BERKELEY CENTER FOR HEALTH TECHNOLOGY

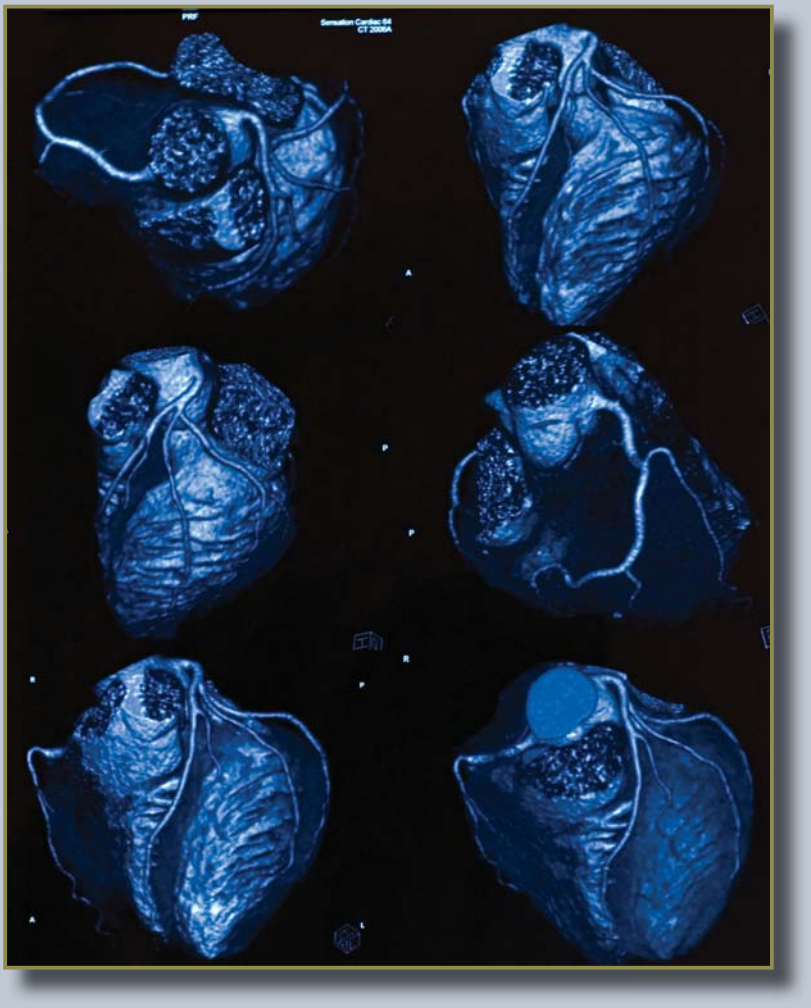
Issue Brief

Coronary Angioplasty with Drug-Eluting Stents: Device Costs, Hospital Costs, and Insurance Payments

The Berkeley Center for Health Technology (BCHT) has been working with the Integrated Healthcare Association (IHA) on its Value–Based Purchasing of Medical Devices (VBP) project, which has included the collection and analysis of hospital and patient data on seven major orthopedic, cardiac, and spine procedures.

This Issue Brief is the fifth in a series that comes out of this project and presents findings on implant costs, total surgical costs, complications, and insurance reimbursement for coronary angioplasty with drug-eluding stents.

Forty-five hospitals in California participated in the full collection initiative, providing data on device costs, total procedure costs, complications,length of stay, reimbursements, and patient characteristics. Of these hospitals, only 27 had interventional cardiology programs; the data presented here are from these institutions.



Hospital participants are diverse in terms of whether they belong to a multi-hospital system, urban or rural location, for-profit or non-profit status, teaching status, and bed size. All data are from 2008.

Figure One

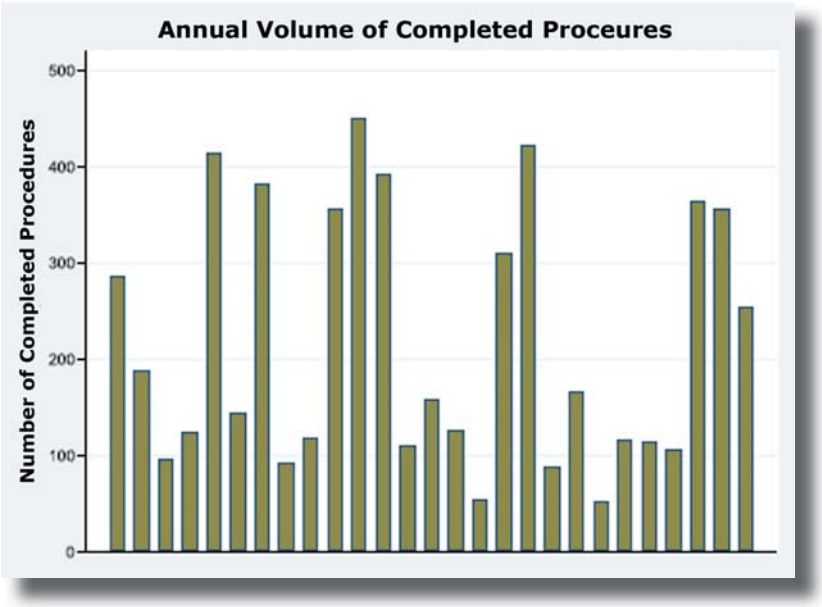
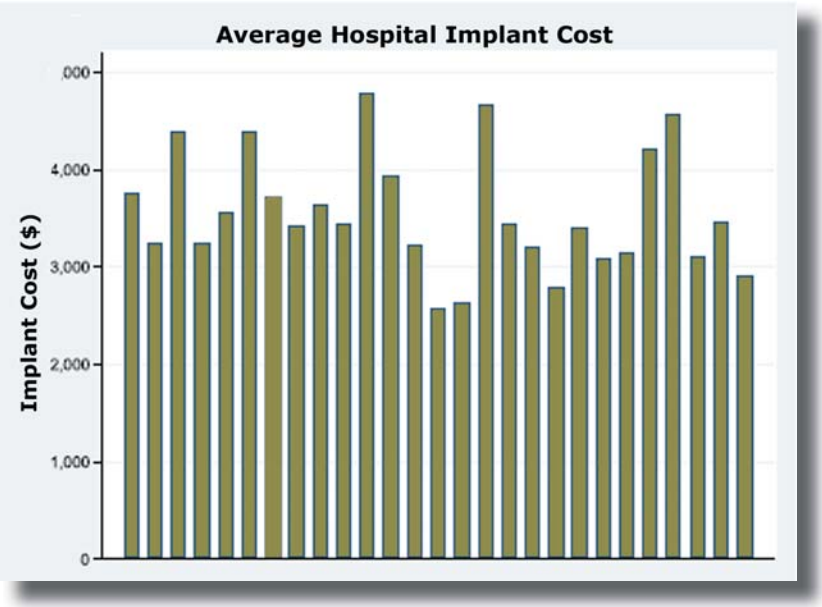


Figure Two



Introduction

Few surgical procedures have garnered more attention from patients, policymakers, and purchasers than coronary angioplasty with drug-eluting stents (DES). Originally hailed as a less intrusive and less costly alternative to the surgical bypass of heart arteries, angioplasty has gone through cycles of disillusion and revitalization as clinical complications have been uncovered and as observers have debated the appropriateness of the procedure for any but the most severe forms of coronary artery disease.

DES were first approved by the FDA in 2003, and after initial clinical trials that showed reductions in restenosis (renewed clogging of the heart arteries), rates of DES implantation (displacing bare metal stents) climbed to 90% of total stent use in the United States.[1] At the same time, their use doubled the size of the world stent market to $5 billion annually.[2] These developments fueled hospitals' concerns that payments by insurers would not rise to cover the increased cost of the procedure once use of DES replaced bare metal stents (BMS).

A drug-eluting stent consists of the stent itself—a metal mesh tube—the method by which the drug is eluted, and the drug—which is slowly released after the stent is implanted. The devices are physician preference items (PPI), as the choice of implant is made by the cardiologist responsible for its placement, rather than the hospital purchasing department.

Traditionally, PPI have been a source of tension between hospitals and their contracted physicians, as they are high-cost supplies, and a physician's choice is often not made with a hospital's desire to contain costs in mind. Both the selection of patients for angioplasty and the choice of DES over BMS implants appear to be influenced by financial

incentives facing interventional cardiologists, who receive higher fee-for-service clinical payments for their implantation or for the use of multiple rather than a single stent per patient, and who may also receive higher consulting honoraria from device manufacturers to the extent that they favor one brand of stent over another.

Highlighting variation between hospitals in terms of device costs, total costs, and reimbursement for device-intensive procedures is a first step in engendering greater cooperation between hospitals and physicians in the purchase and use of PPI devices. In pursuit of this goal, this brief presents data on angioplasty with DES in California hospitals, collected as part of the Value-Based Purchasing of Medical Devices Project.

Annual Volumes of Angioplasty with DES Vary Across Hospitals

Surgical volumes varied by a factor of eight between participating hospitals, from a high of 451 procedures to a low of 53 procedures in 2008. Figure One highlights this variation in hospital procedure volumes. The average number of procedures was 216.

Variation in Implant Costs

There is variation in both the cost per stent *and* the number of stents implanted, which means that both the average implant cost and the average cost of implants per procedure vary across hospitals.

Participating hospitals faced average implant costs of $3,552 for their drug-eluting stents in 2008. The hospital with the lowest average implant cost had a mean cost of $2,582, whereas the highest average implant cost was $4,779. This variation, highlighted in Figure Two, captures both differences in the price paid for implants and the number of stents implanted.

Figure Three

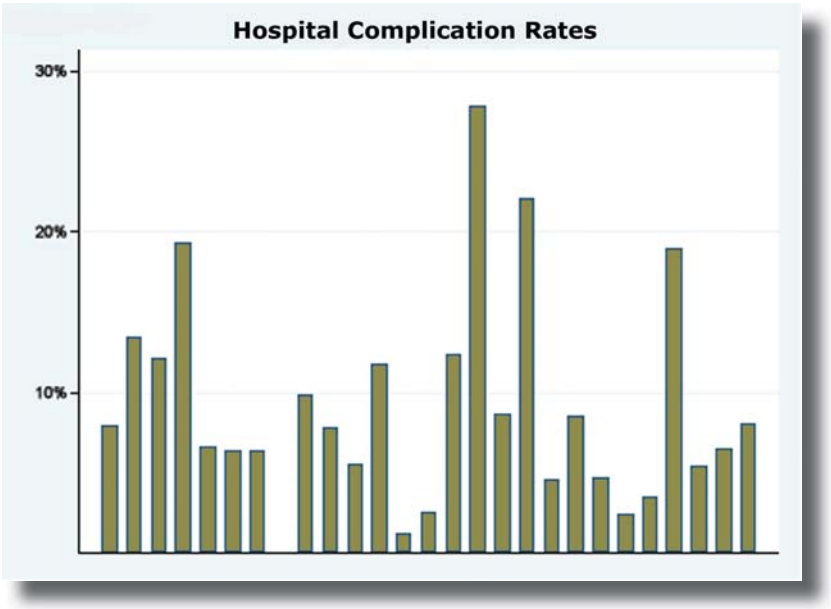
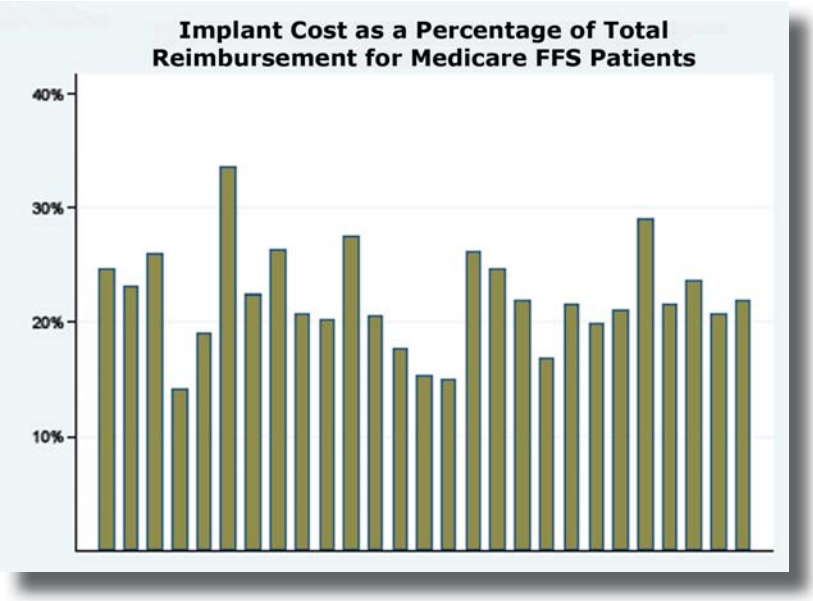


Figure Four

One stent was the most common number implanted, although patients represented here received between one and seven stents.

Prices paid *per stent* also differed across hospitals. The mean stent price in participating hospitals was $2,228 in 2008. The average price per stent ranged from a high of $2,831 to a low of $1,950. These data only capture half of the total variation across patients in DES device costs, as they ignore variation among patients within each hospital.

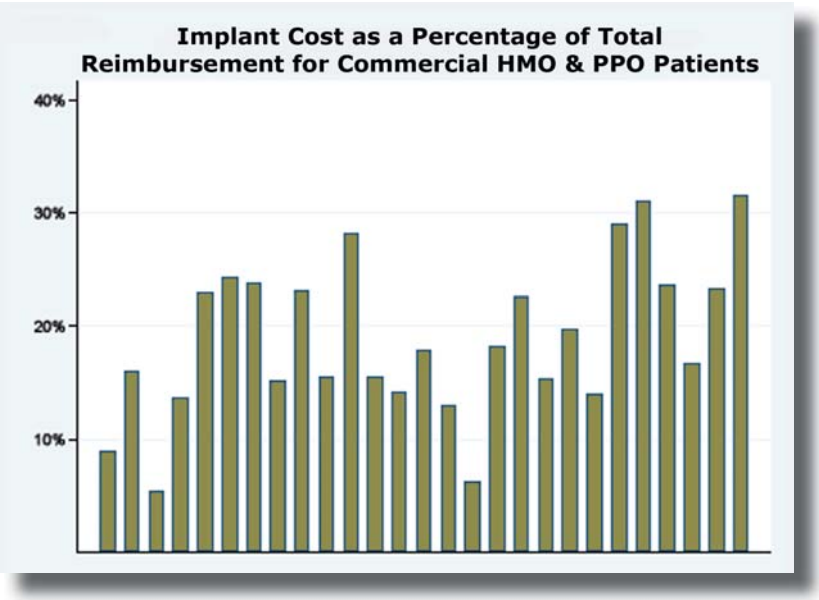
Figure Five



Complication Rates and Length of Stay for Angioplasty with DES

For the purposes of the VBP project, a complication is defined as an adverse event severe enough to prolong hospital length of stay by one day. Complication rates for stent implantation, shown in Figure Three, averaged 9.1% across participating hospitals, and ranged from 0 to 27.8%. Length of stay, which is not illustrated here, ranged across participating hospitals from an average of 1.5 days to an average of 3.1 days, with a mean of 2.3.

Figure Six



Costs per Procedure Vary by a Factor of Five Across Hospitals

Across hospitals, total costs for angioplasty with DES average $13,162. Costs range from $7,419 to $35,427, which can be seen in Figure Four. The upper end of this range is an outlier, with all of the other hospitals facing average costs under $20,000, and the majority (almost 75%) having average costs under $15,000.

Device Cost as a Percent of Insurance Reimbursement Varies Based on Insurance Type

Medicare reimbursement for device-intensive procedures has traditionally been less lucrative for hospitals than commercial reimbursement, both

because CMS sets rates that are lower than the hospital can negotiate with commercial insurers and because hospitals often "carve out" the cost of an implant device from payment for the procedure itself, which shields them from increases in device costs. Nearly half (49.8%) of the angioplasty patients in the participating hospitals were Medicare beneficiaries, with the majority (30.6%) of the remainder being covered by commercial insurance (19.6% were uninsured; 0% were covered by Medicaid).

As seen in Figure Five, device cost as a percent of Medicare fee-for-service (FFS) reimbursement ranges from 14.1% to 33.6%, with an average of 22.1%. Figure Six illustrates device cost as a percentage of commercial HMO and PPO reimbursement, which has a lower average—18.8%—and ranges from 5.3% to 31.5%. Hospitals obtain significantly higher payment rates from commercial insurers than from Medicare, so the fraction of revenues that must be paid out for the DES is proportionately smaller.

Conclusion

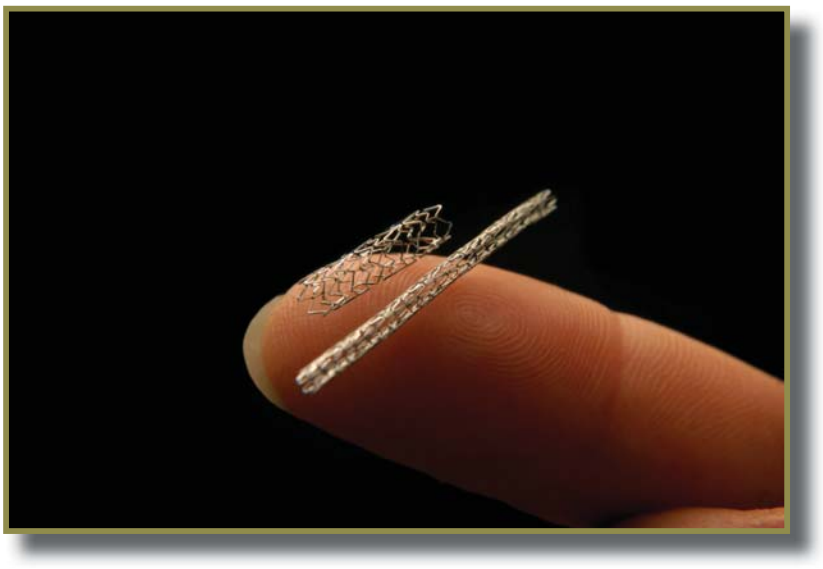
Much of the concern amongst policymakers and purchasers has centered on the appropriateness of angioplasty and the choice of DES over BMS implants. The results obtained through the Value-Based Purchasing project highlight significant variation in implant costs per patient, thus pointing to an avenue for potential efficiency improvements. As indicated in this Issue Brief, DES costs per patient vary by 100% across California hospitals. If variation across patients *within* hospitals is considered as well as variation *across* hospitals (not shown here), the range of costs per patient doubles yet again.

The range of DES costs would be justified if physicians and hospitals using more expensive devices obtained better clinical outomes than those using cheaper alternatives, and if efforts to reduce the cost of the devices impaired the patients' well-being. However, as shown in a study by Ketcham and Furukawa,[3] hospital initiatives to reduce DES costs through cooperation with their cardiologists can reduce costs while not adversely affecting outcomes. The findings reported here on device cost variation give important insights into the scale of potential savings, while recognizing that "gainsharing" and other cooperative cost-control initiatives need to monitor quality at the same time that they seek to improve efficiency and moderate cost growth.

[1] Love MP, Schampaert E, Cohen EA, et al., The Canadian Association of Interventional Cardiology and the Canadian Cardiovascular Society joint statement on drug-eluting stents. *Can J Cardiol*. 2007 February; 23(2): 121–123. .

[2] Cohen, B. Drug Eluting Stent Overview. *http://www.ptca.org/des.html*. Revised September 2008. Accessed June 11, 2010.

[3] Ketcham JD, Furukawa MF. Hospital-physician gainsharing in cardiology. *Health Affairs*. 2008;27.3:803-812. .



JAMES C. ROBINSON is Kaiser Permanente Professor of Health Economics and Director of the Berkeley Center for Health Technology (BCHT) at the University of California at Berkeley. His professional activities include his roles as Senior Director for Medical Technology at the Integrated Healthcare Association (IHA), Contributing Editor for Health Affairs journal, and as keynote speaker for conferences, policy roundtables, and board meetings.

EMMA L. DOLAN is a Policy Analyst with the Integrated Healthcare Association (IHA). She works on translating what IHA has learned about performance measurement and payment over the past ten years into concrete lessons for policymakers and other stakeholders in health care. Ms. Dolan received a joint Masters in Public Policy / Masters in Public Health (MPP/MPH) from the University of California, Berkeley.

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300 Lakeside Drive, Suite 1980, Oakland CA 94612
510.281.5617 • *bcht@berkeley.edu* • *bcht.berkeley.edu*