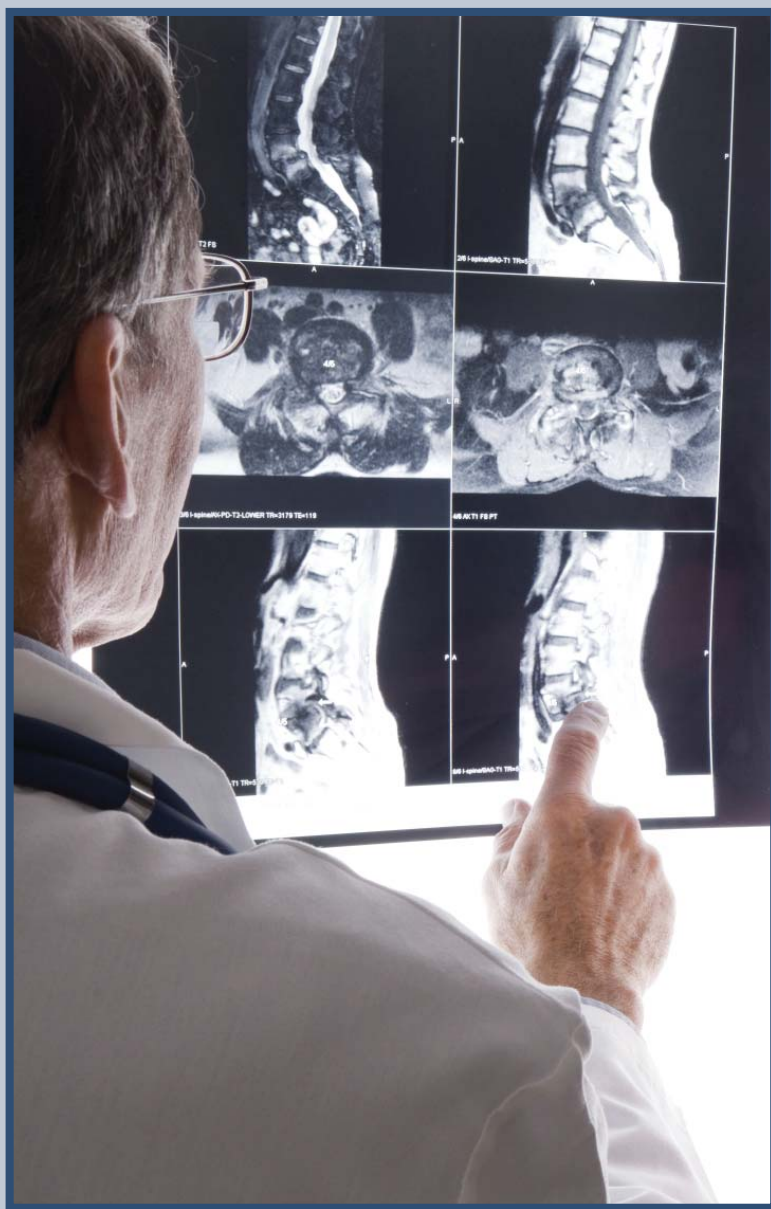


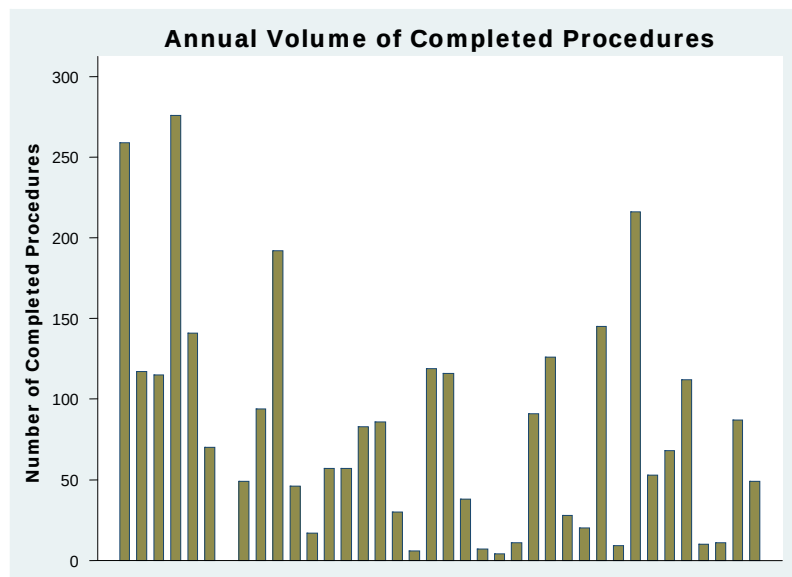
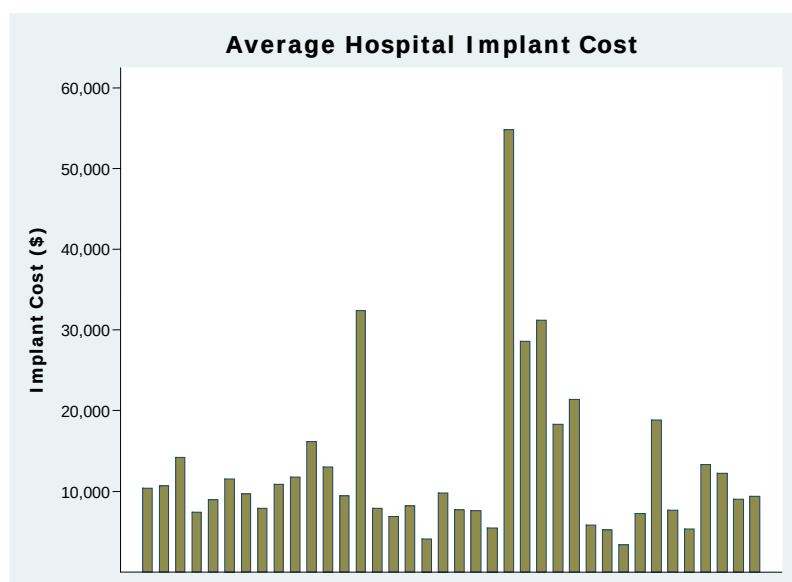
Lumbar Fusion Surgery in California: Volumes, Costs, Length of Stay, Surgical Complications, and Insurance Reimbursement



The Berkeley Center for Health Technology (BCHT), together with the Integrated Healthcare Association (IHA), has conducted a study of “Value-Based Purchasing of Medical Devices (VBP).” The project included the collection and analysis of hospital and patient data on seven orthopedic, cardiac, and spinal procedures.

This Issue Brief presents findings on implant costs, total surgical costs, complications, and insurance reimbursement for lumbar fusion surgery.

Forty-five hospitals in California participated in the 2008 collection initiative, providing data on device costs, total procedure costs, length of stay, complications, reimbursements, and patient characteristics. Of these hospitals, only 38 had spine surgery programs; the data are presented here. 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.

Figure One**Figure Two**

Introduction

Rates of lumbar fusion surgery have increased rapidly over the past two decades; between 1996 and 2001, the annual number of spinal fusion procedures rose 77%, driven by population changes, technological advances, and its use for a greater number of indications, despite a lack of evidence of its comparative effectiveness.^A There is continued concern surrounding the appropriateness of spinal fusion for patients with back pain, especially in light of the rapid rise in annual procedures. Of greatest concern is the rise of multi-level lumbar fusions, which involve much higher costs and greater risks than single-level procedures.^B

Lumbar fusion surgery typically involves complex instrumentation, which can include metal screws, rods or plates, or a “cage” made of metal, bone, or synthetic materials. These implanted devices are “physician preference items” (PPI), meaning that the choice of device is made by the surgeon, based on individual preferences for specific brands and functional levels. Most other hospital supplies are chosen by hospital purchasing departments, which are then able to aggregate purchases in order to achieve volume discounts. This conventional supply chain management is typically not effective for PPI devices, despite their economic and clinical salience, due to the all-too-frequent economic misalignment between surgeons and hospitals.

An overarching theme of the VBP project has been to help align the incentives of hospitals and physicians when it comes to the purchase of PPIs, as the physician’s brand or functional preference can come in conflict with the hospital’s desire to contain costs.

In pursuit of alignment, the Value-Based Purchasing Project hosted a number of roundtables to highlight the issues facing doctors and hospitals, and is publishing this set of Issue Briefs to draw attention to variation in surgical volumes, device

costs, and reimbursement for core orthopedic and cardiac procedures.

Annual Volume

Figure One shows the annual volume of lumbar fusion surgeries across participating hospitals in 2008, which ranged from just a single procedure to 276. The average hospital volume was 79 procedures.

Implant Device Costs

Variation in the cost of implant devices was notable for all seven procedures included in the VBP project, but variation in the cost of lumbar fusion implants was amongst the highest. Average implant cost per hospital, charted in **Figure Two**, ranges from \$3,397 to \$54,826, with a mean of \$12,773. There was also a great deal of within-hospital variation, even after adjusting for patient characteristics such as age and co-morbidities.

Device Costs

Hospitals may seek to manage device costs by limiting the number of vendors from whom they buy devices. This may cause manufacturers to compete for a hospital's business, giving the hospital leverage in the process of price negotiation. Six of the thirty-eight surveyed hospitals limit their whole book of lumbar spine implant business to two vendors; the majority obtain over two-thirds of their devices from their two largest suppliers, although these vendors are different across hospitals.

Figure Three shows the percent of lumbar fusion devices purchased from the largest and second largest vendors for each institution, respectively. Continued variation in device prices across these hospitals signals that consolidation of purchasing does not eliminate variation, and that gains from consolidation may already have been realized.

Figure Three

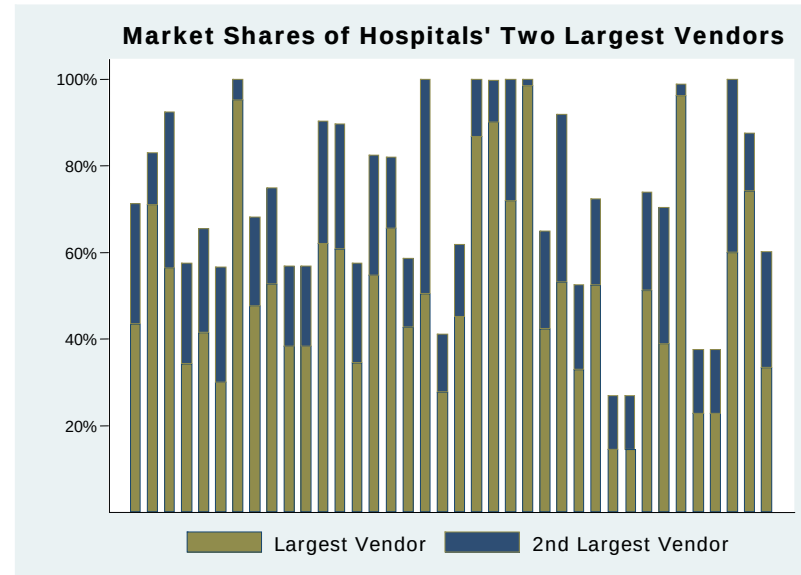


Figure Four

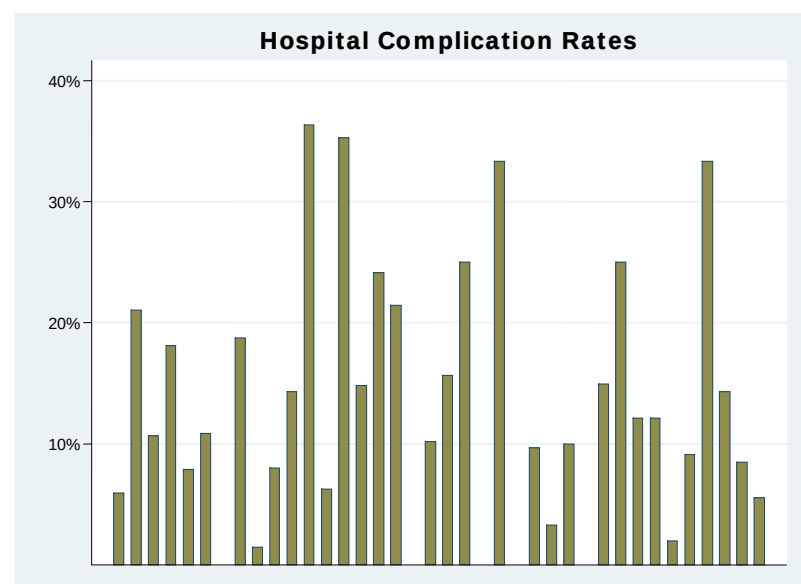
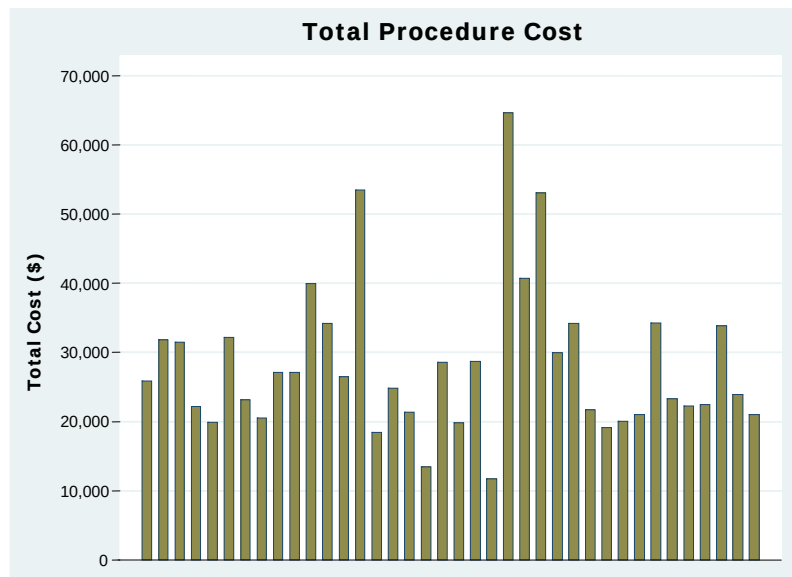
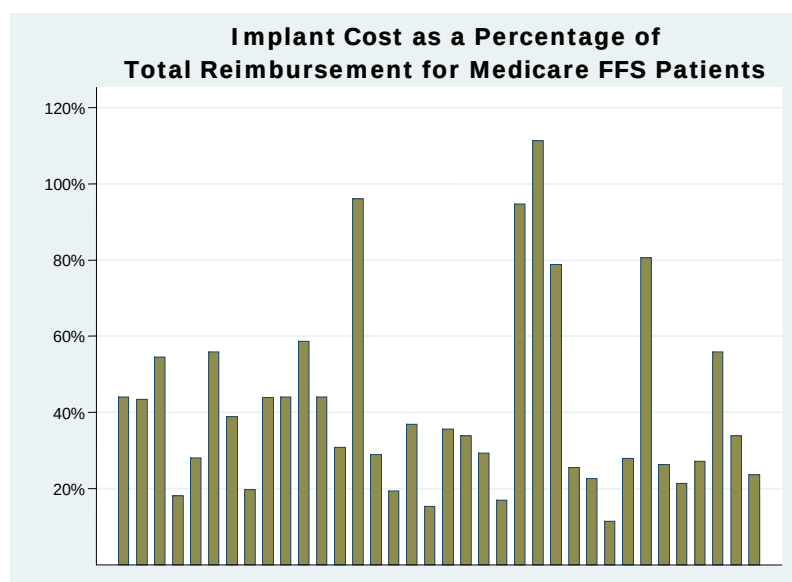


Figure Five**Figure Six**

Consolidation of device vendors may have harmful long-term effects on a hospital, as it can cause a lock-in dilemma. If a hospital has contracted with a vendor for a substantial period of time and then switches to a different vendor, there are switching costs both in terms of the time needed for surgical staff to adapt to new device types, and in terms of the administrative and staff time needed to establish new contractual relationships with a separate vendor. If vendors perceive the hospital as having locked itself into a small number of manufacturers, they may not actively compete for the hospital's business on the basis of price.

Rates of Surgical Complications / Length of Stay

Surgical complications and length of stay are related, as complications have been defined in these data as events severe enough to prolong length of stay by one day. **Figure Four** shows complication rates for lumbar fusion in Californian hospitals, which range from 0% to 36.4%, with a mean rate of 13.1%. Average length of stay, which is not illustrated here, ranged from 2 to 7 days, with a mean length of 4.3 days.

Total Surgical Costs

Driven by the factors described above—implant costs, complications, and length of stay—total surgical costs for lumbar fusion vary by a factor of 5.5 across hospitals, from a low of \$11,693 to a high of \$64,687, with an average of \$28,103. **Figure Five** showcases this variation.

Device Costs & Insurance Reimbursement

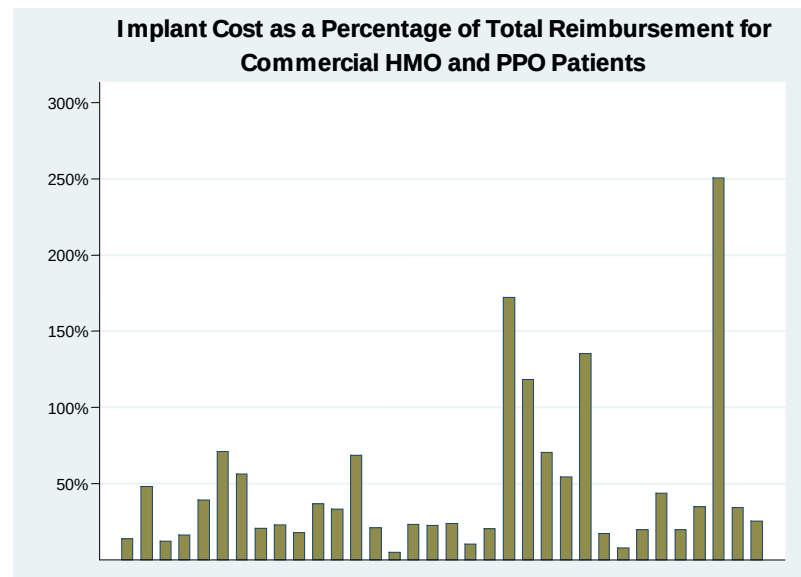
Unlike hip and knee implant procedures, Medicare patients do not comprise the majority of lumbar fusion recipients: in 2009, only 35% of recipients were over the age of 64.^c **Figure Six** presents implant cost as a percent of Medicare reimbursement

across California hospitals, which varies ten-fold from 11.4% to 111.3%, with an average of 41%. In contrast to knee and hip implants, lumbar fusion implant cost as a percentage of Medicare reimbursement was lower than implant cost as a percentage of commercial reimbursement. Lumbar fusion implant cost as a percentage of commercial insurance payment is substantially more variable than for Medicare payment. **Figure Seven** shows implant cost as a percent of reimbursement for commercially insured patients, which ranges from 5% to 250%, with an average of 46.7%.

Conclusion

Despite ongoing debate over clinical effectiveness and appropriateness, rates of fusion for lumbar spine abnormalities are rising. Physicians, hospital managers, patients, and policymakers should all be concerned over this trend, as well as over the efficiency and cost of those procedures that do occur, regardless of their appropriateness. It has been said that the role of diplomacy is to evaluate whether war is in the nation's interest, and that the role of the military is to win the war, if war is chosen. Analogously, the data presented here highlights for hospitals the importance of working with physicians to manage device costs, length of stay, complications, and total surgical costs, while waiting for comparative effectiveness research (CER) and other evidence to clarify the criteria for the appropriateness of this important but costly procedure.

Figure Seven



^A Deyo RA, Nachemson A, Mirza SK. Spinal-fusion surgery: The case for restraint. *NEJM* 2004; 350:7-226.

^B Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *JAMA* 2010;303:13:1259-1265.

^C Mendenhall S. 2009 Spinal surgery update. *Orthop Net News* 2009;20:4-7.

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