Original Article

Utilization, Characteristics, and In-Hospital Outcomes of Coronary Artery Bypass Grafting in Patients With ST-Segment–Elevation Myocardial Infarction

Results From the National Cardiovascular Data Registry Acute Coronary Treatment and Intervention Outcomes Network Registry–Get With The Guidelines

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Background—There are limited data on the utilization and outcomes of coronary artery bypass grafting (CABG) among ST-segment–elevation myocardial infarction (STEMI) patients in contemporary practice.

Methods and Results—Using data from National Cardiovascular Data Registry Acute Coronary Treatment and Intervention Outcomes Network Registry–Get With The Guidelines between 2007 and 2014, we analyzed trends in CABG utilization and hospital-level variation in CABG rates. Patients undergoing CABG during the index admission were categorized by the most common scenarios: (1) CABG only as the primary reperfusion strategy; (2) CABG after primary percutaneous coronary intervention; and (3) CABG after fibrinolytic therapy. A total of 15 145 patients (6.3% of the STEMI population) underwent CABG during the index hospitalization, with a decrease in utilization from 8.3% in 2007 to 5.4% in 2014 (trend *P* value <0.001). The hospital-level use of CABG in STEMI varied widely from 0.5% to 36.2% (median, 5.3%; interquartile range [IQR], 3.5%–7.8%; *P* value <0.001). Of all patients undergoing CABG, 45.8% underwent CABG only, 38.7% had CABG after percutaneous coronary intervention, and 8.2% CABG after fibrinolytic therapy. The median time intervals from cardiac catheterization/percutaneous coronary intervention to CABG were 23.3 hours (IQR, 3.0–70.3 hours) in CABG only, 49.7 hours (IQR, 3.2–70.3 hours) in CABG after percutaneous coronary intervention, and 56.6 hours (IQR, 22.7–96.0 hours) in CABG after fibrinolytic therapy. The Acute Coronary Treatment and Intervention Outcomes Network mortality risk scores differed modestly (median, 33; IQR, 28–40 versus median, 32; IQR, 27–38) between CABG and non-CABG patients. Patients undergoing CABG had similar in-hospital mortality rate (5.4% versus 5.1%) as those not treated with CABG.

Conclusions—CABG is performed infrequently in STEMI patients during the index hospitalization, with rates declining in contemporary US practice over time. There was marked hospital-level variation in the use of CABG, and CABG was typically performed within 1 to 3 days after angiography. Observed mortality rates appear low, suggesting that CABG might be safely performed in select STEMI patients in a timely fashion. **(*Circ Cardiovasc Qual Outcomes*. 2017;10:e003490. DOI: 10.1161/CIRCOUTCOMES.116.003490.)**

Key Words: coronary artery bypass ■ hospital mortality ■ hospitalization ■ percutaneous coronary intervention ■ thrombolytic therapy

Coronary artery bypass graft (CABG) surgery is a commonly used revascularization method in patients with coronary heart disease.[1] Among patients presenting with ST-segment–elevation myocardial infarction (STEMI), however, CABG is infrequently used: it has previously been reported to be used in 5% or less of cases.[2,3] Its role after acute STEMI is mainly limited to those with emergent catastrophes, such as cardiogenic shock, unsuccessful or complicated primary percutaneous coronary intervention (PCI), mechanical complications, or with early recurrent ischemia. All of these

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WHAT IS KNOWN

- CABG is a commonly used revascularization method in patients with coronary heart disease.
- However, with the advance of the interventional technology and wide adoption of PCI in practice, there are limited contemporary data on utilization, pattern of care, patient characteristics, and outcomes of CABG in STEMI.

WHAT THE STUDY ADDS

- Use of CABG in STEMI significantly declined over time, with substantial variations exist across US hospitals.
- The majority of patients underwent CABG as the primary reperfusion strategy or after primary PCI and typically performed within 1 to 3 days after angiography.
- Observed mortality rates of CABG in STEMI appear low and comparable to STEMI patients not treated with CABG, suggesting that CABG might be safely performed in select STEMI patients in a timely manner.

are considered high-risk criteria according to the American College of Cardiology/American Heart Association guidelines.[4] However, with the advance of the interventional technology and wide adoption of PCI in practice, there are limited contemporary data on utilization, pattern of care, patient characteristics, and outcomes of CABG in STEMI.

Using data from the National Cardiovascular Data Registry Acute Coronary Treatment and Intervention Outcomes Network Registry–Get With The Guidelines (ACTION Registry–GWTG), we analyzed STEMI patients undergoing CABG between 2007 and 2014 at participating hospitals in the United States. Our goals were to (1) describe the temporal trends and hospital-level variation in CABG among STEMI patients, (2) evaluate the timing of in-hospital CABG, and (3) describe demographic and clinical characteristics, as well as in-hospital outcomes among STEMI patients receiving CABG.

Methods

Study Population

Our initial study population consisted of 241 244 STEMI patients who underwent coronary angiography from 618 ACTION Registry–GWTG hospitals with both PCI and CABG capabilities between January 1, 2007 and December 31, 2014. Details of the ACTION Registry–GWTG have been previously described.[5] In brief, ACTION Registry–GWTG is a quality improvement program and nationwide registry of patients with STEMI or non-STEMI. The registry uses a standardized data collection with written definitions, has requirements in place to ensure uniform data entry and transmission, and is subject to data quality checks (www.ncdr.com). Trained study personnel extract data from medical records using an electronic case record form using standard definitions and do not require direct contract with individual patients. All participating institutions were required to comply with local regulatory and privacy guidelines. Because data were used primarily at the local site for quality improvement purpose, patient-level informed consent was not required. The Duke Clinical Research Institute serves as the data analysis center and has an agreement to analyze the aggregate deidentified data for research purposes.

Data Collection and Definitions

Data were abstracted from medical records. Reported descriptive data include demographic and historical information (including age, sex, weight, history of diabetes mellitus, hypertension, dyslipidemia, current/recent smoker, currently on dialysis, previous myocardial infarction, previous PCI, previous CABG, previous stroke, peripheral arterial disease, atrial fibrillation, or flutter), clinical characteristics present at arrival to the hospital (including estimated glomerular filtration rate [nondialysis], signs of congestive heart failure [CHF], and cardiogenic shock), in-hospital acute antiplatelet medication within 24 hours of hospital arrival, the documented contraindications for PCI or fibrinolytic therapy, number of diseased vessels, and rate of transferred from outside facility.

In-hospital clinical outcomes included in-hospital mortality, reinfarction, cardiogenic shock, CHF, stroke, post-CABG bleeding, post-CABG transfusion, and length of stay. Reinfarction was defined as postadmission with clinical signs and symptoms of ischemia distinct from the presenting ischemic event. For the outcomes of cardiogenic shock, CHF, and stroke, only new events were included such that individuals presenting with cardiogenic shock, CHF, or stroke at admission were not considered as outcomes of interest. Post-CABG bleeding was defined as an absolute hemoglobin decrease of ≥4 g/dL (baseline to nadir, and nadir date later than CABG date), and intracranial hemorrhage stroke or suspected bleeding event with event date later than CABG date. Post-CABG transfusion was defined as documented CABG-related transfusion with transfusion date later than the CABG date.

Statistical Analysis

Linear trend test was performed to describe the temporal trend of CABG utilization among STEMI patients between 2007 and 2014. Hierarchical logistic regression model with hospital-specific random intercepts was used to evaluate the hospital-level variation in CABG use. Shrinkage estimates from the model are reported. Because the CABG rates would vary substantially in hospitals with small numbers of patients, this analysis was restricted to 578 hospitals with at least 25 patients during the study period. A sensitivity analysis was performed to evaluate the variation in 68 hospitals consistently submitting data during each quarter of study period.

Because both measured and unmeasured confounding will likely influence the surgical decisions, it is almost impossible to make a fair comparison of care and outcomes of different revascularization strategies. Instead, we reported baseline patient characteristics, clinical factors, in-hospital treatment, hospital characteristics, and outcomes between no CABG and CABG groups as descriptive only. Continuous and categorical variables were summarized as medians with interquartile ranges (IQRs) and percentages, respectively. The ACTION mortality risk scores were calculated to summarize the risk profiles across each treatment group.[6] Differences between groups were compared by Wilcoxon-rank sum tests and Pearson χ^2 tests for categorical variables.

Results

Temporal Trends in Use of CABG Among STEMI Patients

Of 241 244 STEMI patients in the ACTION Registry–GWTG between 2007 and 2014, 15 145 underwent CABG during the index admission. Among these, 6937 patients had CABG only as the primary reperfusion strategy, 5863 CABG after PCI, 1239 CABG after fibrinolytic therapy, and 1106 patients underwent CABG with procedural sequence out of aforementioned orders. Overall, CABG was performed in 8.3% of STEMI patients in 2007, and this number decreased to 5.4% in 2014 (trend *P* value <0.001; Figure 1A). A similar decreasing trend of CABG utilization was also observed in STEMI patients receiving fibrinolytic therapy first (from 8.0% of all STEMI patients receiving fibrinolytic therapy in 2007 to 6.1% in 2014, trend *P* value=0.013; Figure 1B). Among STEMI patients receiving PCI, however, there was a slight increase in CABG utilization from 2.7% of all STEMI patients receiving PCI in 2007 to 3.0% in 2009, then a decrease to 2.5% in 2014 (trend *P* value<0.001; Figure 1C).

Hospital-Level Variation of CABG in STEMI

Among the primary analysis cohort of 578 hospitals treating at least 25 patients during the entire study period, the hospital-level use of CABG varied widely from 0.5% to 36.2% of STEMI patients (median, 5.3%; IQR, 3.5%–7.8%; Figure 2A). A similar variation was found in the sensitivity analysis of 68 hospitals consistently submitting data to the ACTION Registry–GWTG during the entire study period (median, 5.4%; IQR, 3.8%–7.6%; Figure 2B). In general, hospitals with a higher proportion of CABG in STEMI were larger and had higher annual PCI and CABG volumes (Table 1).

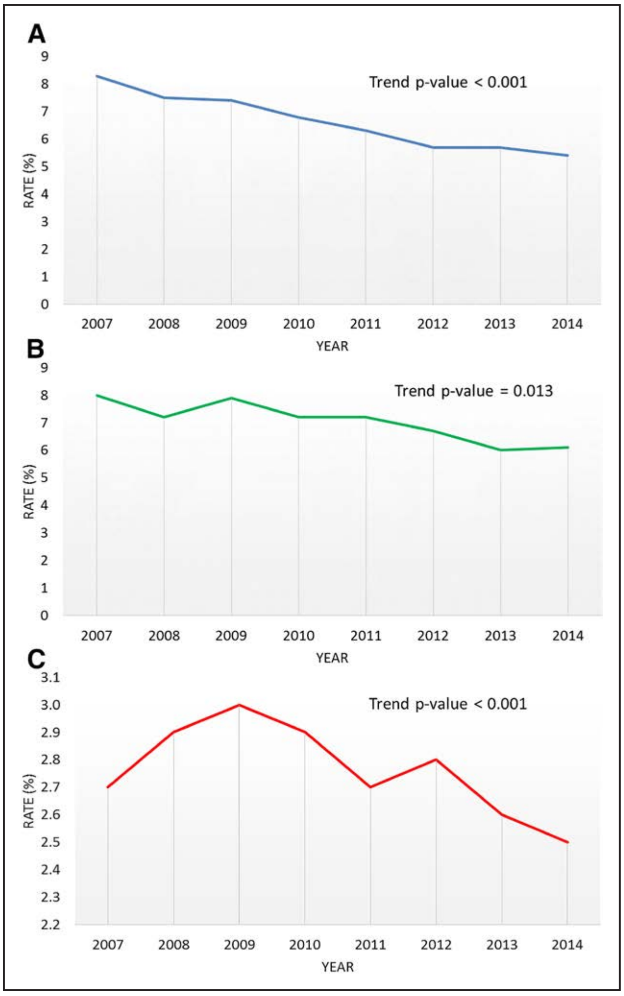

Figure 1. Temporal trend of coronary artery bypass grafting (CABG) in ST-segment–elevation myocardial infarction (STEMI). **A**, CABG in STEMI patients. **B**, CABG in STEMI patients receiving fibrinolytic therapy first. **C**, CABG in STEMI patients undergoing percutaneous coronary intervention first.

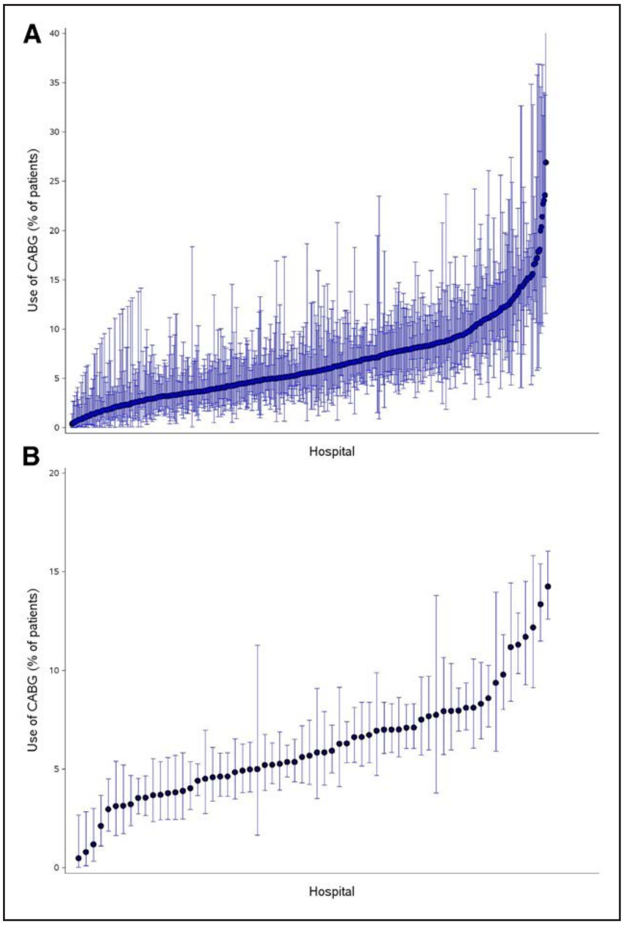

Figure 2. Hospital-level variation of coronary artery bypass grafting (CABG) in ST-segment–elevation myocardial infarction (STEMI). **A**, Among 578 hospitals treating at least 25 STEMI patients during the study period. **B**, Among 68 hospitals that consistently submitted data to Acute Coronary Treatment and Intervention Outcomes Network Registry–Get With The Guidelines during the study period.

Patient Characteristics

Table 2 shows the demographic and clinical characteristics of STEMI patients receiving CABG. Compared with the non-CABG group, patients who underwent CABG were older, more likely to have diabetes mellitus, hypertension, dyslipidemia, heart failure, and cardiogenic shock at presentation, more likely to present with 3-vessel disease, but less likely to have previous CABG or PCI. Contraindications to PCI or fibrinolytic therapy were more frequently documented among CABG patients (38.7% versus 7.7%). In contrast, use of P2Y12 receptor inhibitors within 24 hours of hospitalization was less often in patients receiving CABG (39.5% versus 90.7%). More patients in the CABG group were transferred from outside facilities (41.2% versus 33.9%). Despite these differences, the ACTION mortality risk scores showed only modest differences between CABG and non-CABG patients (median, 33; IQR, 28–40 versus median, 32; IQR, 27–38).

Table 1. Hospital Characteristics According to Hospital-Level Variation of CABG in STEMI

Characteristics	Q1: 0.5%–3.5%	Q2: 3.6%–5.3%	Q3: 5.4%–7.8%	Q4: 7.9%–36.2%
Hospital size, median (IQR), beds	290 (215–426)	337 (236–514)	366 (254–540)	338 (222–466)
Academic center, %	25.4	21.2	23.2	18.4
Annual STEMI volume, median (IQR)	67 (40–98)	84 (63–138)	94 (64–144)	80 (51–130)
Annual PCI volume, median (IQR)	102 (62–157)	140 (94–219)	146 (95–228)	133 (82–223)
Annual CABG volume, median (IQR)	6 (1–12)	16 (9–29)	23 (15–37)	31 (18–51)
Rural, %	8.5	10.3	6.6	9.2

CABG indicates coronary artery bypass grafting; IQR, interquartile range; PCI, percutaneous coronary intervention; and STEMI, ST-segment–elevation myocardial infarction.

Treatment Timelines of CABG in STEMI

Figure 3 displays the timing of CABG in STEMI patients. Overall, the median time interval from hospital arrival to cardiac catheterization was 0.8 hour (IQR, 0.3–1.5 hour) in patients receiving CABG only, 0.6 hour (IQR, 0.3–1.0 hour) in patients receiving CABG after PCI, and 7.0 hours (IQR, 0.7–20.4 hours) in patients receiving CABG after fibrinolytic therapy. The median time intervals from catheterization to CABG were 23.3 hours (IQR, 3.2–70.3 hours), 49.7 hours (IQR, 9.5–105.8 hours), and 56.6 hours (IQR, 22.7–96.0 hours), respectively, in these 3 groups. Patients receiving dual antiplatelet therapy had the longest delay with a median dual antiplatelet therapy initiation to CABG time of 73.0 hours (IQR, 22.2–128.0 hours).

In-Hospital Clinical Outcomes

Table 3 shows the in-hospital outcomes of STEMI patients receiving CABG. The in-hospital mortality rates were similar between STEMI patients treated with CABG (5.4%) and those not treated with CABG (5.1%). However, CABG patients were more likely to experience reinfarction (1.4% versus 0.9%), mortality or reinfarction (6.5% versus 5.8%), cardiogenic shock (13.8% versus 6.0%), CHF (11.3% versus 5.4%), stroke (1.8% versus 0.7%), and longer length of stay (median 9 versus 3 days). A total of 5376 patients had received P2Y12 receptor inhibitors within 24 hours after admission with complete information on the timing of the procedures. Of these, 3912 patients received CABG within 5 days of receiving a P2Y12 receptor inhibitor, and 1464 patients received CABG after 5 days. Although the observed mortality rates (5.2% versus 3.4%) and post-CABG bleeding (83.5% versus 79.8%) or transfusion (53.7% versus 46.5%) were slightly higher in patients who received CABG within 5 days, there was no difference in cardiogenic shock (13.6% versus 13.3%) and stroke (1.9% versus 1.9%) between the 2 groups (Table 4). In contrast, those receiving CABG within 5 days were less likely to experience reinfarction (1.9% versus 3.7%) and more likely to have shorter length of stay (median 8 versus 14 days) than patients receiving CABG after 5 days.

Discussion

In this nationwide registry of acute myocardial infarction in the United States, we found that CABG was infrequently used in STEMI. Although use of CABG in STEMI significantly declined over time, substantial variations exist across US hospitals. Among CABG cases, the majority of patients underwent CABG as the primary reperfusion strategy or after primary PCI. Despite differences in baseline characteristics and risk profiles, STEMI patients underwent CABG have similar in-hospital mortality rates as those not treated with CABG, suggesting that CABG might be safely performed in select STEMI patients.

Although CABG remains the most common cardiac surgery, there has been a dramatic decrease in CABG performed in the United States over the past decades. Data from the national representative sample of US hospitals found a 38% decrease in the annual CABG surgery rate between 2001 and 2008.[7] Similarly, a study in Medicare population reported that CABG procedure volume declined consistently from 2001 to 2008 by ≈4% to 7% per year.[8] Potential explanations included the increasing use of drug-eluting stent or primary PCI obviating the need for additional coronary revascularization. However, there are few studies evaluating the use of CABG in the management of patients presenting with STEMI. Previous studies suggested that CABG in this setting is performed in 5% or less of cases.[2,3] However, these single-center experiences were reported at least a decade ago and may not reflect current practice. In this report, we describe the use of CABG in STEMI patients between 2007 and 2014 in a large, national representative patient sample. We found that CABG is performed in 6.3% of STEMI cases. Nearly, 46% of these surgeries were performed as the primary means of reperfusion, 39% after primary PCI, and 8% after fibrinolytic therapy. Although we were unable to determine the indication for initiating CABG, we found that the rate of CABG after STEMI declined steadily over time, in align with the increasing adoption of PCI. This suggests that the decline in CABG in STEMI might also be related to the advances in technology and the increased interventional experience of primary PCI in STEMI.

We also observed significant variation in CABG utilization among STEMI patients across US hospitals. We found some hospitals operate on more than one third of their STEMI patients and others operate on <1%. This wide hospital-level variation might reflect the lack of consensus on the appropriate use of CABG in the STEMI. For instance, there are no randomized trials or large observational studies comparing CABG versus PCI in STEMI patients with left main or severe multivessel disease. Consequently, there are no Level of Evidence A recommendations on CABG in STEMI.[4,9]

Table 2. Demographics and Clinical Characteristics of STEMI Patients Undergoing CABG

Variables	CABG (n=15 145)	No CABG (n=226 099)	*P* Value
Age, median (IQR), y	63 (55–71)	60 (52–70)	<0.001
Male, %	76.6	70.8	<0.001
Weight, median (IQR), kg	84 (74–98)	85 (73–99)	0.25
Medical history, %			
Diabetes mellitus	29.7	24.3	<0.001
Hypertension	69.0	64.0	<0.001
Dyslipidemia	54.7	52.5	<0.001
Current/recent smoker	39.2	43.6	<0.001
Currently on dialysis	0.9	0.9	0.79
Previous MI	16.5	18.8	<0.001
Previous heart failure	4.0	4.8	<0.001
Previous PCI	16.9	20.3	<0.001
Previous CABG	1.7	6.8	<0.001
Previous stroke	5.1	4.9	0.19
Peripheral arterial disease	6.6	5.5	<0.001
Atrial fibrillation or flutter	4.3	4.2	0.61
Presentation characteristics			
Initial systolic blood pressure, median (IQR), mm Hg	142 (120–164)	140 (119–161)	<0.001
Baseline creatinine, median (IQR), mg/dL	1.0 (0.9–1.3)	1.0 (0.9–1.2)	<0.001
Initial troponin, median (IQR), ng/mL	2.0 (0.4–19.2)	1.2 (0.3–14.6)	<0.001
eGFR (nondialysis), median (IQR), mL min^{-1} 1.73 m^{-2}	73 (59–90)	75 (60–92)	<0.001
Heart failure, %	11.8	7.4	<0.001
Cardiogenic shock, %	8.5	7.2	<0.001
ACTION mortality risk score, median (IQR)	33 (28–40)	32 (27–38)	<0.001
Antiplatelet medication within 24 h, %			
Aspirin	98.1	98.8	<0.001
P2Y12 receptor inhibitors	39.5	90.7	<0.001
Glycoprotein IIb/IIIa inhibitors	39.1	53.9	<0.001
Documented evidence of reperfusion contraindications for PCI or fibrinolytic therapy, %	38.7	7.7	<0.001
No. of diseased vessels			<0.001
1	6.2	39.2	
2	21.2	33.0	
3	72.1	24.9	
Transferred from outside facility, %	41.2	33.9	<0.001

(*Continued*)

Table 2. Continued

ACTION indicates Acute Coronary Treatment and Intervention Outcomes Network; CABG, coronary artery bypass grafting; eGFR, estimated glomerular filtration rate; IQR, interquartile range; MI, myocardial infarction; PCI, percutaneous coronary intervention; and STEMI, ST-segment–elevation myocardial infarction.

Because of the lack of compelling evidence, the choice of revascularization strategies in STEMI might be influenced by hospitals and physicians' preferences. Therefore, large variation in practice should be expected to persist until such evidence is forthcoming.

Prompt restoration of coronary artery flow is essential to improve outcomes in STEMI patients. Numerous studies have demonstrated the relationship between total ischemic time and mortality.[10–12] However, the optimal timing of CABG in STEMI remains a significant debate.[13] In the present study, we found that most of the CABG cases were performed within 1 to 3 days after arrival. Likely because of the use of pharmacological agents during these procedures, in general, patients underwent CABG after primary PCI or fibrinolytic therapy experienced delays in CABG when compared with primary CABG in STEMI. It is also possible that CABG was used for those PCI patients who had complications, or extensive multivessel disease remaining after culprit lesion PCI, and therefore needed surgery despite resolution of the problem causing their initial ischemic event. Similarly, postlytic patients may have had their AMI aborted and subsequently found to have extensive disease best treated with CABG. Therefore, these patients represent very different surgical experiences compared with those undergoing CABG as an initial reperfusion strategy. In addition, we observed that nearly 97% patients receiving CABG after fibrinolytic therapy were transferred from outside facilities; thus, most of these patients were likely stabilized by initial reperfusion therapy and transferred subsequently for definitive revascularization. Given the observational nature of the study, we were unable to determine the appropriateness of the revascularization strategies and clinical circumstances that may influence the treatment decision. Nonetheless, based on the relatively low mortality rates, it seems that urgent/emergent CABG could be safely performed in select STEMI patients in a timely manner. Finally, the observed mortality rates were similar between CABG and non-CABG patients. These findings should be interpreted with caution because variables influencing surgical eligibility decisions are not captured by the registry and these variables have a strong influence on mortality.[14,15]

The current guidelines recommend urgent CABG within 5 days of clopidogrel or ticagrelor administration or within 7 days of prasugrel administration, especially if the benefits of prompt revascularization outweigh the risks of bleeding. However, the magnitude of bleeding risk when CABG is performed in 1 to 4 days after the discontinuation of a P2Y12

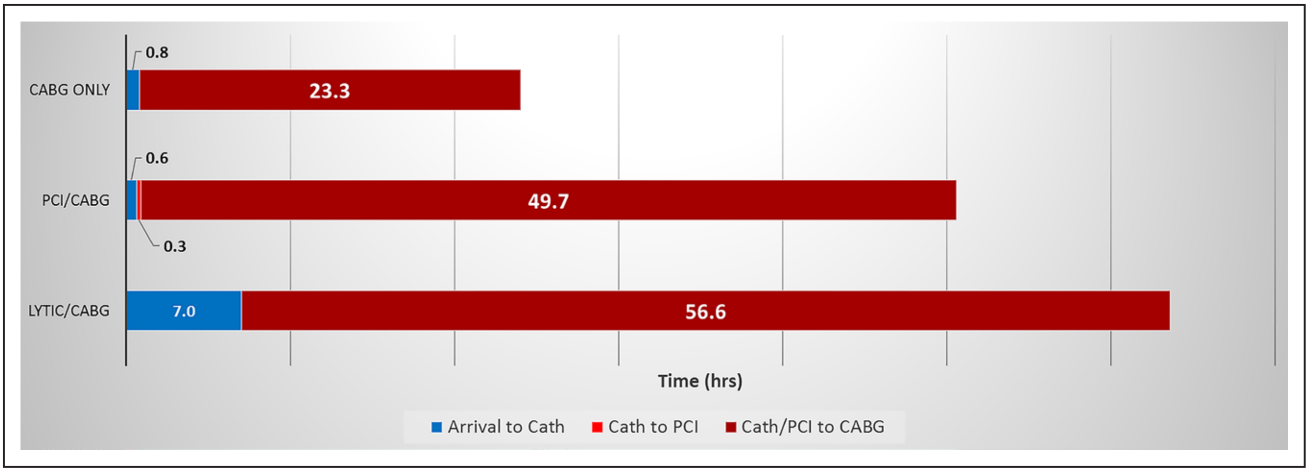

Figure 3. Timing of coronary artery bypass grafting (CABG) in ST-segment–elevation myocardial infarction. PCI indicates percutaneous coronary intervention.

receptor inhibitor is less certain, particularly in patients with STEMI.[16] We observed slightly higher mortality rate, post-CABG bleeding, and post-CABG transfusion in patients undergoing CABG within 5 days after the administration of a P2Y12 receptor inhibitor, compared with those undergoing CABG later than 5 days. Nevertheless, there were no differences in cardiogenic shock and stroke complications. And patients underwent early CABG were less likely to experience reinfarction and more likely to have shorter length of stay. These data suggest that CABG might be safely performed within 5 days in select STEMI patients receiving P2Y12 receptor inhibitors, but must weigh the benefit of early reperfusion against risk of bleeding complications.

Our study has limitations. ACTION registry does not collect detailed angiographic and procedural data, so technical factors influencing decisions about surgery are understood poorly. We were unable to evaluate fully the clinical circumstances (eg, failed PCI or salvage CABG) that may have influenced treatment decisions on CABG. As these observations are acknowledged to be highly vulnerable to potential selection bias and confounding, a direct comparison of outcomes between CABG-treated and non-CABG–treated patients may not be appropriate, even after using techniques, such as propensity score matching. Instead, we provide a description of contemporary use of CABG in this clinical setting. Because the National Cardiovascular Data Registry ACTION Registry–GWTG is an inpatient registry, we were unable to evaluate longitudinal outcomes after discharge. Linkage with Centers for Medicare and Medicaid Services claims data or other outpatient databases would be required for long-term outcomes assessment.[17] Finally, hospital participation in the ACTION Registry–GWTG is voluntary and the analysis was limited to hospitals with CABG capabilities. Therefore, these results may not be generalizable to nonparticipating hospitals or centers without CABG capacity.

In conclusion, we report the rates of CABG use in STEMI overall, after primary PCI, after thrombolytic therapy or as a primary means of coronary reperfusion. CABG in STEMI

Table 3. In-Hospital Outcomes of STEMI Patients Undergoing CABG

Variables	CABG (n=15 145)	No CABG (n=226 099)	*P* Value
In-hospital mortality, %	5.4	5.1	0.15
Reinfarction, %	1.4	0.9	<0.001
Mortality or reinfarction, %	6.5	5.8	<0.001
Cardiogenic shock, %	13.8	6.0	<0.001
CHF, %	11.3	5.4	<0.001
Stroke, %	1.8	0.7	<0.001
Post-CABG bleeding, %	79.6	…	
Post-CABG transfusion, %	48.4	…	
Length of stay, median (IQR), d	9 (6–12)	3 (2–4)	<0.001

CABG indicates coronary artery bypass grafting; CHF, congestive heart failure; IQR, interquartile range; and STEMI, ST-segment–elevation myocardial infarction.

Table 4. In-Hospital Outcomes of STEMI Patients Undergoing CABG Within 5 Days and Later Than 5 Days After Administration of P2Y12 Receptor Inhibitors

Variables	CABG Within 5 Days (n=3912)	CABG Later Than 5 Days (n=1464)	*P* Value
In-hospital mortality, %	5.2	3.4	0.007
Reinfarction, %	1.9	3.7	<0.001
Mortality or reinfarction, %	6.7	6.9	0.85
Cardiogenic shock, %	13.6	13.3	0.77
CHF, %	10.2	14.9	<0.001
Stroke, %	1.9	1.9	0.84
Post-CABG bleeding, %	83.5	79.8	0.002
Post-CABG transfusion, %	53.7	46.5	<0.001
Length of stay, median (IQR), d	8 (6–11)	14 (11–17)	<0.001

CABG indicates coronary artery bypass grafting; CHF, congestive heart failure; IQR, interquartile range; and STEMI, ST-segment–elevation myocardial infarction.

patients was observed to be infrequent and declining over time. Furthermore, use of CABG in the setting of STEMI was observed to vary widely across US hospitals. The majority of CABG procedures in the setting of STEMI were undertaken as the primary revascularization strategy and were performed promptly; delays to CABG were observed among patients initially treated with primary PCI or fibrinolysis. Observed in-hospital mortality rates appear low, suggesting that CABG might be safely performed in select STEMI patients in a timely manner.

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Disclosures

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