

QUARTERLY FOCUS ISSUE: PREVENTION/OUTCOMES

News From the NCDR

National Efforts to Improve Door-to-Balloon Time

Results From the Door-to-Balloon Alliance

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Objectives

The purpose of this study was to determine if enrollment in the Door-to-Balloon (D2B) Alliance, a national quality campaign sponsored by the American College of Cardiology and 38 partner organizations, was associated with increased likelihood of patients who received primary percutaneous coronary intervention for ST-segment elevation myocardial infarction (STEMI) being treated within 90 min of hospital presentation.

Background

The D2B Alliance, launched in November 2006, sought to achieve the goal of having 75% of patients with STEMI treated within 90 min of hospital presentation.

Methods

We conducted a longitudinal study of D2B times in 831 hospitals participating in the National Cardiovascular Data Registry (NCDR) CathPCI Registry, April 1, 2005, to March 31, 2008.

Results

By March 2008, >75% of patients had D2B times of ≤ 90 min, compared with only about one-half of patients with D2B times within 90 min in April 2005. Trends since the launch of the D2B Alliance showed that patients treated in hospitals enrolled in the D2B Alliance for at least 3 months were significantly more likely than patients treated in nonenrolled hospitals to have D2B times within 90 min, although the magnitude of the difference was modest (odds ratio: 1.16; 95% confidence interval: 1.07 to 1.27).

Conclusions

The D2B Alliance reached its goal of 75% of patients with STEMI having D2B times within 90 min by 2008. (J Am Coll Cardiol 2009;54:2423–9) © 2009 by the American College of Cardiology Foundation

In 2005, approximately one-half of patients with an ST-segment elevation myocardial infarction (STEMI) who received a primary percutaneous coronary intervention (PPCI) met the 90-min guideline (1) for the time between hospital presentation and balloon inflation (known as door-

to-balloon [D2B] time). Since that time, substantial efforts have been made to improve D2B time. Strategies for improving D2B times were reported (2,3), public reporting of hospital D2B times began, and in November 2006, the American College of Cardiology and 38 partner organiza-

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Center, Los Angeles, California; |||Sentara Cardiovascular Research Institute, Norfolk, Virginia; and the ¶¶Center for Outcomes Research and Evaluation, Yale-New Haven Hospital, New Haven, Connecticut. This work was supported by the Commonwealth Fund, the Patrick and Catherine Weldon Donaghue Medical Research Foundation, and the American College of Cardiology. These funders did not play a role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript. Ms. Stern was affiliated with the American College of Cardiology, Washington, DC, during the time that this work was conducted. Dr. Masoudi has served on an advisory board for United Healthcare and has contracts with the Oklahoma Foundation for Medical Quality and the American College of Cardiology.

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Abbreviations and Acronyms

D2B = door-to-balloon

PPCI = primary percutaneous coronary intervention

STEMI = ST-segment elevation myocardial infarction

tions launched the D2B Alliance (4). The D2B Alliance sought to achieve door-to-balloon times of ≤ 90 min for at least 75% of nontransfer patients receiving a PPCI. The D2B Alliance disseminated educational material and tools available on the Web. Within its first year, about 1,000 of the approximately 1,400 U.S. hospitals with PPCI capability

enrolled in the D2B Alliance. We used data from hospital surveys and the National Cardiovascular Data Registry (NCDR) CathPCI Registry to examine the use of D2B Alliance-recommended strategies, changes in D2B times before and after the launch of the D2B Alliance, and differences in D2B times for patients treated in D2B Alliance hospitals and hospitals that were not enrolled in the D2B Alliance.

Methods

Study design and samples. We used 3 samples for the data analysis. First, to examine changes in use of D2B Alliance-recommended strategies, we used data from a pre/post-survey of hospitals enrolled in the D2B Alliance. The baseline survey was conducted between November 2006 and June 1, 2007 (797 respondent hospitals from the sampling frame of 915 hospitals enrolled in the D2B Alliance by June 2007); the follow-up survey was conducted between February and June 2008 (715 respondent hospitals from the sampling frame of 794 hospitals, which excluded 3 that had ceased performing PPCIs by follow-up). Second, to examine changes in performance before and after the launch of the D2B Alliance, we used data from all hospitals ($N = 831$) participating in the NCDR CathPCI Registry throughout the 3 years around the launch of the D2B Alliance (April 1, 2005, to March 31, 2008). We included data on all nontransferred patients admitted to emergency departments who received a PPCI for STEMI and excluded patients who received fibrinolytic therapy as well as patients whose D2B times were >6 h or unknown, because these likely did not represent PPCI cases. Third, to examine the association between D2B Alliance enrollment (not enrolled, enrolled ≤ 3 months, or enrolled >3 months at the time of patient admission) and patient D2B time, we used data from all hospitals participating in the CathPCI Registry after the launch of the D2B Alliance (i.e., from November 1, 2006, to March 31, 2008) (614 hospitals that had enrolled and 201 hospitals that had not enrolled in the D2B Alliance). All research procedures were approved by the Human Investigation Committee at Yale University School of Medicine.

Data collection and measures. Baseline and follow-up survey items assessed the use of strategies recommended by the D2B Alliance: 1) activation of the catheterization laboratory by emergency medicine physicians; 2) single-call activation of the catheterization laboratory; 3) hospital expectation that the catheterization team is available within 30 min of being paged; 4) prompt (within 1 week) data feedback about D2B times to emergency department and catheterization laboratory staff; and 5) activation of the catheterization laboratory based on pre-hospital electrocardiogram while the patient was still en route to the hospital.

Our primary patient outcome was a binary variable indicating whether the patient D2B time was ≤ 90 min, based on CathPCI Registry data on time from hospital presentation to balloon inflation (or deployment of first device if a balloon was not used during a PPCI). Enrollment in the D2B Alliance was measured with a 3-level variable indicating that the hospital was enrolled in the D2B Alliance for >3 months, ≤ 3 months, or not enrolled at the time of admission. We also assessed the hospital's report of its participation in 12 activities or use of tools sponsored by the D2B Alliance, using a count from 0 to 12 and the rated helpfulness of each activity or tool using a 5-point scale (1 = not at all helpful, 5 = very helpful), which we dichotomized to report the percentage who found the activity helpful or very helpful. We used the American Hospital Association Hospital Survey from 2005 (5) for data on teaching status, number of staffed beds, ownership type, coronary artery bypass graft capability, urban/rural location, and geographic region.

Data analysis. To examine changes in the use of strategies at baseline and follow-up for enrolled hospitals, we used standard frequency analysis and tested differences in use at baseline versus follow-up with McNemar tests. We characterized campaign activity participation and reported helpfulness of activities with descriptive statistics.

To describe changes in D2B times before and after the launch of the D2B Alliance, we plotted the percentage of patients with D2B times of ≤ 90 min for each month between April 1, 2005, and March 31, 2008, for all hospitals in the CathPCI Registry. We reported pre-D2B Alliance and post-D2B Alliance changes in the distribution of hospitals' performance measured by the percentage of patients with a STEMI receiving a PPCI with D2B times within 90 min (pre-D2B Alliance: April 1, 2005, to October 31, 2006; post-D2B Alliance: November 1, 2006, to March 31, 2008), using a rank sum test. We quantified the average rate of increase in the odds of patients having a D2B time within 90 min over the 3-year period using a mixed-effects logistic model. The model included calendar year (measured as the number of days since April 1, 2005, divided by 365.25) as the primary independent variable and hospital characteristics (teaching status, number of staffed beds, ownership type, coronary artery bypass graft capabil-

Table 1 Characteristics of Included Hospitals (N = 916)

	D2B Alliance Surveyed (n = 715)*	3-Year NCDR in Total (n = 831)	17-Month NCDR (Non-D2B Alliance)* (n = 201)	17-Month NCDR (D2B Alliance)* (n = 614)
Infrastructure				
Teaching status				
Nonteaching	399 (55.8)	504 (60.6)	134 (66.7)	362 (59.0)
Teaching	303 (42.4)	315 (37.9)	61 (30.3)	247 (40.2)
Unknown	13 (1.8)	12 (1.4)	6 (3.0)	5 (0.8)
Bed size				
<300	315 (44.1)	409 (49.2)	131 (65.2)	271 (44.1)
300-499	233 (32.6)	273 (32.9)	44 (21.9)	224 (36.5)
≥500	155 (21.7)	138 (16.6)	20 (10.0)	115 (18.7)
Unknown	12 (1.7)	11 (1.3)	6 (3.0)	4 (0.7)
Ownership				
Government	66 (9.2)	73 (8.8)	16 (8.0)	55 (9.0)
Nonprofit	520 (72.7)	611 (73.5)	153 (76.1)	449 (73.1)
For profit	116 (16.2)	135 (16.2)	26 (12.9)	105 (17.1)
Unknown	13 (1.8)	12 (1.4)	6 (3.0)	5 (0.8)
Facilities				
No CABG capability	90 (12.6)	208 (25.0)	78 (38.8)	126 (20.5)
CABG capability	526 (73.6)	611 (73.5)	117 (58.2)	483 (78.7)
Unknown	99 (13.8)	12 (1.4)	6 (3.0)	5 (0.8)
Geography				
Location				
Rural	32 (4.5)	61 (7.3)	24 (11.9)	37 (6.0)
Urban	447 (62.5)	758 (91.2)	171 (85.1)	572 (93.2)
Unknown	236 (33.0)	12 (1.4)	6 (3.0)	5 (0.8)
Region				
New England	26 (3.6)	37 (4.5)	14 (7.0)	22 (3.6)
Mid Atlantic	84 (11.7)	74 (8.9)	19 (9.5)	53 (8.6)
South Atlantic	126 (17.6)	146 (17.6)	25 (12.4)	120 (19.5)
East North Central	154 (21.5)	171 (20.6)	30 (14.9)	136 (22.1)
East South Central	62 (8.7)	55 (6.6)	9 (4.5)	46 (7.5)
West North Central	50 (7.0)	79 (9.5)	25 (12.4)	54 (8.8)
West South Central	87 (12.2)	85 (10.2)	13 (6.5)	67 (10.9)
Mountain	52 (7.3)	70 (8.4)	25 (12.4)	44 (7.2)
Pacific	74 (10.3)	107 (12.9)	35 (17.4)	72 (11.7)
Unknown	0 (0.0)	7 (0.8)	6 (3.0)	0 (0.0)

Values are n (%). *p < 0.005 for comparison of D2B Alliance and non-D2B Alliance hospital characteristics for all variables.
CABG = coronary artery bypass grafting; D2B = Door-to-Balloon; NCDR = National Cardiovascular Data Registry.

ity, urban/rural location, and geographic region) as covariates; the intercept was modeled as random across hospitals.

To compare D2B times for patients treated in hospitals that were enrolled with times for patients treated in hospitals that were not enrolled in the D2B Alliance, we used patient-level data to estimate a logistic model with a binary outcome variable indicating a D2B time within 90 min. The primary independent variable was D2B Alliance enrollment status of the hospital at the time of patient admission. We estimated a mixed-effects model to account for the correlation of D2B times within a hospital. The model was adjusted for the calendar month of admission, teaching status, number of staffed beds, ownership type, coronary artery bypass graft capability, urban/rural location, and geographic region. We specified both the intercept and the

categorical measures for time enrolled with the D2B Alliance as random effects across hospitals, with correlated errors. We also estimated this model adjusted for the hospital's baseline performance measured by the median D2B time for the 6 months before November 1, 2006, which was available for approximately two-thirds of the sample. We completed analyses using Stata Version 10 (StataCorp., College Station, Texas).

Results

Study samples. Characteristics of the hospitals in this study are shown in Table 1. The CathPCI Registry contained data on 3,139,897 patients during the 3 years examined. Of these patients, 2,912,445 did not have a

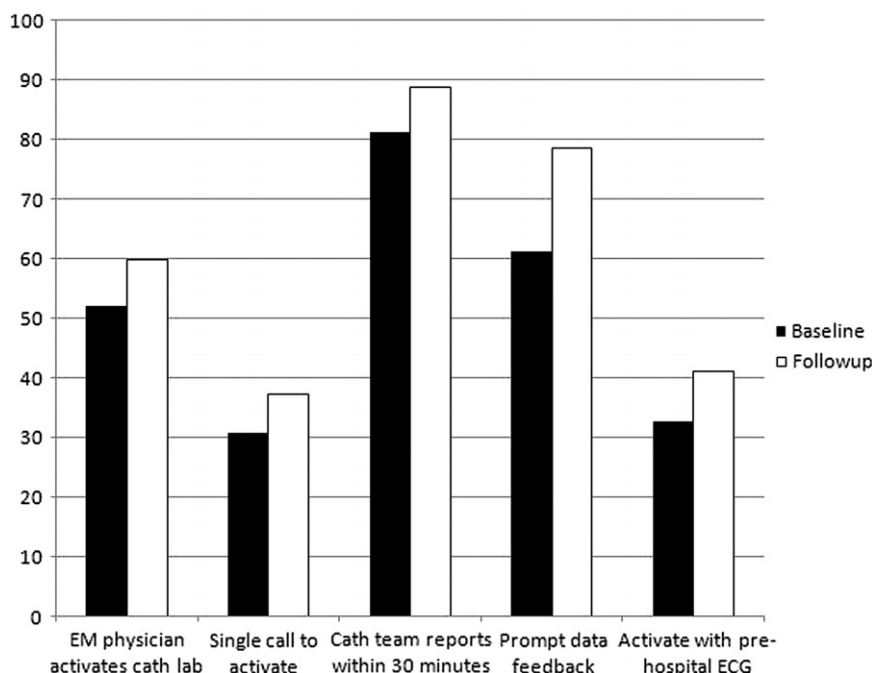


Figure 1 Percentage of D2B Alliance Hospitals Reporting Use of Recommended Strategies at Baseline and Follow-Up Surveys

Analyses were conducted for hospitals that responded to the selected item in both the baseline and the follow-up surveys; therefore, n varies by strategy because of missing data on selected survey items. n = 683 for the first 2 strategies listed, n = 664 for the third strategy listed, n = 598 for the fourth strategy listed, and n = 608 for the last strategy listed. Proportions at follow-up were significantly greater than proportions at baseline for each strategy (McNemar test for difference in proportions, $p < 0.001$). cath = catheterization; D2B = Door-to-Balloon; ECG = electrocardiogram; EM = emergency medicine.

STEMI; an additional 131,547 did not receive a PPCI or received it in > 6 h, and another 13,526 patients were not admitted during the study period. Thus, the 3-year sample (April 1, 2005, to March 31, 2008) included a total of 82,610 hospitalizations for STEMI in 831 hospitals participating in the CathPCI Registry.

Increased use of recommended strategies; participation in D2B Alliance activities. The prevalence of each strategy recommended by the D2B Alliance increased significantly (p values < 0.001) from the baseline period (i.e., when the hospital enrolled in the D2B Alliance) to the follow-up period (Fig. 1, Table 2). The median number

of activities from the D2B Alliance that hospitals reported participating in or using was 3 (interquartile range 1 to 5); use and reported helpfulness of each activity are described in Table 3.

Time trends in D2B times among all hospitals. The 3-year trend in patient D2B times shows significant improvement (Fig. 2) (odds ratio: 1.64; 95% confidence interval: 1.61 to 1.67 for having D2B time ≤ 90 min for the current year compared with the previous year). The improvement began before the D2B Alliance and continued through the end of the study period, with 52.5% of patients with a D2B time within 90 min from April 1, 2005, to May 31, 2005, approximately

Table 2 Number and Percentage of D2B Alliance Hospitals Reporting Use of Recommended Strategies at Baseline and at Follow-Up Surveys*

Strategy	Baseline, n (%)	Follow-Up, n (%)	Increase, n (Percentage Points)	p Value†
Emergency medicine activates cath lab	356 (52.1)	408 (59.7)	52 (7.6)	0.0009
Single call activates cath lab	209 (30.6)	255 (37.3)	46 (6.7)	0.0012
Cath lab team arrives in 30 min	539 (81.2)	589 (88.7)	50 (7.5)	0.0000
Prompt data feedback (within 1 week)	366 (61.2)	470 (78.6)	104 (17.4)	0.0000
Activate with pre-hospital electrocardiogram	199 (32.7)	250 (41.1)	51 (8.4)	0.0001

*Analyses were conducted for hospitals that responded to the selected item in both the baseline and the follow-up surveys; therefore, n varies by strategy due to missing data on selected survey items. n = 683 for the first 2 strategies listed, n = 664 for the third strategy listed, n = 598 for the fourth strategy listed, and n = 608 for the last strategy listed. †p value based on the McNemar test of difference in 2 matched (baseline and follow-up) proportions.

cath = catheterization; D2B = Door-to-Balloon.

Table 3 D2B Alliance Hospitals' Participation in Activities Sponsored by the D2B Alliance

D2B Alliance Activity	Participating Hospitals		Rated Helpful or Very Helpful† (%)
	n/N*	%	
Webinars			
Measuring D2B time	150/699	21.5	64.2
Cath lab activation by emergency medicine physician	253/704	35.9	70.0
Single call to activate cath lab	151/699	21.6	78.0
Prompt data feedback	189/699	27.0	69.7
Improving cath lab culture/process	77/691	11.1	66.2
Use of pre-hospital electrocardiogram to activate cath lab	134/695	19.3	68.7
Online community	299/701	42.7	61.9
Website	449/707	63.5	71.1
Workshops at ACC/AHA annual meetings	120/706	17.0	79.2
Implementation manual	292/708	41.2	70.5
Success stories in newsletter	397/709	56.0	59.2
Mentor network	42/706	5.9	80.5
Median (interquartile range) of activities used	3 (1-5)		

*N represents the number of respondents to the selected item. †Percentage calculated from hospitals that participated in activity and responded to this item; helpfulness scores were missing for <1% of participants.

ACC/AHA = American College of Cardiology/American Heart Association; other abbreviations as in Table 2.

62.8% before the launch of the D2B Alliance (September 1, 2006, to October 31, 2006), and 76.4% by February 1, 2008, to March 31, 2008. The distribution of hospital performance shows the significant ($p < 0.001$) shift toward better D2B time performance after the D2B Alliance (Fig. 3).

Comparing D2B times in hospitals by D2B Alliance enrollment status. Patients treated in hospitals that were enrolled in the D2B Alliance for at least 3 months compared with hospitals that were not enrolled had a slightly higher

odds of having D2B times within 90 min (odds ratio: 1.16; 95% confidence interval: 1.07 to 1.27) (Table 4). For the two-thirds of the sample for which performance in the 6 months before November 1, 2006, was available, adjustment for baseline performance did not attenuate the effect of D2B Alliance enrollment. Cumulatively, over the total of the 17 months after the initiation of the D2B Alliance, 75% of patients in enrolled hospitals compared with 69% of patients in nonenrolled hospitals had D2B times within 90 min.

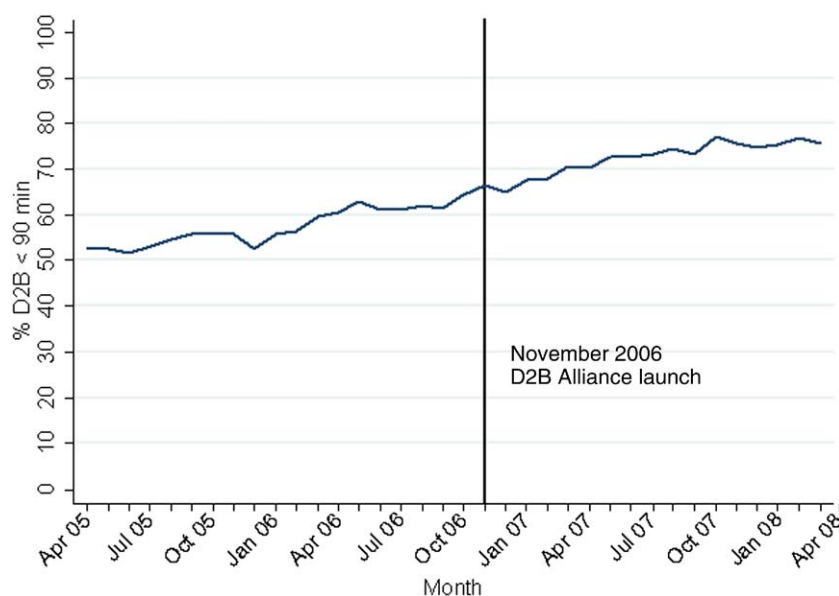


Figure 2 Percentage of Patients With D2B Times Within 90 Min, April 1, 2005, to March 31, 2008

This figure shows the percentage of patients with ST-segment elevation myocardial infarction and treated with a primary percutaneous coronary intervention whose door-to-balloon (D2B) time was ≤ 90 min monthly from April 2005, before the launch of the D2B Alliance, through April 2008, after the launch of the D2B Alliance in November 2006.

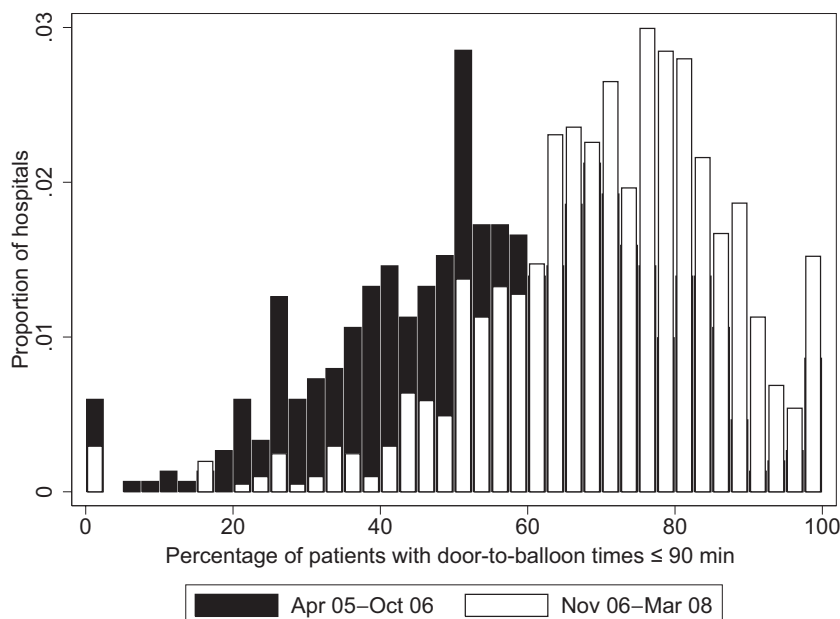


Figure 3 Distributions of Hospitals by Percentage of Patients With D2B Times Within 90 Min

Distributions of the proportion of hospitals by the percentage of patients with an ST-segment elevation myocardial infarction receiving a primary percutaneous coronary intervention with door-to-balloon (D2B) times within 90 min, April 1, 2005, to June 20, 2006 (solid bars), and January 1, 2007, to March 31, 2008 (open bars).

Discussion

The study shows a significantly increased use of the strategies to reduce D2B time by hospitals that enrolled in the D2B Alliance. This amount of organizational change in hundreds of U.S. hospitals within a single year is notable. Although the improvement in D2B times had begun as early as 2002 (6), our findings demonstrate that the trend in improvement did not slow and continued through 2008.

What was the role of the campaign in the national improvement? Although D2B times improved significantly after the launch of the D2B Alliance, it is difficult to determine what can be attributed to the D2B Alliance and what the trajectory in performance would have been without the D2B Alliance. The D2B Alliance was an open campaign that enrolled more than 70% of the hospitals that perform PPCIs; all D2B Alliance webinars, newsletters, and success stories were publicly accessible. Therefore, spillover and herd effects, which would result in widespread improvement beyond those officially enrolled, are likely. Although public campaigns, such as the D2B Alliance, likely play an essential role in fostering whole-system change, their effects should be understood as integrated with, rather than independent from, multiple national efforts to improve quality of care.

Study limitations. Although the CathPCI Registry is the largest and most comprehensive registry for cardiovascular

care, participating hospitals may be more focused on quality improvement in cardiology than other hospitals, because of which our results may have differed. Furthermore, data on use of hospital strategies were self-reported; nevertheless, the same method was used at baseline and follow-up, and many hospitals reported that they were not using recommended strategies.

Conclusions

We demonstrated marked changes in practice and performance among U.S. hospitals in the delivery of PPCI for patients with a STEMI. It is difficult to attribute the changes to a single effort, such as the campaign, because multiple events were occurring simultaneously including publications of research evidence, revisions of national guidelines, and public reporting of performance. However, the rapid improvement in the timeliness of care for patients with a STEMI is an impressive national accomplishment.

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Table 4 Association Between D2B Alliance Enrollment and Door-to-Balloon Time Within 90 Min

	Odds Ratio (SE)	95% Confidence Interval	p Value
D2B Alliance			
Not enrolled	Ref		
Enrolled ≤3 months	1.07 (0.04)	0.99–1.16	0.083
Enrolled >3 months	1.16 (0.05)	1.06–1.27	0.001
Calendar year	1.45 (0.06)	1.34–1.57	0.000
Nonteaching hospital			
Teaching hospital	Ref		
Teaching hospital	0.99 (0.06)	0.88–1.12	0.903
Bed size			
<300	Ref		
300–499	1.03 (0.07)	0.90–1.17	0.675
≥500	1.00 (0.09)	0.84–1.18	0.969
Unknown	1.36 (0.52)	0.64–2.86	0.422
Ownership			
Government	Ref		
Nonprofit	0.87 (0.09)	0.72–1.05	0.152
For-profit	0.82 (0.10)	0.65–1.03	0.087
Facilities			
No CABG capability	Ref		
CABG capability	1.05 (0.07)	0.92–1.20	0.479
Census region			
New England	Ref		
Mid Atlantic	0.96 (0.50)	0.34–2.68	0.933
South Atlantic	0.81 (0.12)	0.60–1.10	0.171
East North Central	0.78 (0.11)	0.59–1.04	0.089
East South Central	0.80 (0.11)	0.61–1.05	0.107
West North Central	0.77 (0.13)	0.56–1.06	0.111
West South Central	1.23 (0.19)	0.91–1.67	0.181
Mountain	0.64 (0.10)	0.47–0.87	0.005
Pacific	0.81 (0.13)	0.59–1.11	0.193

Abbreviations as in Table 1.

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REFERENCES

- Antman EM, Anbe DT, Armstrong PW, et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patients with Acute Myocardial Infarction). *J Am Coll Cardiol* 2004;44:e1–211.
- Bradley EH, Herrin J, Wang Y, et al. Strategies for reducing the door-to-balloon time in acute myocardial infarction. *N Engl J Med* 2006;355:2308–20.
- Bradley EH, Nallamothu BK, Curtis JP, et al. Summary of evidence regarding hospital strategies to reduce door-to-balloon times for patients with ST-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention. *Crit Pathw Cardiol* 2007;6:91–7.
- Krumholz HM, Bradley EH, Nallamothu BK, et al. A campaign to improve the timeliness of primary percutaneous coronary interventions. Door-to-Balloon: An Alliance for Quality. *J Am Coll Cardiol Intv* 2008;1:97–104.
- American Hospital Association. The Annual Survey of Hospitals Database: Documentation for 1998 Data. Chicago, IL: American Hospital Association, 1998.
- Gibson MC, Pride YB, Frederick PD, et al. Trends in reperfusion strategies, door-to-needle and door-to-balloon times, and in-hospital mortality among patients with ST-segment elevation myocardial infarction enrolled in the National Registry of Myocardial Infarction from 1990 to 2006. *Am Heart J* 2008;156:1019–22.

Key Words: acute myocardial infarction ■ hospitals ■ quality collaborative ■ quality improvement.