

RESEARCH LETTERS

Trends in Race-Based Differences in Door-to-Balloon Times

In 2004, our group reported that black patients with ST-segment elevation myocardial infarction (STEMI) were more likely to experience delays in reperfusion than white patients, primarily owing to poorer performance of hospitals with a disproportionate representation of black patients.¹ Since that initial observation, several high-profile initiatives have sought to improve national performance on door-to-balloon (D2B) times.^{2,3} Accordingly, we analyzed data reported by hospitals to the Quality Improvement Organization Inpatient Clinical Data Warehouse for the Centers for Medicare & Medicaid Services Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU) program to determine whether racial disparities in D2B times have attenuated over time.

Methods. We included all patients for whom a D2B time was reported by hospitals to the Hospital Quality Alliance for inclusion in the acute myocardial infarction core measures between July 1, 2004, and June 30, 2008. Detailed information about the measure is available at <http://www.qualitynet.org>. Hospitals reported AMI core measures for patients with a principal discharge diagnosis of AMI, and high-volume hospitals had the option of submitting either a sample or all of their AMI cases. Throughout the study period, patients were eligible for reporting D2B time if they were admitted with *International Classification of Diseases, Ninth Edition, Clinical Modification (ICD-9-CM) code 410.x1*; had STEMI or left bundle branch block on their initial electrocardiogram; and underwent percutaneous coronary intervention within 24 hours of arrival. Additional exclusion criteria were added after the initial year of reporting. Individual hospitals reported patient race based on its assignment during admission. To focus on racial differences in D2B times, we excluded patients who were not reported to be either white or black.

To assess trends over time, patients were grouped into 12-month intervals (July 2004–June 2005; July 2005–June 2006; July 2006–June 2007; and July 2007–June 2008). Within each interval, we analyzed patient-level data to calculate median D2B time overall and stratified by race. We also estimated a hierarchical lin-

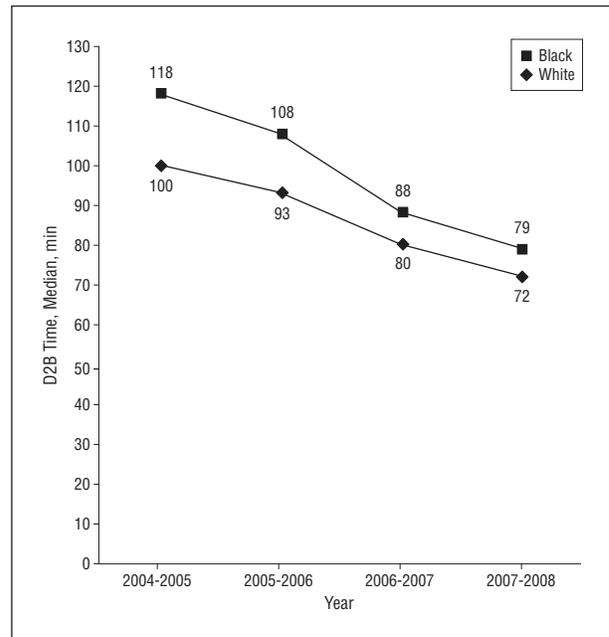


Figure. Trends in door-to-balloon (D2B) times from 2004 to 2008 stratified by race.

ear model to assess the association of D2B time with race, year, and a race \times year interaction term. Because the distribution of D2B times was skewed, we transformed D2B time using natural logarithm. All analyses were performed using SAS 9.1 (SAS Institute Inc, Cary, North Carolina). The Yale Human Investigation Committee approved the analysis and determined that informed consent was not applicable to the data collected for the RHQDAPU program.

Results. Door-to-balloon times were reported for 207 875 patients with STEMI who underwent primary percutaneous coronary intervention at one of 1413 hospitals that submitted data on D2B times. Of these, 160 175 patients were reported to be white and 14 513 black. Overall, the median D2B time improved from 101.0 minutes in 2004-2005 to 73.0 minutes in 2007-2008. Both white and black patients experienced clinically significant reductions in D2B times, but the absolute improvement observed in black patients was greater than that of white patients (**Figure**). Over the study period, the difference in median D2B time between races narrowed from 18 minutes in 2004-2005 to 7 minutes in 2007-2008. In the hierarchical model, the interaction term race \times year was statistically significant ($P < .001$), further supporting the

observation that D2B times improved more rapidly among black patients than among white patients.

Comment. Over 4 years, national performance on D2B times improved dramatically, and these improvements were accompanied by a marked narrowing of racial disparities in D2B times. Improvements may be due to a number of factors, including public reporting of D2B data,⁴ the cumulative experience of hospitals performing primary percutaneous coronary intervention,⁵ and the dissemination of effective strategies to reduce delays through the D2B Alliance and Mission Lifeline.^{2,3}

Previously, we noted that a large proportion of race-related disparities in D2B times was attributable to differences in the care delivered at hospitals that treated a higher proportion of black patients.¹ The current data are consistent with that observation. If overall improvements in D2B times have reduced variation across hospitals, one would expect differences by race to narrow. As such, continued efforts are necessary to eliminate the remaining race-based differences in D2B times and continue to improve overall times. Alternatively, the analysis could be confounded by changes in case mix as well as changes in measure exclusion criteria over time. However, there is no evidence to suggest that these exclusion criteria would disproportionately affect patients based on race.

Our analysis suggests that racial disparities in D2B times have significantly narrowed over time and that improving national quality of care appears to have not only improved overall performance but also diminished disparities.

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1. Bradley EH, Herrin J, Wang Y, et al. Racial and ethnic differences in time to acute reperfusion therapy for patients hospitalized with myocardial infarction. *JAMA*. 2004;292(13):1563-1572.
2. Krumholz HM, Bradley EH, Nallamothu BK, et al. A campaign to improve the timeliness of primary percutaneous coronary intervention: Door-to-Balloon: An Alliance for Quality. *JACC Cardiovasc Interv*. 2008;1(1):97-104.
3. Antman EM. Time is muscle: translation into practice. *J Am Coll Cardiol*. 2008;52(15):1216-1221.
4. Jha AK, Li Z, Orav EJ, Epstein AM. Care in US hospitals—the Hospital Quality Alliance program. *N Engl J Med*. 2005;353(3):265-274.
5. Canto JG, Every NR, Magid DJ, et al; National Registry of Myocardial Infarction 2 Investigators. The volume of primary angioplasty procedures and survival after acute myocardial infarction. *N Engl J Med*. 2000;342(21):1573-1580.

Fatal Malnutrition 6 Years After Gastric Bypass Surgery

Gastric bypass procedures are the most effective weight loss surgical treatments.¹ The Roux-en-Y procedure, the most commonly performed bypass technique in the United States, restricts gastric volume and bypasses absorption from most of the proximal small intestine. Bypass of the duodenum impairs mixing of ingested nutrients with bile acids and pancreatic enzymes leading to maldigestion. The combination of malabsorption and maldigestion, while resulting in significant weight loss, predisposes to malnutrition.

Report of a Case. A 48-year-old woman was seen at the endocrinology clinic for generalized weakness 6 years after Roux-en-Y gastric bypass for morbid obesity (preoperative height, 1.63 m; weight 113.4 kg; and body mass index [BMI], 42.7 [calculated as weight in kilograms divided by height in meters squared]). After an initial postoperative weight loss, her weight plateaued, but 2 years prior to presentation, she developed chronic, oily diarrhea accompanied by new, gradual weight loss. Gastrointestinal evaluation including upper