

Adherence of Catheterization Laboratory Cardiologists to American College of Cardiology/American Heart Association Guidelines for Percutaneous Coronary Interventions and Coronary Artery Bypass Graft Surgery What Happens in Actual Practice?

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Background—The American College of Cardiology and the American Heart Association have issued guidelines for the use of coronary artery bypass graft surgery (CABG) and percutaneous coronary interventions (PCI) for many years, but little is known about the impact of these evidence-based guidelines on referral decisions.

Methods and Results—A cardiac catheterization laboratory database used by 19 hospitals in New York State was used to identify treatment (CABG surgery, PCI, medical treatment, or nothing) recommended by the catheterization laboratory cardiologist for patients undergoing catheterization with asymptomatic/mild angina, stable angina, and unstable angina/non-ST-elevation myocardial infarction between January 1, 2005, and August 31, 2007. The recommended treatment was compared with indications for these patients based on American College of Cardiology/American Heart Association guidelines. Of the 16 142 patients undergoing catheterization who were found to have coronary artery disease, the catheterization laboratory cardiologist was the final source of recommendation for 10 333 patients (64%). Of these 10 333 patients, 13% had indications for CABG surgery, 59% for PCI, and 17% for both CABG surgery and PCI. Of the patients who had indications for CABG surgery, 53% were recommended for CABG and 34% for PCI. Of the patients with indications for PCI, 94% were recommended for PCI. For the patients who had indications for both CABG surgery and PCI, 93% were recommended for PCI and 5% for CABG surgery. Catheterization laboratory cardiologists in hospitals with PCI capability were more likely to recommend patients for PCI than hospitals in which only catheterization was performed.

Conclusions—Patients with coronary artery disease receive more recommendations for PCI and fewer recommendations for CABG surgery than indicated in the American College of Cardiology/American Heart Association guidelines. (*Circulation*. 2010;121:267-275.)

Key Words: AHA/ACC guidelines ■ procedure indications ■ percutaneous coronary intervention
■ coronary artery bypass surgery

The American College of Cardiology (ACC) and the American Heart Association (AHA) jointly publish guidelines to inform practicing clinicians of the appropriate indications for a variety of treatments, including percutaneous coronary angioplasty (PCI) and coronary artery bypass graft (CABG) surgery¹⁻³ for patients with coronary artery disease (CAD). These guidelines were created for the purpose of helping clinicians use evidence-based medicine and expert opinions to determine whether the benefits outweigh the risks for these procedures. They include categories in which

patients can be placed on the basis of factors such as type of angina, ventricular function, number of coronary vessels diseased, results of noninvasive tests for ischemia, and various other factors.

Editorial see p 194
Clinical Perspective on p 275

Recent studies have examined the conformance with guidelines among patients undergoing PCI^{4,5} or CABG surgery⁶ and have demonstrated a direct relationship between

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guidelines adherence and better outcomes.^{4,5} However, these studies examined conformance to guidelines among patients who received only 1 of the 2 major procedures for CAD and did not examine the concomitant use of PCI and CABG surgery guidelines to make referral choices. This is of particular interest because guidelines exist for both PCI and CABG surgery, and these 2 procedures are competing options for patients with CAD, especially multivessel disease. Furthermore, many of the referring cardiologists who perform the diagnostic procedure that leads to a referral decision (cardiac catheterization) also perform PCI, and PCI is frequently performed during the same catheterization laboratory visit as the cardiac catheterization without seeking a multidisciplinary consultation.

The purpose of the present study was to use a cardiac catheterization database in New York State to compare referral decisions with ACC/AHA guidelines to examine the extent to which cardiac catheterization laboratory cardiologists adhered to guidelines when they were the final source of the recommendation. The study also examined whether adherence rates changed substantially after guidelines were revised by the ACC/AHA and whether adherence to guidelines was impacted by whether the hospital in which the catheterization was performed was certified by the New York State Department of Health to perform PCI and/or CABG surgery.

Methods

Database

Data were obtained from New York State's Cardiac Diagnostic Catheterization Database (CD)², a voluntary data system in New York maintained by the New York State Department of Health. The data set was developed to capture indications for CABG surgery and PCI with the published ACC/AHA guidelines. These include PCI guidelines published in 2001 and 2005 and CABG surgery guidelines published in 2004.¹⁻³ Data elements used in the study to identify indications for PCI and CABG surgery were the vessels diseased, including left main disease and proximal left anterior descending coronary artery; Canadian Cardiovascular Society class; whether the anatomy was suitable for PCI and/or surgery; ejection fraction and presence of congestive heart failure; ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction, and unstable angina, if present; diabetes; shock, and hemodynamic instability; area of viable myocardium at risk; and stress test results.

Completeness of data reporting was monitored by matching (CD)² to New York's acute care hospital discharge database, the Statewide Planning and Research Cooperative System (SPARCS), and New York's PCI Registry (PCIRS, the Percutaneous Coronary Interventions Reporting System) and identifying cases reported with a diagnostic catheterization in those databases that were not reported to (CD)². Hospitals were required to provide data for those missing cases. In addition, missing or invalid data elements were returned to hospitals for review and correction on an ongoing basis.

With regard to recommendations, the data set indicates whether the catheterization laboratory cardiologist recommended CABG surgery, PCI, medical treatment, or no treatment. The database also indicates whether the final recommendation was anticipated to come from another source (eg, consulting cardiologists or surgeon), but it does not include the final recommendation for those cases.

Patients and Hospitals

A total of 19 hospitals were included in the study. Eight of these hospitals are full-service hospitals that provide PCI and CABG surgery in addition to cardiac catheterization. The other 11 provided

only catheterization at the outset of the study, but 5 added PCI during the study. In subsequent analyses that compared types of hospitals, these 5 were classified accordingly in the time frames before and after they added PCI.

Patients in the study included a subset of patients in the 19 study hospitals undergoing cardiac catheterization between January 1, 2005, and December 31, 2007, who had CAD, had not undergone previous revascularization, and were not experiencing an ST-segment elevation myocardial infarction. Patients were excluded if information needed to determine whether a procedure was indicated or should be recommended was missing (n=504), if there were deferred recommendations (n=124) or multiple recommendations (n=872), or if the source of final recommendation was anyone other than the catheterization laboratory cardiologist (n=4813). Recommendations from other sources, deferred recommendation, and multiple recommendations were excluded because the nature of the final recommendation was unknown at the time the data were gathered. Thus, with the exclusion of cases with missing data, there were 16 142 patients who were found to have CAD, and the cardiac catheterization laboratory cardiologist was the final source of recommendation for 10 333 (64%). These patients are the subjects of the present study.

End Points

End points in the study were determinations of whether each patient met the ACC/AHA indications for CABG surgery, PCI, neither, or both and the recommendations made by the catheterization laboratory cardiologist for each patient. The recommendations for each patient were categorized as CABG surgery, PCI, medical treatment, or no treatment.

Statistical Analysis

First, the percentages of patients in each of the 4 categories of indications for the 2 procedures (indicated for PCI and CABG surgery, indicated for PCI only, indicated for CABG surgery only, or indicated for neither procedure) were calculated for each of a variety of patient characteristics (demographics, source of admission, ventricular function, coronary vessel disease, suitability of coronary anatomy for each intervention, presence of angina, previous cardiac procedures, previous myocardial infarction, and several comorbidities). Patients in each of the 4 categories of indications were classified according to whether they were recommended for PCI, CABG surgery, or neither procedure. Percentages of patients who were recommended for each procedure but for whom the procedure was not indicated and percentages of patients who had indications for a procedure but for whom it was not recommended were noted and described. The term "indicated" was first defined in such a way that class I criteria (evidence and/or general agreement that the procedure is effective) and class IIa criteria (the weight of opinion/evidence is in favor of usefulness or efficacy) were treated equally as "adherence to guidelines." If 1 procedure was judged to be class I and the other procedure was judged to be class IIa for a given patient, the patient was said to be indicated for both procedures.

A second set of analyses was then conducted in which meeting class I criteria took precedence over meeting class IIa criteria. That is, if 1 procedure (either CABG surgery or PCI) was judged to be class I and the other procedure (eg, PCI) was judged to be class IIa for a given patient, the patient was said to be indicated for CABG surgery but not for PCI. Subsequent analyses were all variations of the first interpretation of indications, whereby a patient with a class I criterion for 1 procedure and a class IIa criterion for another procedure was regarded as indicated for both procedures.

One supplemental set of analyses compared adherence to guidelines before and after the publication of new PCI guidelines in 2005 to determine whether there was a difference in adherence after the updated guidelines were published. April 1, 2006, was used as the time the new guidelines were incorporated in the present study, to give clinicians time to have read and implemented the 2005 guidelines. The 2004 CABG guidelines were used for the entire time period of the present study for identification of indications for CABG surgery. The analyses described above were repeated for each of the

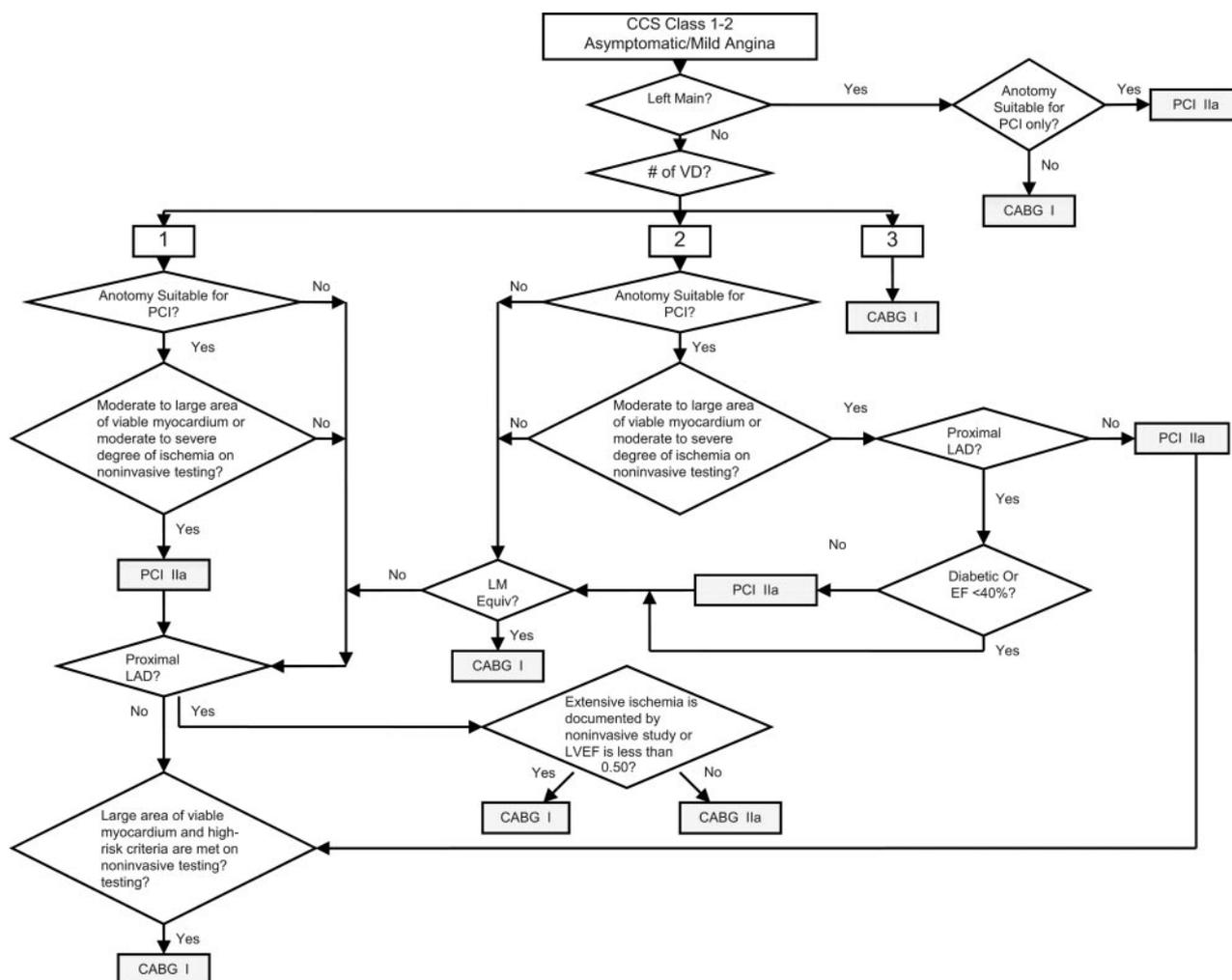


Figure 1. 2005 ACC/AHA indications (class I and IIa) for asymptomatic/mild angina. CCS indicates Canadian Cardiovascular Society; VD, diseased vessels; LAD, left anterior descending coronary artery; LM, left main; EF, ejection fraction; and LVEF, left ventricular ejection fraction.

3 types of hospitals (catheterization-only hospitals that are not certified by the New York State Department of Health to perform PCI, those certified to perform catheterization and elective PCI, and full-service hospitals that are certified to perform both PCI and CABG surgery) to compare their levels of adherence to guidelines.

Results

Flow charts that demonstrate who is indicated for CABG surgery and PCI at levels I and IIa for each of the 3 major groups of patients (asymptomatic/mild angina, stable angina, unstable angina/non-ST-elevation myocardial infarction) in the study are presented in Figures 1 to 3. Of the 16 142 patients undergoing catheterization with complete data who were found to have CAD, the catheterization laboratory cardiologist was the final source of recommendation for 10 333 patients (64%). Of these 10 333 patients, 1337 (12.9%) were indicated for CABG surgery, 6051 (58.6%) were indicated for PCI, 1722 (16.7%) were indicated for CABG surgery and PCI, and 1223 (11.8%) had CAD but were indicated for neither CABG surgery nor PCI (Table 1). A total of 9.6% of the patients were recommended for CABG surgery compared with 77.3% for PCI and 12.7% for medical treatment.

Patients who were indicated for CABG surgery were recommended for it 53% of the time (712 patients). Thirty-four percent of patients (455) with indications for CABG surgery were recommended for PCI, and 12% were recommended for medical therapy. Of the patients with indications for PCI, 94% were recommended for it, 2% were recommended for CABG surgery, and 4% were recommended for medical treatment. For the 17% of patients with indications for both CABG surgery and PCI, 93% were recommended for PCI, 5% were recommended for CABG surgery, and 2% were recommended for medical therapy (Table 1). For the patients with CAD who were not indicated for CABG surgery or PCI (12% of all patients), 71% were recommended for medical treatment, 21% were recommended for PCI, and 6% were recommended for CABG surgery.

Although 53% of the patients with indications for CABG surgery were recommended for CABG, there was a wide variation in the percentage recommended for CABG depending on patients' clinical presentations. In general, CABG was recommended 58% of the time when it was a class I indication (and PCI was indicated at a class below class IIa), but CABG was recommended only 7% of the time when it

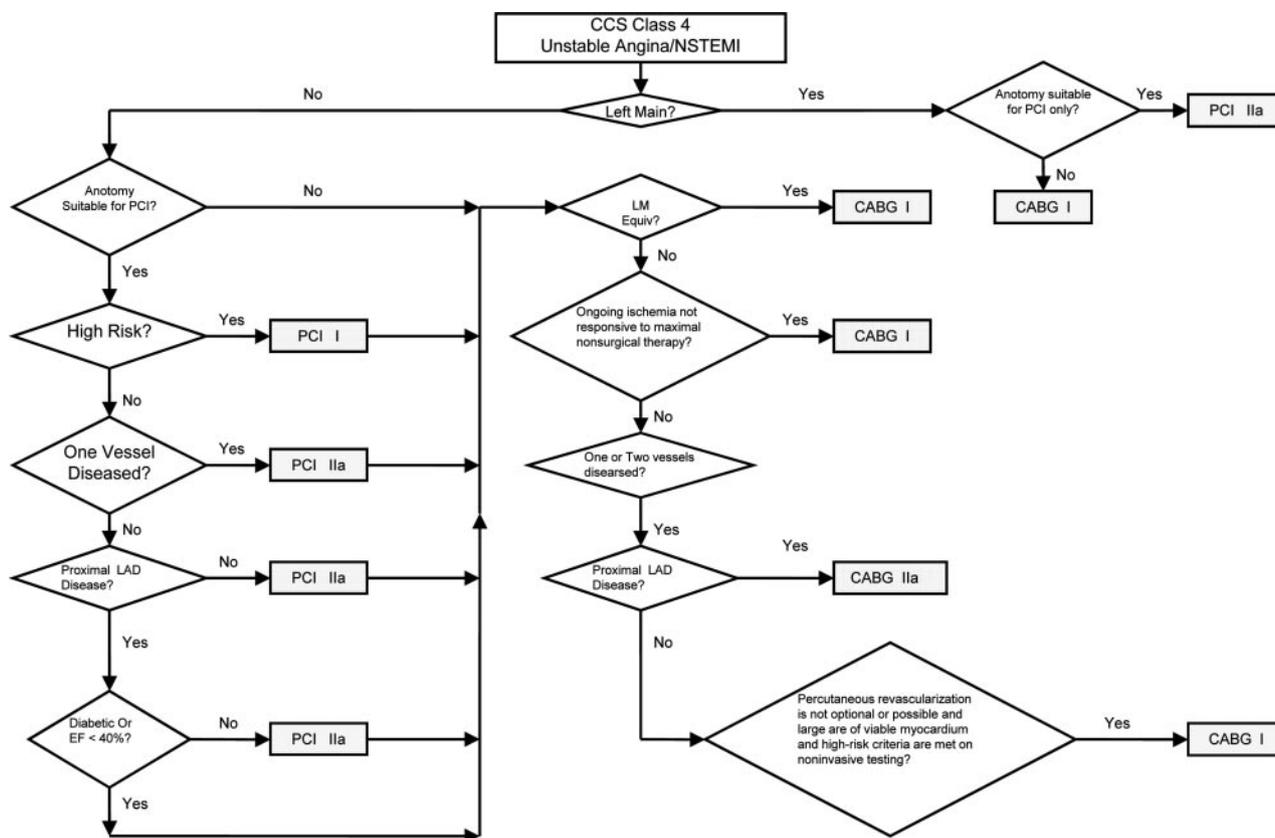


Figure 3. 2005 ACC/AHA indications (class I and IIa) for unstable angina/non–ST-elevation myocardial infarction. CCS indicates Canadian Cardiovascular Society; NSTEMI, non–ST-elevation myocardial infarction; LM, left main; LAD, left anterior descending coronary artery; and EF, ejection fraction.

patients were recommended disproportionately for different clinical presentations.

The variation in the percentage of patients in individual hospitals who were indicated for CABG but recommended for PCI was quite wide, with a range from 4% to 91% among hospitals with at least 50 patients indicated for CABG. However, the mean of 34% in Table 1 was not driven by a few large hospitals.

For all but 2 hospitals, the percentage of patients indicated for both CABG and PCI who were recommended for PCI was >80%. For those 2 hospitals, 57% (74 of 129) and 63% (30 of 48) of such patients were recommended for PCI.

Of the 7984 patients recommended for PCI, 6941 patients were in hospitals with PCI capability. A total of 6399 (92.2%) of these patients underwent ad hoc PCI (PCI in the same catheterization laboratory visit as their cardiac catheterization).

Discussion

The ACC and the AHA periodically have developed guidelines for the use of CABG surgery and PCI for patients with coronary heart disease. Surprisingly few studies have been conducted to determine the extent to which referring physicians use these guidelines or any guidelines in clinical practice. Anderson et al⁵ used data from the ACC’s National Cardiovascular Data Registry from January 2001 to March 2004 to demonstrate that 64% of the PCI patients were class I, 21% were class IIa, 7% were class IIb, and 8% were class III. In addition, clinical success (<25% residual stenosis without myocardial infarction, same-admission CABG surgery, or death) rates were directly related to indication class and varied from 92.8% for class I to 85.5% for class III.⁵

O’Connor et al⁶ used data from the Northern New England Cardiovascular Disease Study Group to determine the con-

Table 1. ACC/AHA Indications vs Catheterization Laboratory Recommendations, New York, January 1, 2005–December 31, 2007: Indications for ACC/AHA Class I and Class IIa Regarded as Equal

ACC/AHA Indication/Cath Lab Recommendation	CABG, n (%)	PCI, n (%)	Medical Treatment, n (%)	None, n (%)	Total, n (%)
CABG	712 (53)	455 (34)	156 (12)	14 (1)	1337 (100)
PCI	124 (2)	5660 (94)	255 (4)	12 (<1)	6051 (100)
CABG and PCI	84 (5)	1608 (93)	26 (2)	4 (<1)	1722 (100)
Neither CABG or PCI	70 (6)	261 (21)	873 (71)	19 (2)	1223 (100)
Total	990 (10)	7984 (77)	1310 (13)	49 (<1)	10 333 (100)

Cath Lab indicates catheterization laboratory.

Table 2. ACC/AHA Indications vs Catheterization Laboratory Recommendations, New York, January 1, 2005–December 31, 2007: Indications for Class I for 1 Procedure Regarded as Superior to Indications for Class IIa for Another Procedure

ACC/AHA Indication/Cath Lab Recommendation	CABG, n (%)	PCI, n (%)	Medical Treatment, n (%)	None, n (%)	Total, n (%)
CABG	748 (43)	800 (46)	160 (9)	15 (1)	1723 (100)
PCI	132 (2)	6086 (94)	259 (4)	14 (<1)	6491 (100)
CABG and PCI	40 (4)	837 (93)	18 (2)	1 (<1)	896 (100)
Neither CABG or PCI	70 (6)	261 (21)	873 (71)	19 (2)	1223 (100)
Total	990 (10)	7984 (77)	1310 (13)	49 (<1)	10 333 (100)

Cath Lab indicates catheterization laboratory.

cordance of patients undergoing CABG surgery in northern New England with the 2004 ACC/AHA guideline update for CABG surgery.³ They found that 87.7% of the procedures performed were class I, 8.4% were class IIa, 2.5% were class IIb, and 1.4% were class III.

Guidelines other than those developed by the ACC/AHA were used in a few earlier studies. Leape et al⁷ used guidelines developed by RAND⁸ to examine the appropriateness of use of CABG surgery in New York State in 1990. They concluded that nearly 91% of the procedures were appropriate, 7% were uncertain, and 2.4% were inappropriate.⁷ McGlynn et al⁹ demonstrated that the rates of inappropriateness of coronary angiography and CABG surgery were low in both Canada and New York State. Hilborne et al¹⁰ used RAND criteria to conclude that in New York State in 1990, 58% of percutaneous transluminal coronary angioplasty (PTCA, the previous term for PCI) cases were appropriate, with 38% uncertain and 4% inappropriate.

Although most studies have examined the overuse of cardiac procedures, some studies have examined underuse by applying RAND appropriateness criteria for coronary angiography to determine the percentages of those patients who received indicated procedures. Hannan et al¹¹ found that 52%

of angiography patients for whom CABG surgery was found to be appropriate received it within 3 months, and there were significant differences by race. Leape et al¹² found that 74% of patients in New York City in 1992 who met the RAND appropriateness criteria for revascularization received either CABG surgery or PTCA (PCI).

Most of the studies referenced above are relatively old; all but 2 used now-outdated RAND criteria rather than ACC/AHA criteria; none looked at both potential overuse and underuse of procedures; and none looked at the interface of CABG surgery and PCI with regard to whether 1 of the 2 procedures was used or recommended when the other was indicated by guidelines. This last point is particularly important, because many recent studies have examined outcomes according to choice of revascularization. These studies include studies that compared drug-eluting and bare-metal stents.^{13–15} Other studies have compared outcomes for CABG surgery and PCI and generally have found CABG surgery outcomes to be superior.^{16–18} Furthermore, some recent studies have compared medical treatment favorably with PCI for patients with stable coronary disease.^{19,20} In light of all of these recent findings, it is important to determine who is being referred for various treatment options and to learn how

Table 3. A. ACC/AHA Indications vs Catheterization Laboratory Recommendations, New York, January 1, 2005–March 31, 2006 and April 1, 2006–December 31, 2007*

ACC/AHA Indication/Cath Lab Recommendation	CABG, n (%)	PCI, n (%)	Medical Treatment, n (%)	None, n (%)	Total, n (%)
January 1, 2005–March 31, 2006					
CABG	191 (45)	186 (43)	48 (11)	4 (1)	429 (100)
PCI	28 (1)	2056 (94)	92 (4)	4 (<1)	2180 (100)
CABG and PCI	27 (4)	609 (93)	15 (2)	3 (<1)	654 (100)
Neither CABG or PCI	36 (7)	181 (33)	322 (59)	9 (2)	548 (100)
Total	282 (7)	3032 (80)	477 (13)	20 (1)	3811 (100)
April 1, 2006–December 31, 2007					
CABG	521 (57)	269 (30)	108 (12)	10 (1)	908 (100)
PCI	96 (2)	3604 (93)	163 (4)	8 (<1)	3871 (100)
CABG and PCI	57 (5)	999 (94)	11 (1)	1 (<1)	1068 (100)
Neither CABG or PCI	34 (5)	80 (12)	551 (82)	10 (1)	675 (100)
Total	708 (11)	4952 (76)	833 (13)	29 (<1)	6522 (100)

Cath Lab indicates catheterization laboratory.

The period from April 1, 2006, through December 31, 2007, represents the period during which referring physicians were able to use the 2005 ACC/AHA guidelines in determining which procedure was appropriate.

Table 4. ACC/AHA Indications vs Catheterization Laboratory Recommendations, New York, January 1, 2005–December 31, 2007

ACC/AHA Indication/Cath Lab Recommendation	CABG, n (%)	PCI, n (%)	Medical Treatment, n (%)	None, n (%)	Total, n (%)
Hospitals with cath labs but no PCI					
CABG	226 (73)	52 (17)	25 (8)	5 (2)	308 (100)
PCI	39 (4)	787 (86)	85 (9)	7 (1)	918 (100)
CABG and PCI	30 (14)	168 (81)	9 (4)	1 (<1)	208 (100)
Neither CABG or PCI	46 (22)	36 (17)	126 (60)	1 (<1)	209 (100)
Total	341 (21)	1043 (63)	245 (15)	14 (1)	1643 (100)
Hospitals with cath labs and PCI but no cardiac surgery privileges					
CABG	130 (67)	42 (22)	18 (9)	3 (2)	193 (100)
PCI	45 (6)	650 (89)	36 (5)	0 (0)	731 (100)
CABG and PCI	24 (13)	152 (85)	3 (2)	0 (0)	179 (100)
Neither CABG or PCI	5 (9)	6 (11)	43 (77)	2 (4)	56 (100)
Total	204 (18)	850 (73)	100 (9)	5 (<1)	1159 (100)
Hospitals with catheterization laboratories and PCI/CABG (full-service hospitals)					
CABG	356 (43)	361 (43)	113 (14)	6 (1)	836 (100)
PCI	40 (1)	4223 (96)	134 (3)	5 (<1)	4402 (100)
CABG and PCI	30 (2)	1288 (96)	14 (1)	3 (<1)	1335 (100)
Neither CABG or PCI	19 (2)	219 (23)	704 (73)	16 (2)	958 (100)
Total	445 (6)	6091 (81)	965 (13)	30 (<1)	7531 (100)

Cath Lab indicates catheterization laboratory.

these referral patterns compare with the latest ACC/AHA guidelines and the latest studies that compare outcomes for competing interventions.

The present study demonstrates that for 64% of patients undergoing catheterization who were found to have CAD, the source of the final recommendations for treatment was the cardiac catheterization laboratory cardiologist. Of the subset of these patients who were indicated for CABG surgery, 53% were recommended for CABG and 34% for PCI. Of the patients indicated for PCI, 94% were recommended for PCI. For the patients who were indicated for both CABG surgery and PCI, 93% were recommended for PCI and 5% for CABG surgery.

Thus, patients received more recommendations for PCI and fewer for CABG surgery than were indicated. The tendency to recommend PCI for patients who were either indicated for CABG surgery or indicated for both procedures was more accentuated in hospitals with PCI capability. In summary, these findings suggest that catheterization laboratory cardiologists make final recommendations relatively frequently and that these recommendations are frequently for PCI despite the fact that CABG surgery or both CABG and PCI are indicated. The finding that PCI appears to be recommended more often than indicated is particularly important because as noted above, some recent studies have found CABG surgery outcomes to be better than PCI outcomes for patients with multivessel disease,^{16–18} and other studies have found that medical treatment compares favorably with PCI for patients with stable coronary disease.^{19,20}

There are a few caveats to the present study. First, we had to translate the ACC/AHA indications for CABG and PCI

into a flowchart that incorporates both of them simultaneously, and there may be disagreement on the way this was done. For instance, we developed indications by taking the ACC/AHA guidelines in the order in which they were presented for each level, and different interpretations could result if the order were changed. In addition, we did not have access to information relative to whether the patient was already receiving medical therapy, which was a factor in defining some indications. Indications for PCI would be reduced if the patient was not undergoing medical therapy, so the impact of having this data element would be to increase the number of recommendations for PCI among patients for whom it was not indicated. However, it would have been valuable to have had information on the extent of medical therapy in the study.

Nonetheless, we believe our interpretations are essentially the same as those made in recent studies,^{4,6} and we have developed the flow charts presented in the appendices so that the logic is transparent. We believe these flowcharts are the first attempt to integrate ACC/AHA indications for both CABG surgery and PCI, and we are hopeful they can be used as a first cut for revision or by referring physicians to determine potential indications for patients with CAD.

Recent commentary on ACC/AHA clinical practice guidelines reminds us that clinical practice guidelines are intended to be only general guides for practice, and there may be extenuating circumstances that may lead a provider or patient to opt for a different decision.²¹ In addition, the CABG and PCI guidelines were developed at different times, by different people, in different ways, and no effort appears to have been

made to standardize them so referring physicians could use them simultaneously to make recommendations. Consequently, another major reason for the lack of concordance between guidelines and recommendations may be that referring physicians were unable to determine what should have been recommended according to the guidelines. The ACC and AHA in conjunction with other professional organizations have recently published appropriateness criteria for coronary revascularization that were developed to serve as a supplement to the ACC/AHA guideline documents.²² Although that document does not distinguish between appropriateness of PCI and CABG surgery for all patients (because for some groups, the appropriateness rating applies only to “revascularization”), it does address the appropriateness of both procedures in the same document, and it would be interesting to apply the methodology used in the present study to these new appropriateness criteria.

Furthermore, the results may not be representative of all patients undergoing cardiac catheterization in New York. A total of 19 of the 75 to 80 hospitals that provided cardiac catheterization in New York volunteered to be part of the study. For 2005, the earliest year of the study, there were 10 hospitals in the study, and hospitals were gradually added until all 19 were participating. Over the course of the study period, 5 catheterization-only hospitals began providing elective PCI, and these hospitals were treated in the analyses according to their status at the time.

We did not always know whether the treatment that was recommended was actually received. However, we were able to determine whether patients recommended by the catheterization laboratory cardiologist for PCI in a hospital with PCI capability underwent ad hoc PCI (PCI in the same laboratory visit as the cardiac catheterization). As noted in the Results, most patients recommended for PCI in the present study (6941 of 7984) were in hospitals with PCI capability, and more than 92% of these patients underwent ad hoc PCI. This demonstrates that patients recommended for PCI did receive the procedure, and they received it with seemingly little multidisciplinary input or deliberation.

Although an examination of the patients recommended for medical therapy who were indicated for revascularization provides some measure of underuse of revascularization procedures, it is likely that because cardiac catheterization is the driver for revascularization procedures, the majority of underuse would be among patients who never received cardiac catheterization. In conclusion, the results of the present study suggest that multidisciplinary input before final treatment recommendations should be promoted to improve concordance with professional guidelines.

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Disclosures

None.

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CLINICAL PERSPECTIVE

Although the American College of Cardiology and the American Heart Association have issued guidelines for the use of coronary artery bypass graft surgery (CABG) and percutaneous coronary interventions (PCI) for many years, little is known about the impact of these evidence-based guidelines on referral decisions. A cardiac catheterization laboratory database used by 19 hospitals in New York State was used to identify treatment (CABG surgery, PCI, medical treatment, or nothing) recommended by the catheterization laboratory cardiologist for patients undergoing catheterization with asymptomatic/mild angina, stable angina, and unstable angina/non-ST-elevation myocardial infarction between January 1, 2005, and August 31, 2007. The recommended treatment was compared with indications for these patients based on American College of Cardiology/American Heart Association guidelines. Findings were that of the 16 142 patients undergoing catheterization who were found to have coronary artery disease, the catheterization laboratory cardiologist was the final source of recommendation for 10 333 patients (64%). Of these cases, 13% were indicated for CABG surgery, 59% for PCI, and 17% for CABG surgery and PCI. Of the patients who were indicated for CABG surgery, 53% were recommended for CABG and 34% for PCI. Of the patients indicated for PCI, 94% were recommended for PCI. For the patients who were indicated for both CABG surgery and PCI, 93% were recommended for PCI and 5% for CABG surgery. In conclusion, patients with coronary artery disease receive more recommendations for PCI and fewer recommendations for CABG surgery than are indicated in the American College of Cardiology/American Heart Association guidelines.

Adherence of Catheterization Laboratory Cardiologists to American College of Cardiology/American Heart Association Guidelines for Percutaneous Coronary Interventions and Coronary Artery Bypass Graft Surgery: What Happens in Actual Practice?

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