The surgeon's role in optimizing medical therapy and maintaining compliance with secondary prevention guidelines in patients undergoing coronary artery bypass grafting

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Despite receiving complete revascularization using multiple arterial conduits, patients who undergo coronary artery bypass grafting (CABG) are still susceptible to recurrent major adverse cardiovascular events (MACE) owing to the progression of atherosclerotic disease in saphenous vein grafts (SVGs) and native, ungrafted coronary vessels. This is more likely to occur in patients who are obese, have diabetes, have hyperlipidemia, have hypertension, have chronic kidney disease, or who are smokers. Unless these risk factors are properly controlled, the long-term benefits of CABG will be jeopardized. Unfortunately, guideline-directed medical therapy (GDMT) to achieve secondary prevention is underused in CABG patients,[1,2] and GDMT use has been shown to be significantly lower than in patients who have undergone a percutaneous coronary intervention (PCI).[3] As a result, the superior outcomes achieved with CABG compared with PCI early after revascularization might not be apparent in the long term, given the lower compliance with GDMT in CABG patients compared with PCI patients.[3,4]

The aims of this Invited Commentary are to (1) review the current GDMT for CABG patients, (2) review the current level of compliance with these guidelines, (3) determine the factors responsible for the poor compliance with GDMT, and (4) develop interventions and strategies that can be instituted by surgeons to ensure that CABG patients continue to receive GDMT to achieve the most optimal long-term outcomes following surgical revascularization.

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CENTRAL MESSAGE

Compliance with guideline-directed medical therapy following coronary artery bypass grafting (CABG) is poor. Surgeons must play a larger role in strategies and interventions to maintain compliance with secondary prevention guidelines to achieve the best long-term outcomes in CABG patients.

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CURRENT RECOMMENDATIONS FOR OPTIMAL MEDICAL THERAPY IN CABG PATIENTS

Antiplatelet Therapy

Aspirin (ASA) therapy following CABG has been shown to improve SVG patency, decrease mortality, and reduce the incidence of myocardial infarction (MI), stroke, and renal failure.[5-7] The ideal time for initiating ASA appears to be within 6 hours after CABG. Although concerns have been raised that preoperative ASA may increase bleeding and does not reduce perioperative mortality or MI, several studies have shown that preoperative ASA significantly decreases mortality, MI, and acute kidney injury in both stable patients and those with acute coronary syndromes (ACS) without an increased incidence of reexploration for bleeding or red blood cell transfusions.[8,9]

Off-pump CABG may result in a hypercoagulable state characterized by increased platelet adhesion and decreased sensitivity to ASA.[10] The addition of clopidogrel to ASA has resulted in a significant reduction in SVG occlusion at 1 year after off-pump CABG.[11,12] Although ASA alone has not been shown to enhance arterial graft patency, it prevents and limits atherosclerotic disease in both distal

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grafted and ungrafted vessels.[13] Therefore, all CABG patients, irrespective of the type of conduit used, will benefit from ASA therapy.

Dual-antiplatelet therapy (DAPT) combining ASA with a P2Y12 inhibitor (clopidogrel, prasurgel, or tricagrelor) is recommended only for CABG patients who have previously undergone PCI stent implantation, and in those CABG patients in whom DAPT has already been instituted for ACS. There is currently insufficient evidence to recommend DAPT in stable CABG patients who have not previously undergone a PCI with a stent. Ticagrelor and prasurgel exert more potent and consistent platelet inhibition and have a faster onset and offset of action than clopidogrel. In patients with ACS treated with ticagrelor, prasurgel, or clopidogrel who must now undergo CABG, to reduce the risk of bleeding complications, elective CABG should be postponed for at least 3 days after discontinuation of ticagrelor, 5 days after clopidogrel, and 7 days after parasurgel.[14]

The current recommendations for antiplatelet therapy in the CABG patient are as follows:

- ASA should be administered preoperatively and within 6 hours after CABG in doses of 81 mg to 325 mg and should be continued indefinitely to reduce the incidence of graft occlusion and MACE; class I, level of evidence (LOE) A.[14]
- Following off-pump CABG, DAPT should be administered for 1 year with ASA (81 mg once daily) and clopidogrel (75 mg once daily) to reduce graft occlusion; class I, LOE A.[14]
- In patients who receive DAPT for PCI stent implantation and then undergo CABG, DAPT should be resumed postoperative and continued for the recommended duration for stent implantation; class I, LOE C.[14]
- In patients with ACS being treated with DAPT who must now undergo CABG, DAPT should be resumed after CABG to complete 12 months of DAPT therapy after ACS; class I, LOE C.[14]

Angiotensin-Converting Enzyme (ACE) Inhibitors and Management of Hypertensive CABG Patients

Hypertension is a major modifiable risk factor for limiting the development and progression of atherosclerosis and has been shown to increase long-term mortality in CABG patients.[15] To date, no trials have been undertaken to determine the ideal target for blood pressure control in CABG patients. Nevertheless, it is reasonable to target a systolic blood pressure of <140 mm Hg in CABG patients.[14] In view of their vasculoprotective and antihypertensive properties, ACE inhibitors should be included in all antihypertensive management therapies for CABG patients. The beneficial effects of ACE inhibitors derive not only from their ability to lower blood pressure, but also from their vasculoprotective and antiatherogenic properties, which include minimizing thrombosis by reducing platelet aggregation[16] and limiting vascular inflammation and oxidative stress by enhancing nitric oxide production.[17] In clinical trials involving patients undergoing CABG surgery, ACE inhibitors significantly reduced the long-term composite endpoints of cardiac death, acute MI, and congestive heart failure.[18,19] The beneficial effects of ACE inhibitors were seen in multiple populations: men and women, all age groups, and individuals with or without hypertension, diabetes, hyperlipidemia, and cerebrovascular disease. Diabetic CABG patients receiving ACE inhibitors have shown significantly reduced perioperative mortality and improved 3-year event-free survival.[20,21] Therefore, ACE inhibitor therapy will benefit all CABG patients regardless of whether or not they have a diagnosis of hypertension.

Patients who receive ACE inhibitors before undergoing CABG may develop hypotension due to decreased systemic vascular resistance, especially while on cardiopulmonary bypass.[22] Withholding ACE inhibitors in elective CABG patients for 24 to 48 hours before surgery attenuates their vasodilatory effects and reduces the need for vasopressor agents.[17,23] Hypotension after initiation of ACE inhibitors in postoperative CABG patients is usually related to the dosage used, the levels of hydration and intravascular volume, and the presence of underlying renovascular disease. In the postoperative period, ACE inhibitors should be initiated only after beta-blockers have been instituted for 24 to 48 hours and systolic blood pressure remains >100 mm Hg.

Current guidelines for the use of ACE inhibitors in CABG patients are as follows:

- ACE inhibitors or angiotensin receptor blockers (ARBs) in a patient intolerant of ACE inhibitors initiated before CABG should be instituted postoperatively once the patient is stable, unless contraindicated; class I, LOE B.[14]
- ACE inhibitions or ARBs should be initiated postoperatively and continued indefinitely in CABG patients who were not receiving them preoperatively and who are stable, have an ejection fraction <40%, and who have hypertension, diabetes, or chronic kidney disease, unless otherwise contraindicated; class I, LOE A.[14]
- It is reasonable to initiate ACE inhibitors or ARBs postoperatively and to continue them indefinitely in all CABG patients who were not receiving them preoperatively and are considered at low risk (ie, patients with a normal ejection fraction and in whom cardiovascular factors are well controlled), unless otherwise contraindicated; class IIA, LOE B.[14,24]

Antilipid Therapy

Statins. Statins have been shown to reduce the incidence of SVG stenosis and occlusion, cardiovascular-related death, stroke, recurrent angina, ACS, and the need for repeat revascularization procedures in CABG patients with or without

elevated lipid profiles. These beneficial effects are due to their ''pleiotropic'' properties, which include improved endothelial and vasomotor function and decreased oxidative stress, vascular inflammation, and platelet aggregation.[25-27] There is no evidence to support the use of one statin over another. High-intensity statin therapy to achieve a low-density lipoprotein (LDL) level <100 mg/dL provide increased protection from long-term MACE.[28,29]

The current guidelines for statin therapy in the CABG patients are as follows:

- All patients undergoing CABG should receive statin therapy, unless contraindicated, before surgery and reinstituted early after surgery when the patients can tolerate oral medication and continued indefinitely; class I, LOE A.[14,24]
- In CABG patients, high-dose statin therapy (40-80 mg) should be used to achieve at least a 30% drop LDL level in patients age <75 years; class I, LOE A.[14,24]
- Moderate-intensity statin therapy should be administered to CABG patients who are intolerant of high-intensity therapy and patients at increased risk of drug interactions (age >75 years); class I, LOE A.[14,24]
- Statin therapy should not be discontinued before or after CABG unless the patient is having an adverse reaction to therapy; class III, LOE B.[14,24]

High-Density Lipoprotein Management

CABG patients may still be at risk for cardiovascular MACE even with a lowered LDL level. Low high-density lipoprotein (HDL) levels have been linked to worse long-term survival and a higher risk of MACE following CABG.[30]

The Lopid Coronary Angiography Trial (LOCAT), the only HDL trial involving CABG patients reported to date, randomized patients to receive either slow-release gemfibrozil (1200 mg/day) or placebo.[31] Gemfibrozil increased HDL levels, decreased the progression of native coronary artery disease, and decreased the incidence of new lesions in SVGs (2% vs 14%; $P < .001$). However, this trial was performed in an era before the routine use of statins following CABG surgery. In addition, gemfibrozil carries increased side effects, especially when combined with statins, which include muscle pain and rhabdomyolysis.[32] Therefore, these agents have not been advocated for increasing HDL levels in CABG patients already receiving statins.

Triglyceride Management

High triglyceride level is linked to an increased risk of coronary artery disease and has been associated with worse outcomes following CABG, including increased risk for a repeat coronary revascularization procedure,[33,34] MACE and death,[35] and SVG occlusion.[36] Although statins may have some benefit in decreasing triglyceride levels, the first-line therapy for hypertriglyceridemia involves diet modification, exercise, weight loss, carbohydrate restriction, and reduced alcohol intake. Although no prospective trials have shown any benefit of adding other medications to treat hypertriglyceridemia, Keech and coworkers[37] found that the combination of fenofibrate and statin therapy may help reduce the risk MACE in diabetic CABG patients with severely elevated triglyceride levels (>500 mg/dL).

Beta-Blockers

Beta-blocker therapy is the treatment of choice for rate control and for decreasing the risk of atrial fibrillation in post-CABG patients, and is a quality metric for cardiac surgery in the STS database.[38] Long-term beta-blocker therapy following CABG has been shown to reduce mortality and congestive heart failure (CHF) in patients with or without a history of previous MI or CHF.[39,40] A recent comprehensive review by Joseph and colleagues[41] summarized the evidence supporting the use of beta-blockers in patients with congestive heart failure and preserved and reduced ejection fraction following ACS and stable coronary artery disease. Although most of their recommendations are derived from patients undergoing medical therapy and not surgical revascularization, they also serve to define those CABG patients who stand to benefit the most from beta-blockers in the perioperative period. They recommend using beta-blockers in patients with CHF and an ejection fraction <40%, in patients with hypertension or atrial fibrillation, and following an ACS, for which beta-blockers should be continued for up to 3 years.[41]

The current recommendations for the use of beta-blockers in CABG patients are as follows:

- All CABG patients without contraindications should receive beta-blockers for at least 24 hours before CABG, to reduce the risk of postoperative atrial fibrillation; class I, LOE A.[14,24]
- CABG patients with a history of MI with or without reduced ejection fraction should receive a beta-blocker, unless contraindicated; class I, LOE A.[14]
- CABG patients with left ventricular dysfunction should receive beta-blocker therapy unless contraindicated; class I, LOE B.[14]
- Beta-blockers should be prescribed to all CABG patients without contraindications postoperatively and at the time of discharge; class I, LOE C.[14,24]

Glycemic Control

Hyperglycemia (serum blood glucose >180 mg/dL) that persists before, during, and after CABG is an independent predictor of operative mortality and morbidity, including infection, stroke, MI, and low cardiac output syndrome.[42,43] Continuous insulin infusions designed to maintain serum

glucose level <180 mg/dL during the perioperative period after CABG surgery decrease mortality, intensive care unit (ICU) and hospital length of stay, the need for inotropic support, and the risk of infections and atrial fibrillation; improve long-term survival; and decrease the risk of recurrent angina.[44-46] Because the diagnosis of diabetes mellitus is unknown before surgery in many patients, all CABG patients should have Hgb A1c measured before surgery, along with a fasting blood glucose level. Glycemic control is best instituted in the perioperative period with continuous insulin infusions and monitored throughout hospitalization by an in-hospital team composed of intensivists, endocrinologists, pharmacists, and dieticians in conjunction with the nursing and cardiac surgical services. Before discharge, all diabetic patients receiving insulin or noninsulin oral antiglycemic agents should receive education on glucose monitoring, nutrition, and lifestyle changes as well as follow-up visits with an endocrinologist.

The current guidelines for glycemic control in CABG patients are as follows:

- All patients undergoing CABG should have fasting glucose and Hgb A1c measured before surgery; class I, LOE C.[47]
- Continuous intravenous insulin infusion is the method of choice to achieve and maintain glycemic control (120-180 mg/dL) in the perioperative period, class I, LOE A.[47]
- All oral diabetic medication should be discontinued 24 hours before surgery, especially sulfonylureas and glinides, to avoid hypoglycemia in the absence of food. Outpatients on insulin therapy should take their basal insulin dose on the morning of surgery but hold their nutritional insulin (LISPRO). NPH insulin should be reduced by one-half to one-third before surgery; class I, LOE B.[47]
- For preoperative patients with persistently elevated glucose values >180 mg/dL, an insulin drip should be initiated at least 12 hours before surgery; class 1, LOE C.[47]
- In the ICU, patients with persistently elevated serum glucose levels > 180 mg/dL should receive a continuous insulin infusion to keep serum glucose between 120 and 180 mg/dL; class I, LOE A.[47]
- Patients who require >3 days of ICU care due to ventilatory, inotropic, or mechanical support, renal replacement therapy, or the need for antiarrhythmic agents should have a serum glucose level <150 mg/dL; class I, LOE B.[46,47]
- Following discharge from the ICU, patients receiving intravenous insulin infusions should be transitioned to a subcutaneous insulin dosing schedule. The target glucose goal should be <110 mg/dL preprandial and <180 mg/dL postprandial; class I, LOE A.[47]
- Patients with type 2 diabetes may be started on their oral medication once they have reached their targeted glucose goals and are tolerating a regular diet. Metformin should not be restarted until stable renal function has been achieved; class I, LOE C.[47]
- All attempts should be made to achieve a Hbg A1c <7% in patients following CABG surgery to reduce both microvascular and macrovascular complications; class IIA; LOE B.[14,47]

Smoking Cessation

Smoking cessation is one of the most important risk modification goals for CABG patients. Patients who continue to smoke following CABG have a 68% greater risk for all-cause mortality and a 75% greater risk of cardiac death. In contrast, patients who stop smoking following CABG have a 41% reduction in the need for a repeat revascularization procedure.[48] The postoperative period is the most effective time to institute smoking cessation strategies, which include behavioral counseling, nicotine replacement therapy, and medication with bupropion and varenicline. Nicotine replacement therapy is safe for patients with stable coronary artery disease but has been associated with increased mortality in patients with ACS.[49] Bupropion is safe and effective for smoking cessation in all patients, including those following an MI.[50] Although varenicline is also effective for smoking cessation, it has been associated with a nonsignificant increase in the incidence of nonfatal MIs and the need for coronary revascularization and should be used with caution in post-CABG patients.[51] To further assist clinicians with smoking cessation, the American College of Cardiology recently released the "Expert Consensus Decision Pathway on Tobacco Cessation Treatment,"[52] which includes prescriptions for pharmacologic smoking cessation aids and evidence-based behavioral support groups. The current guidelines for smoking cessation in the CABG patient are as follows:

- Counseling should be offered to all patients who smoke during and after hospitalization for CABG to improve both short and long-term outcomes after surgery; class I, LOE A.[14]
- It is reasonable to offer nicotine replacement therapy with bupropion and varenicline as adjuncts to smoking cessation counseling for stable CABG patients after hospital discharge; class I; LOE B.[14]

Cardiac Rehabilitation

Cardiac rehabilitation (CR) programs following CABG surgery play an important role in educating patients about secondary prevention and facilitate lifestyle and behavior modification to minimize MACE. Physician advocacy is the key factor in determining whether a patient will enroll in a CR program.[53] Participation in an outpatient

hospital-based CR program promotes adherence to secondary prevention therapies that were initiated during the post-CABG hospital stay.

The current guidelines for CR following CABG are as follows

- All CABG patients should be referred to a cardiac rehabilitation program during their postoperative hospital stay; class I; LOE A.[14]

Mental Health, Emotional, and Psychosocial Therapy

Preoperative depression and anxiety contribute not only to increased operative mortality and ICU and hospital length of stay, but also to decreased long-term survival and increased hospital readmissions.[54,55] Every effort should be made to identify and treat these patients before CABG and even delay surgery in stable patients, given that preoperative therapy has resulted in decreased morbidity, mortality, and need for analgesic medication.[56]

Postoperative depression and delirium also have been associated with increased postoperative mortality, decreased long-term survival, and increased rates of recurrent angina, MI, rehospitalization for CHF, and the need for repeat revascularization procedures.[57-59] This is most likely due to poor compliance with GDMT and secondary prevention therapies. Symptoms of anxiety and postoperative depression may be indicative of dementia and should not simply be dismissed as postoperative anxiety. Interventions to treat post-CABG depression, such as the use of antidepressant medication and psychotherapy, should be initiated immediately in the hospital and have been associated with decreased mortality, reduced analgesic use, and shorter hospital length of stay.[60,61] These interventions allow patients to better participate in postoperative care programs and they are more likely to be compliant with secondary prevention therapies.[62] The current guidelines for mental health, emotional, and psychosocial therapies in the CABG patient are as follows:

- Following CABG surgery, all patients should be screened for depression; class IIA, LOE B.[14]

LEVEL OF COMPLIANCE WITH GDMT AND SECONDARY PREVENTION IN CABG PATIENTS

Despite the proven benefits of GDMT in prolonging survival and decreasing MACE and the need for re-revascularization procedures, compliance with secondary prevention therapies in CABG patients remains poor. CABG patients are less likely the patients undergoing a PCI to fill secondary prevention medications on discharge. Pinho-Gomes and colleagues[3] found on 50% adherence to GDMT in CABG patients at 5 years after surgery. In 2389 CABG patients, Filion and colleagues[63] observed that only 23% of patients with a history of hypertension received an ACE inhibitor on discharge, and only 64% received a statin. Looi and colleagues[64] found that after 3 years, only 43% of CABG patients were on ACE inhibitors and only 72% received a statin. According to Belcher and coworkers,[65] at 1 year after CABG, only 70% of patients were on receiving ASA, 18% were receiving no antiplatelet agents, 24% were receiving an ACE inhibitor, 17% were receiving a beta-blocker, and only 28% were receiving a statin. There was no reduction in the incidence of active smokers, and there was a significant rise in systolic blood pressure (135 $\pm$ 20 mm Hg vs 148 mm Hg $\pm$ 25 mm Hg; $P < .001$). The detrimental effects of not taking antiplatelet agents, beta-blockers, ACE inhibitors, and statins at discharge and 1 year post-CABG were reported by Goyal and colleagues in 2970 patients.[66] Patients taking one-half or fewer of these medications had a significantly higher incidence of death or MI at 2 years after CABG ($P < .013$). Pinho-Gomes and colleagues[3] found that CABG patients who were noncompliant with GDMT were more likely to have decreased long-term survival and freedom from MACE. Equally important, the superior outcomes achieved with CABG over PCI early after revascularization became less apparent as compliance with GDMT decreased in CABG patients compared with PCI patients. The negative impact resulting from nonadherence to GDMT was also observed by Kurlansky and colleagues[4] in 2352 patients undergoing CABG or PCI who were enrolled in the Coronary Artery Revascularization Evaluation (CARE) registry. Outcomes of CABG were superior to those of PCI in patients who were nonadherent to GDMT; however, there was no difference in outcomes between CABG and PCI in patients who were adherent with GDMT. Regardless of the revascularization strategy used, MACE-free survival was significantly improved in patients who were adherent with GDMT.

FACTORS RESPONSIBLE FOR POOR COMPLIANCE WITH GDMT IN CABG PATIENTS

In view of the overwhelming evidence showing that noncompliance with GDMT significantly negates the beneficial effects of CABG, why is compliance with secondary prevention therapies so low? There are several possible explanations:

- Patients are frequently led to believe that CABG is the most definitive therapy for their coronary artery disease, and thus long-term treatment with medications might not be necessary.
- There is a misconception among cardiologists and some surgeons that performing CABG with complete total arterial revascularization will eliminate the need for further GDMT. This is reinforced by the fact that CABG provides a survival benefit over PCI by protecting

patients against a new MI.[67] MI remains the leading cause of death following PCI.[68] The etiologies of recurrent MACE differ following CABG and PCI. Recurrent angina is a more common recurrent ischemic event in CABG patients compared with MI or ACS in PCI patients, and thus cardiologists are more likely to aggressively pursue adherence to GDMT in their PCI patients to avoid a potentially fatal ACS event.

- CABG patients may not always be followed long-term by a cardiologist or an internist with a special interest in cardiovascular medicine. Unfortunately, primary care physicians and nurse practitioners are not always aware of the latest guidelines for secondary prevention following CABG and are more likely to decrease or discontinue ASA, statins, beta-blockers, and ACE inhibitors once target goals have been reached.
- Patients may find that medications for secondary prevention are too costly and are not always covered by third-party payers.

DEVELOPING INTERVENTIONS TO ENSURE COMPLIANCE WITH GDMT IN CABG PATIENTS

What role can surgeons play to enhance compliance with GDMT in their CABG patients? Because patients in whom GDMT is instituted at the time of hospital discharge are more likely to achieve long-term compliance with GDMT,[69,70] every effort should be made to initiate a ''get with the guidelines'' program to target goals that can be maintained in outpatient programs and at home.[71,72] Patients who are ready for discharge should receive a discharge packet that includes a list of all GDMT medications and programs. This information should be reviewed with the patient by a member of the cardiac surgery team, either an NP or a PA, but not a floor nurse, who is more likely to concentrate on issues related to the immediate postoperative period, such as wound care and sternal precautions, instead of long-term GDMT and secondary prevention therapy.

Another mechanism to improve compliance with discharge medical therapy is the use of ''quality indicators,'' such as the use of discharge prescriptions for ASA, beta-blockers, statins and ACE inhibitors to assess adherence with discharge medications, similar to the 3-star rating system adopted by the STS. In a study of STS participating hospitals, CABG patients were randomized into a control or intervention group.[73] The intervention group received ''feedback reports'' on the compliance with discharge prescriptions for ASA, beta-blockers, statins, and ACE inhibitors every 6 months, along with patient education materials that stressed the importance of secondary prevention medications and lifestyle modifications. Compliance with these 4 medications was significantly increased over the 24-month period following CABG in the intervention group. It has been estimated that the simultaneous use of an ACE inhibitor, ASA, a beta-blocker, and a statin simultaneously in patients with cardiovascular disease can decrease ischemic events by at least 14%.[74]

Another approach to improving compliance with GDMT is for surgeons to encourage and institute enrollment in either an inpatient or an outpatient rehabilitation program.[75] This should be advocated for all patients irrespective of their age and social or educational background. The early postoperative period, during which time the trauma of the surgery is still fresh in the patient's mind, is the best time to stress the importance of secondary prevention therapies. Rehabilitation programs provide an environment in which GDMT and lifestyle changes can be best promoted to achieve optimal patient compliance. Because the cost of medications can be a significant deterrent to compliance with GDMT, surgeons, cardiologists, NPs, and PAs should be cognizant of methods to decrease the cost of these drugs. These include using lower-cost insurance-preferred formularies, enrollment in medication assistance programs, and prescribing of lower-cost but high-quality alternative drugs.

Although these inpatient and postdischarge rehabilitation programs can achieve initial success, maintaining compliance with long-term GDMT remains a problem, especially for patients who are no longer being followed by a cardiologist or an internist with an interest in cardiovascular diseases. It is often difficult for surgeons to follow their CABG patients after their initial postoperative visit, because these patients are normally seen by their local physicians who assume their medical care and are reimbursed for these visits. Another option could be to institute a ''cardiac revascularization clinic'' at the hospital where the CABG or PCI was performed to provide long-term follow-up for both procedures. The ''heart team'' approach is being advocated for determining the best approach for coronary revascularization, and it makes sense to follow all these patients in a single clinic. This would be similar to what is now being performed at a heart valve clinic, a transplant clinic or an oncology clinic for lung cancer. This would ensure that all CABG patients are seen by cardiovascular specialists who are knowledgeable with the most recent guidelines for secondary prevention following coronary revascularization. Patients would have their blood pressure, lipid levels, and Hgb A1c checked on a regular basis. Not only would adherence to GDMT be assessed, but also the needed changes in medication and dosages could be made to ensure achievement of the appropriate targeted values. This clinic would also serve as a ''revascularization registry'' similar to that for TAVR, so that long-term MACE, need for re-revascularization, and mortality could be recorded. Patients being followed by their local cardiovascular physicians and those that live at longer distances could have their laboratory values and outcome data sent to the registry, so that all CABG patients would have

some form of follow-up. Support for such a revascularization clinic and registry from societies such as the AATS, STS, ACC, and AHA would facilitate reimbursement from CMS and third-party payers, given that compliance with GDMT decreases long-term MACE and would result in a significant health care cost savings for CABG patients.

CONCLUSIONS

Maintaining GDMT following CABG is vital to minimize MACE, prolong survival, and improve quality of life. Interventions should be instituted by surgeons in the postoperative period, while patients are still hospitalized, to ensure maximal patient compliance with GDMT and secondary prevention therapies. Proper follow-up after discharge by physicians familiar with the latest secondary prevention guidelines is essential to ensure that CABG patients continue to receive GDMT, so that the superior benefits derived from surgical revascularization continue for years after surgery.

Conflict of Interest Statement

Author has nothing to disclose with regard to commercial support.

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