduction in PCI-related mortality, primarily by shifting those deaths to the pool of patients who do not undergo procedures. That patients who are most in need of revascularization might be denied these procedures is clearly not what was intended with reporting programs. States that are considering adding public reporting for PCI should read this study carefully and give careful consideration to the potential for unintended consequences. ■

ABSTRACT & COMMENTARY

Blood Transfusion After Cardiac Surgery

By Michael H. Crawford, MD, Editor

SOURCE: Murphy GJ, et al. Liberal or restrictive transfusion after cardiac surgery. *N Engl J Med* 2015;372:997-1008.

Due to the cost of blood transfusions and the lack of data supporting liberal transfusion policies, newer guidelines recommend more restrictive transfusion thresholds (e.g., hemoglobin < 7 g/dL). However, many believe cardiac surgery is an exception due to the myocardium's high oxygen requirement. Thus, these investigators performed the Transfusion Indication Threshold Reduction (TITRe2) trial to determine if a restrictive transfusion threshold would reduce postoperative morbidity and health care cost. In 17 United Kingdom (UK) cardiac surgery centers, 2003 patients were randomized to a restrictive threshold of < 7.5g/dL or a liberal threshold of < 9g/dL, with transfusions administered to help the hemoglobin above these thresholds. The patients were followed for 3 months for the primary outcome of serious infections or an ischemic event in the brain, heart, gut, or kidney. Median age of the patients was 70 years old, and 69% were men. Most had coronary bypass (41%) or valve surgery (31%). One-quarter of the patients received a transfusion before being enrolled. A median of one unit of red cells was transfused in the restrictive group and two in the liberal group. Transfusions were given to 64% of the restrictive group and 95% of the liberal group.

The primary outcome was seen in 35% of the restrictive group and 33% of the liberal group (*P* = NS). The rates of pulmonary complications and the length of ICU stay did not differ between groups. There were more deaths in the restrictive group (4.2% vs 2.6%; HR, 1.64; 95% CI, 1.0-2.7, *P* = 0.045). Overall costs were no different between the two groups. The authors concluded that a restrictive transfusion policy after cardiac surgery was not superior to a more liberal policy, and overall costs were similar.

■ COMMENTARY

Currently, transfusion rates in the UK and the United States are highly variable between cardiac surgery centers (8-93%). Part of this wide variation in practice is the controversy in the literature. Observational studies that showed higher risks of mortality and morbidity with liberal transfusion policy were confounded by patient characteristics that influenced transfusion decisions. The few comparative trials done lacked statistical power. This study largely avoided these pitfalls and failed to prove the hypothesis that bad outcomes and costs would be higher with a liberal transfusion policy. Concerning was the results of the secondary outcome variable of death, which were almost twice as high in the restrictive group. Also, this difference persisted despite sensitivity analyses. In addition, patients who already got a transfusion before being enrolled in the trial were excluded. When rising creatinine was added to the primary endpoint, the results favored a liberal policy.

The more liberal approach is clinically plausible when you consider that ischemic myocardium needs oxygen delivery, which makes the cardiac surgery setting different from other settings with blood loss. Thus, I believe allowing clinicians to use their own judgment with cardiac surgery patients, rather than being constrained by hospital policy, makes the most sense for now. ■

ABSTRACT & COMMENTARY

Paravalvular Leaks and TAVR Outcomes

By Michael H. Crawford, MD, Editor

SOURCE: Kodali S, et al. Paravalvular regurgitation after transcatheter aortic valve replacement with the Edwards sapien valve in the PARTNER trial: Characterizing patients and impact on outcomes. *Eur Heart J* 2015;36:449-456.

Moderate or severe paravalvular regurgitation (PVR) has been reported in up to one-quarter of patients following transcatheter aortic valve replacement (TAVR) and has been associated with a higher 1-year mortality. Whether PVR is the cause of increased mortality or is simply associated with

mortality is unclear. Thus, these investigators from the PARTNER trial of the Edwards SAPIEN catheter mounted valve sought to characterize the anatomic and physiologic impact of PVR by echocardiography and its relationship to the observed mortality. The patients in this analysis included 496 from the randomized trial: 40 from the randomized post trial continued access phase and 1979 from the non-randomized post commercial approval registry. From these 2515 patients, 81 were excluded because of missing echocardiograms, resulting in a total population of 2434. In these patients, 53% had no or trace PVR, 38% mild, and 9% were graded moderate to severe. There were differences in baseline echocardiographic parameters between these three groups. Despite similar aortic valve areas, left ventricular (LV) size was larger with increasing PVR severity; LV ejection fraction (EF) was lower; annulus diameter was larger; and there was more mitral and aortic regurgitation pre-procedure. Also, PVR was observed less with the transapical approach and with the 23 mm valve vs the 26 mm valve.

Thirty-day outcomes were not different in the three groups, but at 1-year all cause mortality, cardiac mortality, and rehospitalization were progressively higher as PVR severity increased. In a multivariate model that considered multiple clinical and echocardiographic variables, moderate-to-severe PVR (HR, 2.2; 95% CI, 1.7-3.4; $P < 0.0001$) and mild PVR (HR, 1.4; 1.1-1.9, $P = 0.012$) were independent predictors of 1-year mortality. Despite similar post procedure aortic valve areas and increases in LVEF in all three groups, LV end diastolic dimension decreased in the none to trace and mild PVR groups, but increased in the moderate-to-severe PVR group. The latter group exhibited less decrease in LV mass as well. The authors concluded that baseline differences in patients with PVR post-transcatheter aortic valve replacement (TAVR) may increase the risk of this complication, which is associated with higher one year mortality.

■ COMMENTARY

This is the largest systematic study of the impact of PVR following TAVR, and it confirms the results of some smaller studies that even mild PVR is associated with increased 1-year mortality. Also, this study shows that PVR is associated with larger LV diastolic volumes and less LV mass regression after TAVR. However, despite controlling for this reduced LV remodeling benefit of TAVR, mild or more PVR is still an independent predictor of 1-year mortality. PVR does not change 30-day mortality, which suggests that there is some delayed effect that decreases survival.

Interestingly, there were baseline echocardiographic differences in the 3 severity of PVR groups. Most provocative is the observation that the more severe PVR group had more baseline aortic regurgitation and larger LVs. Thus, there may be structural changes in the LV that make TAVR less successful. Of note, baseline aortic annulus and outflow tract diameters were larger in the more severe PVR patients. Also, use of the larger 26 mm valve was associated with more PVR. This suggests that valve sizing may be more difficult in larger LVs and this leads to more PVR, which in turn retards the remodeling of these larger LVs and increases long term mortality. ■

ABSTRACT & COMMENTARY

Intravenous Iron Shows Long-term Benefit in Patients with Heart Failure and Iron Deficiency

By Van Selby, MD

Assistant Professor of Medicine, UCSF Cardiology Division, Advanced Heart Failure Section

Dr. Selby reports no financial relationships relevant to this field of study.

SOURCE: Ponikowski P, et al. Beneficial effects of long-term intravenous iron therapy with ferric carboxymaltose in patients with symptomatic heart failure and iron deficiency. *Euro Heart J* 2015;36:657-668.

Iron deficiency (ID) is common in patients with heart failure (HF), and its presence is associated with reductions in functional capacity, quality of life, and survival. Several clinical trials have shown improved outcomes in patients with HF and ID who are treated with IV iron. However, these trials only administered

IV iron for short periods of time, and the long-term effects of IV iron in these patients are not well understood.

To address the effects of long-term IV iron, the authors conducted the Ferric CarboxymaltOse evaluation on performance in patients with iron deficiency in combination with chronic heart failure (CONFIRM-HF). Eligible participants had stable HF with NYHA functional class II or III symptoms, ejection fraction ≤ 45%, and presence of ID as defined as serum ferritin level < 100 ng/mL, or between 100 and 300 ng/mL if the transferrin saturation was less than 20%. Subjects were randomized to either IV iron or placebo. Those in the iron arm received ferric carboxymaltose (FCM) at doses of 500-2000 mg. After two initial doses at study initiation and week 6, maintenance doses were given every 12 weeks if ID was still present. The primary endpoint was change in the 6-minute walk test distance.

Three hundred and four subjects were randomized. At 24 weeks, the difference in the 6-minute walk distance between the IV iron and placebo groups was 33 ± 11 meters (P = 0.002). Subjects randomized to IV iron also saw significant improvement in NYHA class (P = 0.004), global assessment, and quality of life, and these benefits persisted at 52 weeks of follow-up. The risk of hospitalization due to worsening HF was also significantly lower in the IV iron group (HR, 0.39; P = 0.009). The benefits were observed regardless of whether or not anemia was present. There were no differences in adverse events between the groups. The authors conclude that treatment of stable, symptomatic, iron-deficient HF patients with FCM over a 1-year period results in sustained improvement in functional capacity, symptoms, and quality of life, and may reduce hospitalizations due to worsening HF.

■ COMMENTARY

CONFIRM-HF adds to the growing literature demonstrating benefit from IV iron therapy in patients with HF and ID. The FAIR-HF trial previously showed that treatment with IV iron is associated with improvements in functional status, exercise tolerance, and QOL over a 6-month follow-up. The present study strengthens these findings by showing the benefits persist after 1 year of treatment. Intravenous iron was well-tolerated and the benefits were seen in all subgroups.

Although the primary outcome was 6-minute walk distance, the reduction in HF-related hospitalization is particularly promising and consistent with previous trials of IV iron for ID in HF. In an accompanying editorial, Brunner-La Rocca and colleagues pool the results of CONFIRM-HF with three previous studies. The summary risk ratio for heart failure hospitalization in patients receiving IV iron compared to placebo was an impressive 0.33 (95% CI, 0.19-0.56). It is also interesting that the beneficial effects of IV iron were observed regardless of whether anemia is present. This is similar to what has been observed in previous studies, and highlights our incomplete understanding of the mechanism by which these patients benefit from IV iron.

One particularly useful aspect of CONFIRM-HF is the dosing scheme and administration protocol used. Subjects received bolus doses of IV iron (administered over 1 minute) at baseline and week 6, with additional doses only given as needed. Seventy-five percent of subjects required only two injections to correct and maintain iron levels. This schedule is entirely compatible with real-world implementation, and easier than the schedules used in several previous studies. Oral iron has not been well studied in this population.

So is it time to start giving IV iron to all patients with HF and ID? Current ACC/AHA guidelines mention the FAIR-HF trial, but do not make any specific recommendations regarding the management of anemia or ID in HF patients. European guidelines suggest testing for iron deficiency in HF, but similarly do not make strong recommendations regarding IV iron. We will need to see a larger randomized trial with a "harder" primary endpoint than 6-minute walk distance before we see a class I indication for IV iron.

At this point, for HF patients who remain symptomatic despite adherence to standard guideline recommended therapies and correction of other comorbidities, treating ID with IV iron is a reasonable intervention to improve symptoms and possibly reduce HF-related hospitalizations. It is important to monitor iron levels after initial treatment, as patients may require occasional maintenance doses. Given its ease of use, the treatment protocol from CONFIRM-HF seems like a reasonable dosing strategy for this purpose. ■

QUESTIONS & COMMENTS:
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CME QUESTIONS

1. In the PARTNER trials, paravalvular regurgitation post TAVR was more common in patient with:

a. enlarged LVs.

b. smaller aortic valve area.

c. smaller prosthesis sizes.

d. the transapical approach.

2. Analysis of national health records in Taiwan suggests that anticoagulants should be given to which atrial fibrillation patients?

a. Women with a CHA2DS2-VASc score of 1

b. Women with a CHA2DS2-VASc score of 2

c. Men with a CHA2DS2-VASc score of 1

d. B and C

3. A randomized trial of blood transfusion after cardiac surgery suggested that the hemoglobin cutoff should be?

a. < 10 g/dL

b. < 9 g/dL

c. < 8 g/dL

d. < 7 g/dL

4. Public reporting of PCI outcomes in acute MI can lead to:

a. lower PCI mortality.

b. lower total mortality.

c. higher total mortality.

d. A and C

5. Intermittent IV iron in anemic symptomatic systolic heart failure patients resulted in:

a. improved 6 min walk tests.

b. reduced NYHA class.

c. fewer heart failure hospitalizations.

d. All of the above

6. The risk:benefit ratio for statin therapy in primary prevention patients is most favorable for:

a. lower-intensity therapy.

b. moderate-intensity therapy.

c. high-intensity therapy.

d. no statin therapy.

CME OBJECTIVES

Upon completion of this educational activity, participants should be able to:

- discuss the most current information related to cardiac illness and the treatment of cardiac disease;
- explain the advantages and disadvantages, as well as possible complications of interventions to treat cardiac illness;
- discuss the advantages, disadvantages, and cost-effectiveness of new and traditional diagnostic tests in the treatment of cardiac illness; and
- discuss current data regarding outpatient care of cardiac patients.