

Association of Hospital Prices for Coronary Artery Bypass Grafting With Hospital Quality and Reimbursement



Bria D. Giacomino, DO^{a,*}, Peter Cram, MD, MBA^b, Mary Vaughan-Sarrazin, PhD^{c,d}, Yunshu Zhou, MS^e, and Saket Girotra, MD, SM^a

Although prices for medical services are known to vary markedly between hospitals, it remains unknown whether variation in hospital prices is explained by differences in hospital quality or reimbursement from major insurers. We obtained “out-of-pocket” price estimates for coronary artery bypass grafting (CABG) from a random sample of US hospitals for a hypothetical patient without medical insurance. We compared hospital CABG price to (1) “fair price” estimate from Healthcare Bluebook data using each hospital’s zip code and (2) Society of Thoracic Surgeons composite CABG quality score and risk-adjusted mortality rate. Of 101 study hospitals, 53 (52.5%) were able to provide a complete price estimate for CABG. The mean price for CABG was \$151,271 and ranged from \$44,824 to \$448,038. Except for geographic census region, which was weakly associated with price, hospital CABG price was not associated with other structural characteristics or CABG volume ($p > 0.10$ for all). Likewise, there was no association between a hospital’s price for CABG with average reimbursement from major insurers within the same zip code ($\rho = 0.07$, p value = 0.6), Society of Thoracic Surgeons composite quality score ($\rho = 0.08$, p value = 0.71), or risk-adjusted CABG mortality ($\rho = -0.03$, p value = 0.89). In conclusion, the price of CABG varied more than 10-fold across US hospitals. There was no correlation between price information obtained from hospitals and the average reimbursement from major insurers in the same market. We also found no evidence to suggest that hospitals that charge higher prices provide better quality of care. © 2016 Elsevier Inc. All rights reserved. (Am J Cardiol 2016;117:1101–1106)

Health care in the United States (US) is costly and accounts for nearly 18% of the gross domestic product.^{1,2} As a result, health care expenses are a leading cause of financial stress in US households.¹ Moreover, unlike other businesses where consumers choose services based on prices, the price of health care services in the US is usually not known until the services are received, making it difficult for patients to function as educated consumers. Furthermore, although major insurers negotiate discounted prices for their members, uninsured patients do not enjoy a similar protection. Therefore, increasing transparency in medical prices has gained significant traction in recent years as a measure to reduce costs by engaging patients in comparison shopping and encouraging competition between hospitals.³ Although previous studies have shown a 10-fold variation in price of health care services across US hospitals,^{2,4–8} it remains

unknown whether hospitals that charge higher prices for uninsured patients also receive high reimbursement for insured patients or provide greater quality of care. Clarifying this relation will be of critical importance to patients who may be willing to pay a higher price for superior quality of care. To address this gap in knowledge, we contacted a sample of US hospitals by telephone to request hospital and physician prices for coronary artery bypass grafting (CABG) for a hypothetical patient without health insurance. We examined the association between a hospital’s price for CABG with (1) average hospital reimbursement from major insurers within the hospital’s zip code and (2) risk-adjusted mortality rate and composite quality score for CABG obtained from the Society of Thoracic Surgeons (STS) database.

Methods

We used 4 main sources of data in our study: (1) Medicare part A data, 2010 to identify CABG hospitals; (2) American Hospital Association (AHA) data, 2010 for hospital structural characteristics; (3) Healthcare Bluebook data for average reimbursement for CABG in the hospital’s zip code of location (<https://www.healthcarebluebook.com>); and (4) STS data, 2013 for hospital risk-adjusted CABG mortality and composite quality score.

We used Medicare data to identify all US hospitals that performed at least 10 CABG surgeries on Medicare patients in 2010 (latest year of Medicare data available at our institution). From that list, we randomly selected 2 hospitals from each of the 50 US states and the District of Columbia.

^aDivision of Cardiovascular Medicine, Department of Internal Medicine, and ^cDepartment of Internal Medicine, Institute of Clinical & Translational Science, University of Iowa Carver College of Medicine, Iowa City, Iowa; ^bDivision of General Internal Medicine, Faculty of Medicine, University of Toronto, Toronto, Ontario; ^dDepartment of Comprehensive Access and Delivery Research and Evaluation Center, Iowa City Veterans Affairs Medical Center, Iowa City, Iowa; and ^eDepartment of Internal Medicine, Roy J. and Lucille A. Carver College of Medicine, University of Iowa, Iowa City, Iowa. Manuscript received September 4, 2015; revised manuscript received and accepted January 7, 2016.

See page 1106 for disclosure information.

*Corresponding author: Tel: (+1) 319-384-7382; fax: (+1) 319-356-4552.

E-mail address: bria-giacomino@uiowa.edu (B.D. Giacomino).

Table 1
US hospitals and study hospital population by characteristics

Variables	All U.S. hospitals, N = 1141	Study hospitals, N = 101	p values
CABG volume			
<50	293 (26%)	19 (19%)	0.35
50-99	334 (30%)	33 (33%)	
100-199	348 (30%)	30 (30%)	
>200	166 (15%)	19 (19%)	
Geographic area			
North Mid-Atlantic	149 (13%)	17 (17%)	0.43
South Atlantic	170 (15%)	18 (18%)	
North Central	305 (27%)	24 (24%)	
South Central	266 (23%)	16 (16%)	
Mountain-Pacific	234 (21%)	26 (26%)	
Teaching status			
Yes	229 (20%)	31 (31%)	0.014
No	903 (79%)	70 (69%)	
Location			
Urban	1036 (91%)	93 (92%)	0.9
Rural	85 (7%)	8 (8%)	
Ownership			
Non-profit	795 (70%)	75 (74%)	0.66
For-profit	219 (19%)	16 (16%)	
Government	118 (10%)	10 (11%)	

Bold value indicates statistically significance.

A total of 101 hospitals were identified (Vermont only had one hospital that met our CABG volume criteria) for participation in the study (Table 1). The list of 101 study hospitals is provided in the [Supplementary Table 1](#).

Based on previous work and method developed by our author group,⁵ we developed a standardized script to conduct telephone interviews to obtain price for CABG from our study hospitals (included in the [Supplementary Material](#)). We developed a hypothetical scenario in which the 62-year-old father of one of the study investigators (BDG) was advised to undergo CABG, and the caller was trying to obtain a price estimate for that procedure. Briefly, the caller's father was a previously healthy man who developed angina over the past few months. He had undergone multiple testing and imaging procedures, had failed medical therapy, and had multiple evaluations from physicians, all of whom recommended CABG. The caller's father did not have health insurance but would be willing to pay for the procedure "out-of-pocket." Therefore, the caller was "shopping" for the best possible price for the surgery and would be comparing prices from different hospitals before choosing a hospital. Additional details regarding the medical history, results of the cardiac testing, social history, expected length of stay, postdischarge care, the *Current Procedural Terminology* and *International Classification of Diseases—Ninth Clinical Modification* codes were also included in the script. The study's lead investigator (BDG) made all the telephone calls to study hospitals. During the telephone call, every effort was made to use the script as much as possible. Pilot testing of the script was completed on 4 hospitals that were not included in the study sample to assess for content, structure, and clarity; modifications and revisions were made as needed.

All telephone interviews were conducted during January 1, 2014, to February 11, 2014. The investigator (BDG) called

the main hospital telephone number for each hospital and requested to be connected to an office or a department that could provide a "cash" or "out-of-pocket" price estimate for a surgery. If the main hospital operator was unable to find the appropriate contact person or department, the caller requested to speak with either the financial department or the patient billing office. On being transferred to the appropriate department, the caller repeated her request to speak with someone who could provide a price estimate for a surgery. Once connected with someone who stated they could provide that information, the caller transitioned immediately to the script for the remainder of the interview. The caller requested an estimate for the bundled price (hospital and physicians fees). If the hospital was unable to provide a complete bundle price, information regarding affiliated cardiac surgery practices was obtained. If more than one cardiac surgery practice was affiliated with the hospital, each practice was contacted in alphabetical order until a price estimate was obtained. All prices were recorded in addition to information regarding the phone call process. When the caller was unable to speak directly with the appropriate person, a standard message with the reason for the phone call and a callback telephone number was left. If a hospital declined to provide a price estimate, the reason for this was recorded. Every hospital was contacted a maximum of 3 times. If the caller was unable to obtain a price estimate after 3 separate attempts that hospital was deemed as unable to provide an estimate.

Our primary outcome was the complete price for CABG obtained as a bundled price or after summing the individual hospital and physician price. We used the AHA data, 2010 to obtain information regarding each hospital's structural characteristics—geographic census region (North Mid-Atlantic, South Atlantic, North Central, South Central, and Mountain Pacific), teaching status, location (urban vs rural), and ownership structure (nonprofit, for-profit, and government). In addition, for each hospital that was able to provide a complete bundle price, we also obtained data regarding average reimbursement price for CABG within the zip code of the hospital location using the Healthcare Bluebook website.

Finally, we obtained data regarding hospital quality from the STS website. Briefly, the STS database collects data on 11 quality measures that are endorsed by the National Quality Forum and are reported under the following 4 domains: (1) perioperative medical care, (2) operative care, (3) avoidance of risk-adjusted mortality, and (4) avoidance of risk-adjusted major morbidity. Performance in individual domains is combined to yield a composite STS CABG quality score for each hospital. For this study, we obtained the risk-adjusted mortality and the overall CABG composite score from the STS website for hospitals that provide a price estimate. Additional details regarding the quality measures from the STS database are described in detail elsewhere.^{9–11}

First, we compared characteristics of our study hospitals with all hospitals that met our study inclusion criteria (i.e., performed CABG on at least 10 Medicare patients during the year 2010). Second, we compared characteristics of hospitals that were and were not able to provide a complete price (either bundled or separate) using the chi-square test or unpaired *t* test when appropriate. Third, we examined

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