BERKELEY CENTER FOR HEALTH TECHNOLOGY

Issue Brief

Volumes, Costs, and Reimbursement for Cervical Fusion Surgery in California Hospitals, 2008

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 fourth in a series that comes out of this project and presents findings on implant costs, total surgical costs, complications, and insurance reimbursement for cervical fusion surgery.

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 38 had spine surgery 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.

Despite continued concern surrounding their appropriateness, spinal fusion procedures are rapidly increasing in the United States. Between 1996 and 2001, the annual number of procedures rose 77%, driven in part by population changes,

Figure One

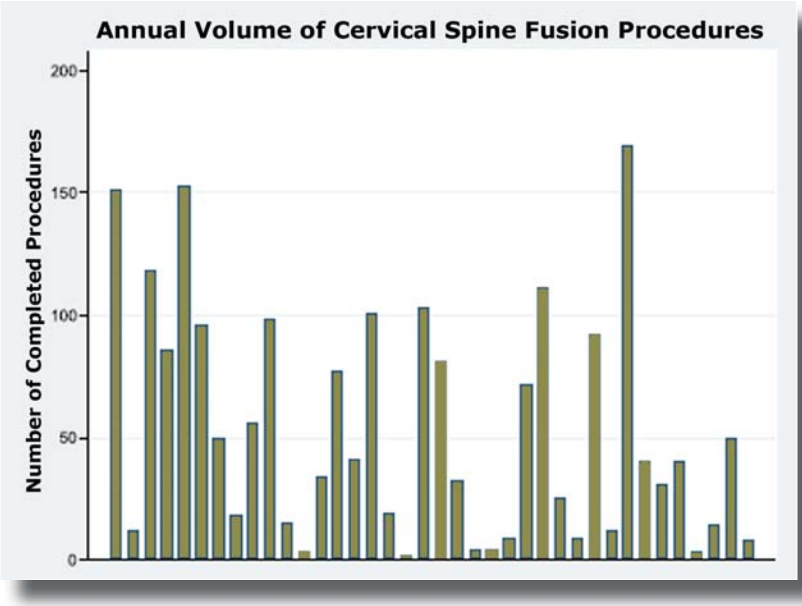
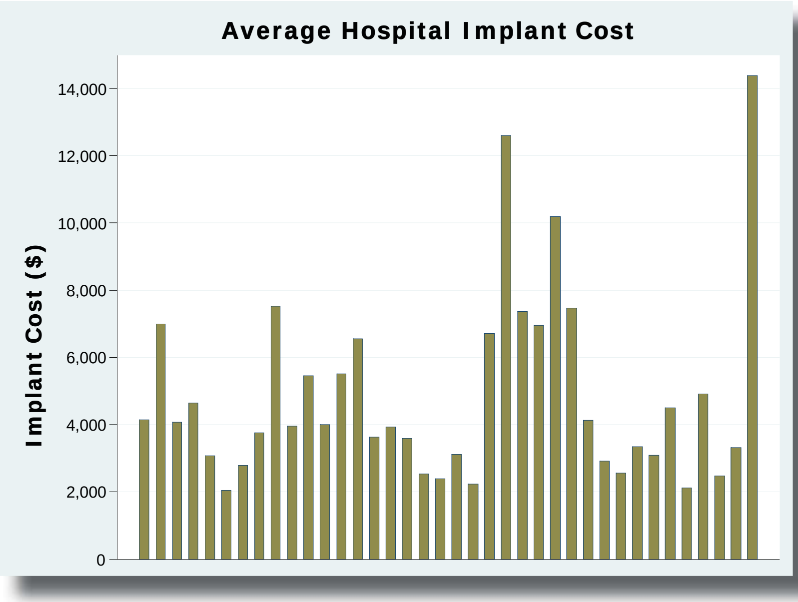


Figure Two



technological advances, and its use for a greater number of indications.[1] In the cervical spine, as well as in the lumbar spine, rates of fusion surgeries have increased faster than rates of non-fusion surgeries in the past several years.[2] Rates of cervical fusion tripled among the Medicare population between 1992 and 2005.[3]

Cervical fusion surgery generally involves complex instrumentation, which can include metal screws, rods, plates, and an interbody fusion device. These devices are often called "physician preference items" (PPI), as surgeons themselves are responsible for choosing which device to implant, and develop preferences for particular brands and functional levels. This contrasts with many other supplies used in the hospital, where physicians do not develop loyalties to particular brands, and the hospital can aggregate purchases for cost-savings.

Historically, PPI devices have been a point of contention between hospitals and surgeons, as they are very expensive and are often chosen without regard for a hospital's desire to contain costs. A major goal of the VBP project has been to help physicians and hospitals align their incentives, since cooperation on clinical quality and supply purchasing are important for the efficiency of surgical service lines, especially when it comes to the adoption and diffusion of new medical technology. A first step in this process is to highlight areas where hospitals can gain from increased cooperation, which is the goal of this set of Issue Briefs.

Annual Volumes of Cervical Fusions Vary Across Hospitals

The annual volume of cervical fusion procedures among the participating hospitals, shown in Figure One, ranged from two to 169, with an average of 54 procedures. Some facilities do very few procedures; indeed, eight of the 38 hospitals (21.1%) that perform cervical fusion did less than 10 during the entire course of the year. Higher-volume hospitals generally have lower mortality rates[4] and have the possibility of gaining price advantages from bulk purchasing of devices, although as discussed below, this is not necessarily the case in Californian hospitals.

The Cost of Cervical Fusion Implants

The cost of implants varies by a factor of seven amongst hospitals, as shown in Figure Two. Average implant cost ranges from a minimum of $2,053 to a maximum of $14,382, with a mean of $4,868. This represents only half of the total variation across patients in device costs, as there is also wide variation within each hospital, even when controlling for patient characteristics such as age, principal diagnosis, co-morbidities, complications, and discharge destination. This suggests that differences in device costs are driven largely by surgeons' device brand and functional level preferences.

Hospital Efforts to Manage Device Costs

Variation in device costs across hospitals can be explained in two ways: the first is that some hospitals have larger procedure volumes, and corresponding device purchases, which can lead to volume discounts on implants. Volume discounting, however, does not directly follow a high volume of business from a vendor, given that implant device choices are not made by a centralized decision maker.

The second factor that can explain variation in device costs across hospitals is whether a hospital contracts with a small number of device vendors for the purpose of leverage. Vendors may offer discounted prices in order to be chosen for contracts, which would lead to lower prices for a hospital in

Figure Three

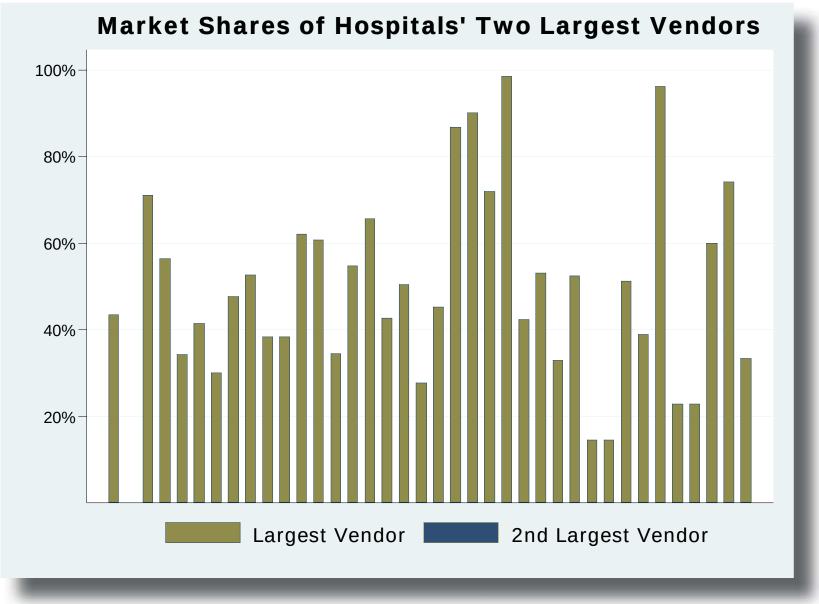


Figure Four

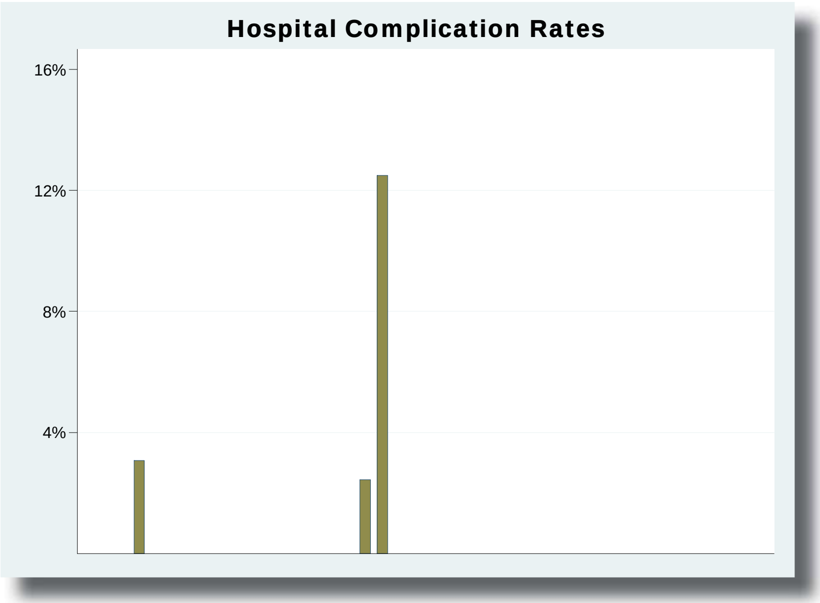


Figure Five

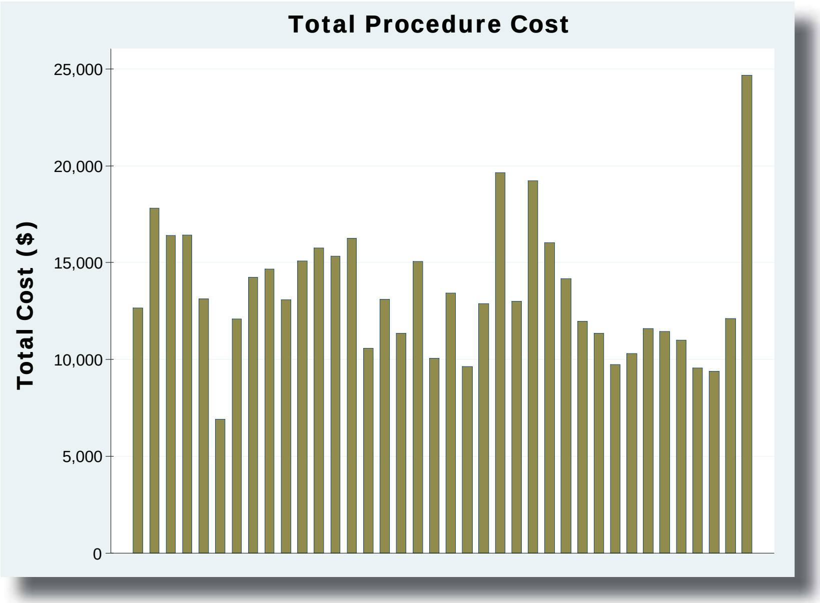
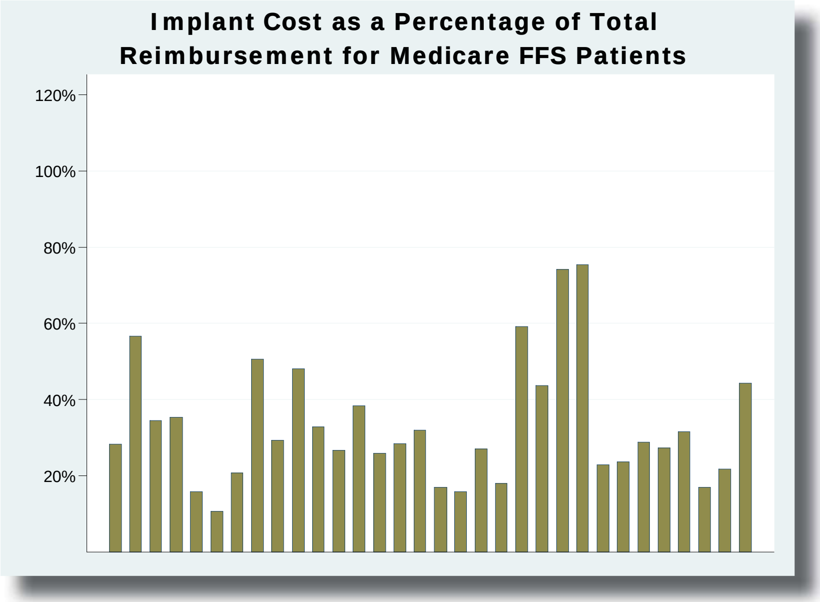


Figure Six



the short run. It is not clear, however, that this would reduce costs in the long-term, as hospitals could be left with a lock-in dilemma. Switching to a new device vendor entails costs, both for the surgeons who must adapt to new implants, and for hospital administrators who must establish contracts with new vendors.

Some California hospitals have embraced the volume discount perspective, and limit their business to two vendors, although these vendors are different across the hospitals. Figure Three shows the percent of cervical fusion devices purchased from the largest and second largest vendors for each institution, respectively. Five hospitals get 100% of their devices from just two vendors, and the vast majority obtains over two-thirds of devices from the two largest suppliers. This illustrates that consolidation of purchasing does not eliminate variation, and that many gains from consolidation may already have been realized.

Variation in Surgical Complications and Length of Stay

In the VBP project, surgical complications are defined as events severe enough to prolong length of stay by one day, thus there is a relationship between the two variables. Complication rates for cervical fusion in Californian hospitals range from 0% to 12.5%, with a mean rate of 0.5%. Of the procedures studied, cervical fusion has amongst the lowest complication rates, with over 90% of hospitals having complication rates of 0%. Average length of stay, shown in Figure Four, ranged from 1 to 3 days, with a mean length of 1.9 days.

Variation in Total Surgical Costs

Driven by the factors described above, total surgical costs for cervical fusion vary by a factor of 3.6 across hospitals, from a low of $6,907 to a high of $24,689, with an average of $13,450. Figure Five showcases this variation.

Device Costs Make Up a Large Portion of Insurance Reimbursement

Medicare patients do not comprise the majority of cervical fusion recipients; in 2009, only 21% of cervical fusion recipients were Medicare-aged.[5] Figure Six presents implant cost as a percent of Medicare reimbursement across Californian hospitals, which ranges from a low of 10.7% to a high of 75.4%, with an average across the hospitals of 33.2%.

Cervical fusion implant costs as a percentage of commercial insurance payments are substantially more variable than for Medicare payments. Figure Seven shows implant cost as a percent of reimbursement for commercial patients, which ranges from 5.7% to 158%, with an average of 33.6%. Although the range is larger for commercial payments, the average percent of reimbursement (33.2% for Medicare and 33.6% for commercial) is quite similar.

Conclusion

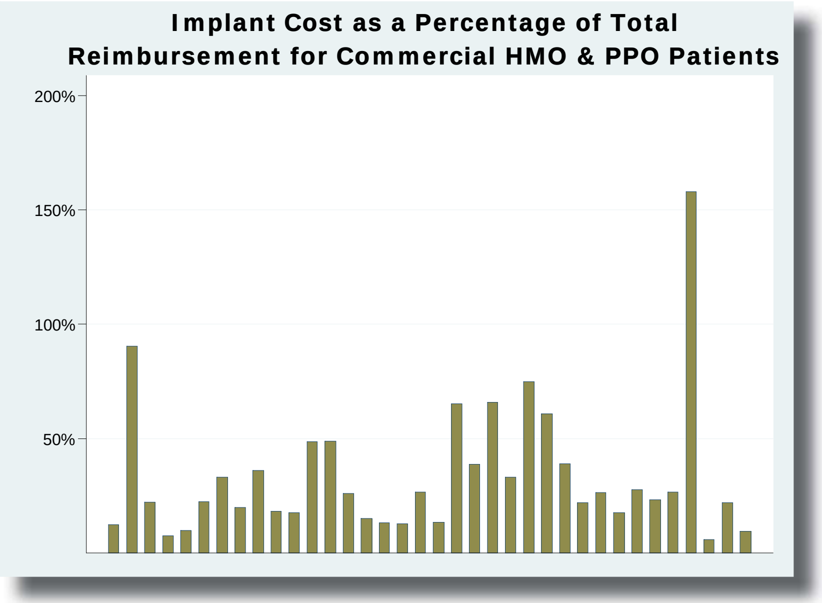
A major challenge facing the U.S. health care system is how to improve efficiency, and thereby moderate growth in costs, without undermining innovation and improvements in quality. As with other industries, the first step in efforts to improve efficiency is to understand and reduce unjustified variation in work processes and the costs and outcomes associated with them.

As long as physicians and hospitals treat patients with similar conditions in very dissimilar manners, and without collecting comparative performance statistics, it is impossible to improve performance. Similarly, in order to improve the mean of the hospital performance distribution, it is important to analyze and reduce its variance.

The data reported here highlight variations across hospitals in every dimension of economic performance for cervical spine fusion. California hospitals witness an almost four-fold difference in the cost per patient for cervical fusion, and this across-hospital variation is only half the total variation (which includes within-hospital variation). The cost of the screws, plates, and other 'physician preference items' that are implanted in these patients varies by twice as much, with a seven-fold difference among hospitals and much more when within-hospital variance is included. Analogous variation is also found for length of stay, complications, and reimbursements.

Data on variation do not identify the appropriate level of cost. Ideally, health service research would be able to see whether physicians and hospitals with high-cost practice patterns and device implants obtain better patient outcomes than those with more conservative practice styles and device choices. At a minimum, however, documentation

Figure Seven



of variation highlights the need to justify which approach to spine complications is the most justified, as the nation cannot afford to spend the major sums that these procedures necessitate without clinical evidence on which approach works best. Spine fusion exhibits the highest variation in population-based rates of surgery, and the data presented here show that it also exhibits major variation in costs per case and, in particular, in the prices paid for the implanted medical devices.

In an era of widespread concern over high and rising medical costs, the burden of proof is gradually shifting from requiring physicians and hospitals with low costs to prove that their care is not of lower quality to requiring those with high costs to prove that their care is indeed of higher quality. The information presented here should inform these conversations and help lead to cost-savings in the hospital industry in California.

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