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Price Transparency For Medical Devices

Pricing information can motivate physicians to work with hospitals on reducing the prices and price variation of medical devices.

by **Mark V. Pauly** and **Lawton R. Burns**

ABSTRACT: Hospital buyers of medical devices contract with manufacturers with market power that sell differentiated products. The medical staff strongly influences hospitals' choice of devices. Sellers have sought to limit disclosure of transaction prices. Policy-makers have proposed legislation mandating disclosure, in the interest of greater transparency. We discuss why a manufacturer might charge different prices to different hospitals, the role that secrecy plays, and the consequences of secrecy versus disclosure. We argue that hospital-physician relationships are key to understanding what manufacturers gain from price discrimination. Price disclosure can catalyze a restructuring of those relationships, which, in turn, can improve hospital bargaining. [*Health Affairs* 27, no. 6 (2008): 1544–1553; 10.1377/hlthaff.27.6.1544]

HOSPITALS BUY MANY EXPENSIVE medical devices used in patients' treatment. Although some devices are sold in competitive commodity markets, sellers of the more expensive and specialized devices operate in oligopolistic markets with few competitors. In these markets, not all buyers pay the same price to a seller for a given or similar product. Buyers might not know the prices other buyers have paid. Much of the device market thus does not fit the description of a competitive market in competitive equilibrium, with the "Law of One Price" holding, price driven down to long-run marginal cost, and profits limited to the competitive level.

Sellers' market power in devices comes from patent protection and limited competition. However, device manufacturers do not set a single price, reflective of their market power, and sell to all buyers at that uniform price. Sellers frequently charge some buyers more than they charge others.¹ Some sellers of devices have gone further than simple price discrimination and have designed contracts accompanying sales agreements that include language forbidding buyers from disclosing

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the final negotiated price to other buyers, or even to patients or insurers.² In the past, these provisions may have served only as a caution, since they were generally not enforced. Third-party organizations (for example, consultants and medical product testing firms) collected and disseminated information on transaction prices, reducing the cost to each participating buyer of obtaining information on what other buyers paid. Some device makers have recently begun to enforce this contract language (for example, via litigation with third-party organizations or implicit threats to rescind hospital contracts and revert back to list prices), to limit disclosure and sharing of transaction prices.³ What prompted such contract language and the increase in enforcement of it? We provide one answer and then specify its implications for public policy and the functioning of private markets.

There have been some well-known efforts to address pricing policy and disclosure. Policymakers have proposed legislation mandating disclosure of average and median product prices (but not the range of such prices).⁴ An advocacy group for device manufacturers sponsored an economic report by Robert Hahn and Hal Singer on the value of disclosure, which concludes that mandatory price disclosure harms consumer welfare more than it helps.⁵ Neither of these efforts dealt with why prices vary for the same product from the same seller, and so have largely missed the point of real impact and debate.

Differentiated Price-Discriminating Oligopoly

The market for medical devices—such as implantable cardioverter defibrillators (ICDs), pacemakers, and artificial hips and knees—fits under the economic label of “differentiated oligopoly.” Here a relatively small number of sellers offer products that are close but not always perfect substitutes, because different products have different characteristics that their makers can uniquely determine. Because of both small numbers and differentiation, sellers have some control over the prices of the products they choose to make.

■ **Derivation of sellers’ market power.** The prices hospitals pay for devices vary greatly and are often the result of either bargaining between the hospital and the manufacturer or the seller’s setting its own firm price instead of taking the prevailing market price as given.⁶ The first is by far the more typical relationship for the big-ticket items involved in the controversy. Sellers’ market power derives from several sources. First, similar devices made by different firms have differentiated features. Second, patents may protect some of these features, permitting the seller to cover its costs and earn a profit. Third, buyers may lack comparative information (on prices or product performance) and (most importantly) face high switching costs because of sticky relationships with specific manufacturers, generally the result of the preferences of physicians who use the products. Such relationships retard the ability of group-purchasing organizations to standardize and channel hospital device purchases to specific manufacturers, thereby upholding sellers’ market power.⁷

■ **Influences on hospitals’ purchasing decisions.** In contrast to the small

number of sellers (device makers), there are a large number of buyers (hospitals), which have different characteristics that affect and reflect the value to them of specific products. These characteristics stem partly from their missions (teaching versus nonteaching) and size (high versus low procedure volume). Perhaps more important, however, are the differences in their medical staffs and those staffs' preferences. In most cases, the hospital is not the real buyer of important devices. Rather, the decision on how much and what type of device to buy is heavily influenced by the attending physicians who will use, monitor, or implant the device and who have a range of preferences for devices. These preferences may be shaped by patients' preferences (perhaps by direct-to-consumer advertising) but more likely reflect physicians' familiarity with a particular device model, judgments of relative product features and clinical attributes, preferences for specific vendors, and close ties with vendors' sales representatives.⁸ These preferences are sticky and remain in place for years, often extending back to a surgeon's residency training.⁹ The hospital's demand for devices is thus the quintessential "derived demand," dependent on patients' demand for admissions and procedures, patients' preferences for particular physicians and products, and (especially) physicians' preferences for the number and type of devices they want to or do use.

■ **Financial effects of high device prices.** As the initial buyer, hospitals experience the immediate financial effect from paying higher device prices. Under Medicare's administered per case reimbursement, higher device prices consume a greater share of the reimbursement and reduce hospitals' net income per unit of output. Assuming that the hospital does not have the authority or the desire to substitute other technologies for the device ordered by the physician, higher device prices for a given volume of output translate into higher private insurance costs and therefore higher premiums paid by citizens in one way or another. Consumers may respond by dropping insurance coverage (if they are paying their own premiums). If they remain insured with the same coverage, they pay more for the same thing. Either way, the net effect of high or rising device prices is a reduction in consumers' welfare, which may translate into lower efficiency in the economy as a whole and may reduce total welfare in the economy (including the welfare of hospital workers and device-maker stockholders and employees).¹⁰

For patients covered by Medicare or Medicaid, which pay administered per case reimbursements, the initial loss in profits from higher device prices is not easily offset by the hospital's pricing strategy. If the hospital had not been charging its profit-maximizing price to private insurers, it might raise that price still further to offset the public payer's losses. Or it may cut back on certain community benefits.

■ **Impact of price disclosure, variation, and discrimination.** Hospitals (and other parties) are thus interested in lower, or at least stable, device prices and generally favor price disclosure. To understand the impact of disclosure in a market characterized by price and product differentiation, we need to know why a manufacturer charged lower prices to some buyers than to others in the first place, and

perhaps why it chose the product characteristics it did. The conditions for price discrimination by firms with market power—as opposed to price variation based on variation in (marginal) costs to serve different sellers—are that different buyers have different demand elasticities, the seller can identify which buyers are which, and markets can be kept separate. The first two characteristics do approximately fit the hospital market for medical devices. It is the applicability of the last one—the proviso that a buyer charged a high price cannot somehow get access to or obtain the lower price charged to some others—that is affected by pricing information. The issue is not how price discrimination is broken in other markets (for example, a lower-price buyer retrading with those paying higher prices) but, rather, what strategies might be available to buyers that are being charged more than others.

■ **Value of price information.** If sellers with some market power were to charge different prices to different buyers, what impact would information about those “transactions prices” (as distinguished from list or posted prices) have on the functioning of the market and its efficiency? One intuition is that if every hospital knew what everyone was paying to a given seller for a given product, those hospitals paying more than the lowest transaction price could somehow use this information to reduce what they pay, closer to the price charged to the buyers getting lower prices. At a minimum, better information would do no harm.

One source of ambiguity about the value of such price information stems from the uncertainty about the process by which buyers and sellers agree upon a price. Imagine a firm selling a differentiated version of a device that no other seller can exactly copy, but for which some substitutes exist. Assume also that transaction prices differ across buyers. With full disclosure of these prices, all buyers except the one paying the lowest price would know that the seller sold the product at a lower price elsewhere. But does that knowledge help in negotiation? For example, if the seller knows the particulars of each buyer’s circumstances—such as the physician’s product preferences, vendor allegiances, physician power in the hospital, or total volume of purchases—a buyer with a medical staff strongly preferring the seller’s version of the product but buying relatively modest volumes should expect to be charged more than another buyer with greater medical staff willingness to substitute and larger volume with which to threaten. For the weak buyer to discover that the strong buyer is paying less does not lead to an obvious alternative behavior; the seller could tell the weak buyer, “We charge you more because we can.” To be of value, the pricing information must be accompanied by knowledge of how buyers’ circumstances lead to lower prices and how to change one’s own circumstances accordingly. Sellers with market power in unregulated markets have no economic incentive to respond to buyers’ complaints that “it just isn’t fair.”¹¹

A buyer who knows all sales prices does have a better idea of the prices that are close to the minimum price the seller would accept. And there may be adverse reputation effects for the seller accused of gouging some weak buyers. Nevertheless, there does not seem to be an obvious theory of bargaining that predicts that infor-

mation about other transactions prices will in itself automatically improve buyers' welfare in markets where the discriminatory prices proceed from adverse characteristics of some buyers and sellers' market power to take advantage of these characteristics. In other words, in settings where price discrimination is most likely to emerge, buyers may be least capable of using information about prices to do anything about the discrimination. The outcome may depend as much on the personalities of buyer and seller, consistent or inconsistent expectations, each buyer's circumstances, and related psychological (rather than rational) considerations. In short, in this model, better information does not do harm, but it does not obviously help much, either. So we now seek to model hospitals' demand for devices in more detail to go beyond platitudes about bargaining power.

Can Pricing Information Improve Hospital Coordination?

■ **Strengthening hospitals' bargaining position.** The price a hospital will pay a given seller for a given product depends on the hospital's bargaining position. But the hospital's bargaining position should not be taken as given; perhaps pricing information may strengthen the hospital's bargaining through more coordinated planning of purchasing. We take a simple case first. There may be value to price information if hospital boards have difficulty in evaluating current management's purchasing and bargaining skills. The board or even top management might not be able to tell how good a job their staff is doing in bargaining if they only know the sales price they paid; however, if they see much lower prices negotiated by other hospitals (even ones with which they are not in competition), this may allow them to better motivate and monitor their staff.

Consider the more complex but probably more important case where physicians are the key influence on product selection; we argue above that physicians' preferences are especially important for costly devices. In the past, physicians' product preferences were shaped by clinical features and benefits, as well as physicians' relationships with manufacturers; they liked products that they were familiar with and thought worked well. Physicians may have been unaware of (or unconcerned about) the product's absolute price or price relative to other products. Without data to establish which alternatives will be lower-cost at their hospital, physicians' willingness to hold down costs and management's efforts to engage physicians to hold down costs may be inhibited.

■ **Bridging inconsistent objectives.** The main problem that pricing information may address is the often inconsistent objectives between hospitals and physicians.¹² Hospitals care about their patient (especially surgical) volumes and seek to minimize their spending per case, given the per case reimbursement levels or prices they receive from payers. Physicians are concerned with their patient outcomes, their productivity (time per procedure), and their monetary incomes, and they often seek to use newer technology in treating their patients.

Manufacturers have exploited the divergence between these two parties in a

number of ways: direct payments to physicians for product development and promotion, indirect payments for facilities and support personnel, and practice support via the efforts of sales representatives. Hospitals have been unable to match this support, and, especially in larger hospitals, medical staffs themselves cannot coordinate the behavior of their members, even when it is in their collective best interest to do so. In the long run, the medical staff will benefit from a financially healthy hospital. The result is that physicians may give greater loyalty to their sales representatives than to their hospitals and tend to use more and different products than those on hospitals' purchasing contracts and new products that are not under any contracts—all of which increase the hospital's costs.¹³

There may therefore be value to hospitals from providing pricing information to physicians to assist them in making product selections based on cost as well as on product attributes. If the administrator can show that the device models favored by staff physicians are more costly than average—either because they tend to choose expensive models or because idiosyncratic choice of a wide variety of models limits volume discounts for any single model—a cooperative arrangement in which physicians agree to change to lower-cost alternatives may be possible.¹⁴

For example, by gathering and spreading pricing information available for multiple vendors or versions of the same medical device, hospitals can engage their physicians in discussions of the cost and quality profiles of each manufacturer's product. Such information can show that catering to the preferences of individual physicians opens the door for device sellers to charge higher prices for all physicians. Discussion of why one's hospital is not purchasing at as low a price as it could might then lead to joint hospital-physician decisions on which vendor(s) to purchase products from that satisfy physicians' clinical preferences and improve the hospital's (or the relevant hospital department's) financial picture.

There is a growing consensus that such a dialogue is necessary for providers to control the cost and improve the quality of health care they provide. This was one of the major conclusions of the Medicare Heart Center Bypass Demonstration and may be a major reason why the Medicare Payment Advisory Commission (MedPAC) is now recommending the use of bundled payments for providers under the Medicare program.¹⁵ Most important for our model, such a dialogue limits manufacturers' ability to play physicians against hospitals by causing physicians to overemphasize their preferences for particular high-price devices. Our view is that combining price disclosure with a restructuring of hospital-physician relationships could yield benefits; our hope is that the availability of such data might be a catalyst for such a cooperative restructuring. Of course, for physicians to cooperate on lowering hospital costs, it would be desirable for them to be concerned about their hospital's fiscal well-being. Up to a point, improvements in a hospital's financial situation can improve its ability to provide surgeons with a productive and modern facility, with higher costs incurred only when they yield large benefits in total for the whole medical staff, not for individual members.¹⁶

Problems In Applying Hahn And Singer's Model To Hospitals

Hahn and Singer argue that mandatory price disclosure would impose welfare costs on consumers, partly because the four conditions required for social benefits from price disclosure—large search costs that disclosure can reduce, disclosure's ability to provide current pricing information, competitive forces that lead hospitals to pass along savings to consumers, and large variation in device prices paid by hospitals—are allegedly absent.¹⁷ This is the classic framework for describing the role of information about prices when prices vary across firms but not across buyers. We think that there are logical and institutional limits to applying this model to hospitals.

■ **Physicians' influence on hospitals' demand for devices.** One problem is Hahn and Singer's assumption about which group influences hospitals' demand for devices. Physicians, rather than consumers, currently exert the largest influence on demand, since physicians are both potential consumers of price information and selectors of medical devices (who relay their preferences to hospital purchasers). Some form of price disclosure may improve hospital-physician dialogue and selection among alternative products.

■ **Manufacturers' concern about price disclosure.** A second problem with their argument is that if they are correct—that search costs for pricing information are small, price information is outdated and irrelevant, and only limited pricing dispersion exists—then manufacturers should not care about price data being disclosed and might instead compete on the basis of price. Such is obviously not the case in the medical device industry, as Hahn and Singer admit. Moreover, manufacturers do care about price disclosure. Guidant has brought suit in two recent cases to reduce the ability of third parties to collect and disseminate price information.

■ **Manufacturers' assumption about search costs.** A third problem relates to Hahn and Singer's assumption about search costs. The important costs in the standard economic model are the costs of searching for lower prices across firms. The implicit assumption is that if a buyer finds a seller charging a lower price to its current customers, that new buyer would be charged that same price. In this model, the firm that was charging the lowest price would be delighted if buyers helped spread the word about a good deal. As we have already noted, the market for devices is characterized by different buyers' paying different prices to the same firm, and it is information about that kind of variation that sellers seek to suppress.

■ **How hospitals price and to whom they pass on the savings.** A fourth problem is Hahn and Singer's contention that noncompetitive hospital markets prevent any savings from using pricing information being passed on to consumers. The problem here is how hospitals price and to whom they pass on the savings.

In the abstract, even a monopolist lowers its price when its marginal costs fall; hospitals do seek to attract health maintenance organization (HMO) contracts and perhaps are concerned about the small fraction of the population with health

savings accounts (HSAs). Moreover, even if hospitals do not reduce their prices to payers, they might pass along the savings to physicians via gainsharing.

In gainsharing, the hospital elicits physicians' cooperation to negotiate lower device prices from manufacturers, use fewer devices per procedure, and reduce overall resources per case, and it promises to share the savings with physicians. Physicians can invest their share to make their clinical service more productive or state of the art. Given physicians' desire for such investments and the fact that most surgeons do not receive financial payments from manufacturers (that might swamp any gainsharing payments from hospitals), they may be more price-sensitive than patients in selecting medical devices in the presence of gainsharing arrangements.¹⁸ Indeed, recent evidence suggests that gainsharing reduces the prices hospitals pay for coronary stents, ostensibly as a result of the joint bargaining among hospitals and physicians.¹⁹

The Benefits Of Price Disclosure

What, then, is the benefit of price disclosure? We suggest that information on prices paid by different hospitals for similar products serves as a mechanism for hospitals to engage physicians in jointly negotiating with device manufacturers. Physicians may not be aware of how much devices cost, or how much of the hospital's reimbursement is consumed by device prices, or how big the price differences are between similar products made by alternative vendors. We do not want to overstate the case: the reorganization of physicians' roles in U.S. hospitals is too large a task to be accomplished only by better information on the prices of medical devices. Still, hospitals' purchasing managers believe that such information can motivate physicians to work with them to reduce prices paid and pricing variations. Without this information, physicians may be inclined to assume that satisfying their preferences adds little or nothing to their hospital's costs. What disclosure seeks to achieve is a change in physicians' purchasing behavior and loyalty to their preferred manufacturers.

In our view, actual or potential medical staff cooperation may also be linked to device makers' interest in enforcing nondisclosure. Following the advent of prospective payment, relatively few institutions have had cooperative medical staffs. Those that did found it helpful to have comparative information on transaction prices for devices, since management and medical staff alike wanted a low price; however, since only a small fraction had this preference, device firms did not bother to enforce contract provisions regarding confidentiality. Stated differently, most hospitals had low demand elasticity and therefore were charged higher prices, while only a few had high demand elasticity. Rising device and procedure costs, in tandem with pushback from insurers on raising reimbursements, changed this situation. More hospitals sought ways to cope, and more now seek cooperation with their staffs in opting for lower-price devices and seek data that allow them to determine whether their current price is low and where they might

find an even lower price. Device makers have responded to this spread of potentially higher demand elasticity by trying to make it harder for providers to search for lower prices or determine whether the prices charged them are high or low. This is at least a plausible explanation of recent events that additional research should confirm.

DESPITE THE INCREASED INTEREST in cooperation, hospitals are still disadvantaged in their bargaining with medical device manufacturers for several reasons enumerated above. The absence of disclosure of the range of prices—which may occur if manufacturers continue to take third-party information sources to court and hospital managements continue to acquiesce—does not seem to make sense. The pursuit of greater disclosure of average or median prices, such as envisioned in the proposed Senate legislation, also might not help, because it gives information only on central tendencies and not on the range of prices paid. What does make sense is for hospitals to improve their relationships with physicians and their contract negotiations with manufacturers. Hospitals can use the former to support the latter. In the end, hospitals may decide that information on whether they pay somewhat more or less than others for the same medical devices is not of great value. What is needed is a market test for the value of this information, and neither contract litigation nor federal legislation may be the best way to structure things.

NOTES

1. We analyzed hip implant prices for both acetabular and femoral components paid by different hospitals to the same manufacturer during 2005–2007, using published information collected by ECRI. Across all components and manufacturers, the minimum price paid was 28.5 percent below the average sales price in 2005. For 2006 and 2007, the minimum price was 32.4 percent and 25.9 percent below the average. HCPro, “Price Survey: Baby Boomers, Patient Education to Drive Hip Implants,” *Hospital Materials Management* 33, no. 1 (2008): 4–8.
2. J. Mantone, “Contracting Concerns: Disputes Threaten to Restrict Supply-Price Sharing,” *Modern Healthcare* (22 May 2006): 18; and P. DeJohn, “Materials Managers Caught in Sudden Vendor Crackdown on Sharing,” *Hospital Materials Management* 31, no. 7 (2006): 1–4.
3. *Ibid.*; and authors’ interviews with hospital materials managers. In principle, buyers could renegotiate sales agreements to delete these restrictions, possibly paying a penalty in the form of a higher price. No analysis we are aware of has discussed this alternative.
4. “Grassley, Specter Introduce Transparency in Medical Device Pricing Act,” Press Release, 23 October 2007, http://grassley.senate.gov/public/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=ce9ec99a-1321-0e36-ba48-fb44aebca994 (accessed 30 July 2008).
5. R.W. Hahn and H.J. Singer, *Is Greater Price Transparency Needed in the Medical Device Industry?* (Washington: Criterion Economics, 2007). They do not argue that contractual prohibitions on disclosure are a good thing.
6. B.M. Nudell, “BMET, SYK, and ZMH: Price Transparency Is a Major Threat” (New York: Sanford Bernstein and Co., 27 June 2006); and J. Scannell and L. Bedell, “Orthopaedics: Company Pricing Power Rests with Sticky Surgeons, Summary of Quantitative Switching Survey” (New York: Sanford Bernstein and Co., 29 February 2008).
7. L.R. Burns and J.A. Lee, “Hospital Purchasing Alliances: Utilization, Services, and Performance,” *Health Care Management Review* 33, no. 3 (2008): 203–215.
8. L.R. Burns et al., “Implant Manufacturers and Hospitals: Suitors Competing for the Attention of Orthope-

- dic Surgeons,” Poster session presented at Fourteenth Annual NRSA Trainees Conference, Washington, D.C., 7 June 2008.
9. Scannell and Bedell, “Orthopaedics”; and M. Hsu and F. Wise, “Orthopedics: Unique Market Dynamics Drive Steady Growth” (New York: Bear Stearns, May 2004).
 10. Although normative economic theory (the part of economics that deals with efficiency) and theories of legislation about competition have somewhat similar goals, the identity is not exact. The law is usually interpreted as seeking to improve static “consumer welfare,” presumably because the legal system favors consumers. Normative economics does not make that distributional assumption; it seeks economywide efficiency, and sometimes things that reduce consumer welfare may actually add to efficiency if they increase the welfare of suppliers (for example, scientists, physicians, nurses, stockholders, or managers). There are at least two normative considerations, one obvious and one less so. Neither has been part of the debate over price disclosure. The first normative consideration views the supply of innovative new products as having social and economic value even at the cost of higher prices for consumers in the short run. Approval of this trade-off is embodied in the patent system, which uses the government’s police power to enforce temporary monopolies to encourage the development of valuable intellectual property. Should policymakers think that inventors and developers of medical devices are subject to excessively strong incentives, the best solution would be to alter the terms of the patent system, rather than leave the incentives in place and then graft on arrangements to counter the incentives. The second normative consideration is that nondiscriminating monopoly is inefficient in economics not because it harms consumers but because it leads to inefficiently low levels of output of monopolized products. Paradoxically, the welfare cost of monopoly can be reduced if the monopolist can perfectly price discriminate, because price discrimination can lead to a large total volume of products sold. The efficiency advantage of discriminating monopoly is even greater if the products are produced under conditions where marginal cost is less than average cost (fixed costs in the short run and economies of scale in the longer run). Then discriminating monopoly can guarantee that the all-efficient products will be properly incentivized and brought to market—something that neither simply monopoly nor perfect competition can produce. T.J. Philipson and A.B. Jena, “Who Benefits from New Medical Technologies? Estimates of Consumer and Producer Surpluses for HIV/AIDS Drugs,” *Forum for Health Economics and Policy* 9, no. 2 (2006).
 11. There are alternative avenues available to hospitals to seek lower prices other than price disclosure. For example, hospitals may form or join a buyer’s cartel to confront a seller’s cartel. Then theory is nearly useless in predicting where the price will settle (other than based on vague appeal to “bargaining power and prowess”), but the net effect is usually to leave quantities sold inefficiently below the competitive level, as the buyer’s cartel holds down its purchases to exert pressure on the seller.
 12. L.R. Burns and R. Muller, “Hospital-Physician Collaboration: Landscape of Economic Integration and Impact on Clinical Integration,” *Milbank Quarterly* 86, no. 3 (2008): 375–434.
 13. Burns et al., “Implant Manufacturers and Hospitals.”
 14. This may help reduce the total cost of hospital care and ultimately increase consumer welfare (per our earlier discussion), although the impact on hospital prices is uncertain.
 15. J. Cromwell et al., *Medicare Participating Heart Bypass Center Demonstration: Volume I, Final Report* (Waltham, Mass.: Health Economics Research Inc., 1998).
 16. Gainsharing arrangements do this explicitly.
 17. Hahn and Singer argue that the search costs are small by virtue of group-purchasing organization contracts, product innovation quickly renders prices obsolete, market forces do not lead hospitals to pass along any price savings since hospitals operate in oligopolistic markets and do not purchase devices on the basis of price, and there is only limited evidence for pricing variation caused by non-volume-related factors. We believe that all four arguments are wrong, but that is a subject for another paper.
 18. Burns et al., “Implant Manufacturers and Hospitals.”
 19. J.D. Ketcham and M.F. Furukawa, “Hospital-Physician Gainsharing in Cardiology,” *Health Affairs* 27, no. 3 (2008): 803–812.