WARSAW, Ind. — Michael Shopenn’s artificial hip was made by a company based in this remote town, a global center of joint manufacturing. But he had to fly to Europe to have it installed.

Mr. Shopenn, 67, an architectural photographer and avid snowboarder, had been in such pain from arthritis that he could not stand long enough to make coffee, let alone work. He had health insurance, but it would not cover a joint replacement because his degenerative disease was related to an old sports injury, thus considered a pre-existing condition.

Desperate to find an affordable solution, he reached out to a sailing buddy with friends at a medical device manufacturer, which arranged to provide his local hospital with an implant at what was described as the “list price” of $13,000, with no markup. But when the hospital’s finance office estimated that the hospital charges would run another $65,000, not including the surgeon’s fee, he knew he had to think outside the box, and outside the country.

“That was a third of my savings at the time,” Mr. Shopenn said recently from the living room of his condo in Boulder, Colo. “It wasn’t happening.”

“Very leery” of going to a developing country like India or Thailand, which both draw so-called medical tourists, he ultimately chose to have his hip replaced in 2007 at a private hospital outside Brussels for $13,660. That price included not only a hip joint, made by Warsaw-based Zimmer Holdings, but also all doctors’ fees, operating room charges.
crutches, medicine, a hospital room for five days, a week in rehab and a round-trip ticket from America.

"We have the most expensive health care in the world, but it doesn't necessarily mean it's the best," Mr. Shopenn said. "I'm kind of the poster child for that."

As the United States struggles to rein in its growing $2.7 trillion health care bill, the cost of medical devices like joint implants, pacemakers and artificial urinary valves offers a cautionary tale. Like many medical products or procedures, they cost far more in the United States than in many other developed countries.

Makers of artificial implants — the biggest single cost of most joint replacement surgeries — have proved particularly adept at commanding inflated prices, according to health economists. Multiple intermediaries then mark up the charges. While Mr. Shopenn was offered an implant in the United States for $13,000, many privately insured patients are billed two to nearly three times that amount.

An artificial hip, however, costs only about $350 to manufacture in the United States, according to Dr. Blair Rhode, an orthopedist and entrepreneur whose company is developing generic implants. In Asia, it costs about $150, though some quality control issues could arise there, he said.

So why are implant list prices so high, and rising by more than 5 percent a year? In the United States, nearly all hip and knee implants — sterilized pieces of tool steel, plastic or ceramics — are made by five companies, which some economists describe as a cartel. Manufacturers tweak old models and patent the changes as new products, with ever bigger price tags.

Generic or foreign-made joint implants have been kept out of the United States by trade policy, patents and an expensive Food and Drug Administration approval process that deters start-ups from entering the market. The “companies defend this turf ferociously,” said Dr. Peter M. Cram, a physician at the University of Iowa medical school who studies the costs of health care.

Though the five companies make similar models, each cultivates intense brand loyalty through financial ties to surgeons and the use of a different tool kit and operating system for the installation of its products; orthopedists typically stay with the system they learned on. The thousands of hospitals and clinics that purchase implants try to bargain for deep discounts from manufacturers, but they have limited leverage since each buys a relatively small quantity from any one company.

In addition, device makers typically require doctors’ groups and hospitals to sign nondisclosure agreements about prices, which means institutions do not know what their competitors are paying. This secrecy erodes bargaining power and has allowed a small industry of profit-taking middlemen to flourish: joint implant purchasing consultants, implant billing companies, joint brokers. There are as many as 13 layers of vendors between the physician and the patient for a hip replacement, according to Kate Willhite, a former executive director of the Manitowoc Surgery Center in Wisconsin.

Hospitals and orthopedic clinics typically pay $4,500 to $7,500 for an artificial hip, according to MD Buyline and Orthopedic Network News, which track device pricing. But those numbers balloon with the cost of installation equipment and all the intermediaries’ fees, including an often hefty hospital markup.

That is why the hip implant for Joe Catugno, a patient at the Hospital for Joint Diseases in New York, accounted for nearly $37,000 of his approximately $100,000 hospital bill; Cigna, his insurer, paid close to $70,000 of the charges. At Mills-Peninsula Health Services in San Mateo, Calif., Susan Foley’s artificial knee, which costs about the same as a hip joint, was
billed at $26,000 in a total hospital tally of $112,317. The components of Sonja Nelson’s hip at Sacred Heart Hospital in Pensacola, Fla., accounted for $30,581 of her $50,935 hospital bill. Insurers negotiate discounts on those charges, and patients have limited responsibility for the differences.

The basic design of artificial joints has not changed for decades. But increased volume — about one million knee and hip replacements are performed in the United States annually — and competition have not lowered prices, as would typically happen with products like clothes or cars. “There are a bunch of implants that are reasonably similar,” said James C. Robinson, a health economist at the University of California, Berkeley. “That should be great for the consumer, but it isn’t.”

‘Sticky Pricing’

The American health care market is plagued by such “sticky pricing,” in which prices of products remain high or even increase over time instead of dropping. The list price of a total hip implant increased nearly 300 percent from 1998 to 2011, according to Orthopedic Network News, a newsletter about the industry. That is a result, economists say, of how American medicine generally sets charges: without government regulation or genuine marketplace competition.

“Manufacturers will tell you it’s R&D and liability that makes implants so expensive and that they have the only one like it,” said Dr. Rory Wright, an orthopedist at the Orthopedic Hospital of Wisconsin, a top specialty clinic. “They price this way because they can.”

Zimmer Holdings declined to comment on pricing. But Sheryl Conley, a longtime Zimmer manager who is now the chief executive of OrthoWorx, a local trade group in Warsaw, said that high prices reflected the increasing complexity of the joint implant business, including more advanced materials, new regulatory requirements and the logistics of providing a now huge array of devices. “When I started, there weren’t even left and right knee components,” she said. “It was one size fits all.”

Mr. Shopenn’s Zimmer hip has transformed his life, as did the replacement joint for Mr. Catugno, a TV director; Ms. Foley, a lawyer; and Ms. Nelson, a software development executive. Mr. Shopenn, an exuberant man who maintains a busy work schedule, recently hosted his son’s wedding and spent 26 days last winter teaching snowboarding to disabled people.

His joint implant and surgery in Belgium were priced according to a different logic. Like many other countries, Belgium oversees major medical purchases, approving dozens of different types of implants from a selection of manufacturers, and determining the
allowed wholesale price for each of them, for example. That price, which is published, currently averages about $3,000, depending on the model, and can be marked up by about $180 per implant. (The Belgian hospital paid about $4,000 for Mr. Shopenn’s high-end Zimmer implant at a time when American hospitals were paying an average of over $8,000 for the same model.)

“The manufacturers do not have the right to sell an implant at a higher rate,” said Philip Boussauw, director of human resources and administration at St. Rembert’s, the hospital where Mr. Shopenn had his surgery. Nonetheless, he said, there was “a lot of competition” among American joint manufacturers to work with Belgian hospitals. “I’m sure they are making money,” he added.

Dr. Cram, the Iowa health cost expert, points out that joint manufacturers are businesses, operating within the constraints of varying laws and markets.

“Imagine you’re the C.E.O. of Zimmer,” he said. “Why charge $1,000 for the implant in the U.S. when you can charge $14,000? How would you answer to your shareholders?” Expecting device makers “to do otherwise is like asking, ‘Couldn’t Apple just charge $50 for an iPhone?’ because that’s what it costs to make them.”

But do Americans want medical devices priced like smartphones? “That,” Dr. Cram said, “is a different question.”

A Miracle for Many

When joint replacement surgery first became widely used in the 1970s, it was reserved for older patients with crippling pain from arthritis, to offer relief and restore some mobility. But as technology and techniques improved, its use broadened to include younger, less debilitated patients who wanted to maintain an active lifestyle, including vigorous sports or exercise.

In the first few decades, implants were typically cemented into place. But since the 1980s, many surgeons have used implants made of more sophisticated materials that allow the patient’s own bone to grow in to hold the device in place. For most patients, implants have proved miraculous in improving quality of life, which is why socialized medical systems tend to cover them. Per capita, more hip replacements are done in Britain, Sweden and the Netherlands, for example, than in the United States.

Motivated in part by science and in part by the need to create new markets, joint makers churn out new designs that are patented, priced higher and introduced with free training courses for surgeons. Some use more durable materials so that a patient requiring a hip
implant at age 40 or 50 might rely on it longer than the standard 20 years, while other models are streamlined and require smaller incisions.

Zimmer got a big sales bump a few years ago when it began promoting its new “female knee,” a slightly slimmer version of its standard design, in an advertising campaign directed at patients. Hospitals on average pay about $800 more to buy the gender-specific knee implants, according to MD Buyline.

Many doctors say that for most patients, older, standard implants with a successful track record are appropriate. Expensive modifications make no difference for the typical patient, but they drive up prices for all models and have sometimes proved to be deeply flawed, they say.

In the last few years, joint manufacturers have faced lawsuits and have settled claims with patients after new, all-metal implants, which were meant to be more durable than the standard version, had unusually high failure rates. As for those “female knees,” a study featured at the meeting of the American College of Orthopedic Surgeons this year concluded, “While we certainly use the female components frequently in surgery, we don’t detect any objective improvement in clinical outcomes.”

That is why Dr. Scott S. Kelley, an orthopedist affiliated with Duke University Medical Center, generally tries to dissuade patients who request “new, improved” joints. “I tell them: ‘That’s taking a big risk for the potential of a few percentage points of improvement. You wouldn’t invest your retirement account this way.’”

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**A Town’s Lifeblood**

The power and profits of the medical device industry are on display here in Warsaw, which has trademarked itself the Orthopedic Capital of the World. Four of the big five joint manufacturers in the world are based in the United States; the other is in Britain. Three of these giants — Zimmer, Biomet and DePuy, a division of Johnson & Johnson — have their headquarters here, a town of 14,000.

An industry that began as a splint-making shop in 1895 has made Warsaw the center of a global multibillion-dollar business. The companies based here produce about 60 percent of
the hip and knee devices used in the United States and one-third of the world's orthopedic sales volume, local officials said. Nearly half the jobs in Kosciusko County, where Warsaw is, are tied to the industry. Residents joke that a mixed marriage is when one spouse works for Zimmer and the other for DePuy.

The industry's benefits are evident. The county has the lowest unemployment rate in Northern Indiana, and the median family income of $50,000 puts it significantly above the state average. The town boasts lush golf courses and streets lined with spacious homes. The lobby of the elegant City Hall, which is in a restored 1912 bank, features plaques about device manufacturers.

"We eat, sleep and breathe orthopedics," said Ms. Conley of OrthoWorx, which she said was set up to "plan for the future of the orthopedic industry here." OrthoWorx's board of directors includes executives from Biomet and DePuy.

With a high-tech industry as its lifeblood, Ms. Conley said, Warsaw needed to attract engineers and doctors from afar and train local youths for "the business." It has upgraded the public schools and helped create programs at local colleges in orthopedic regulation and advanced machinist techniques.

Officials at OrthoWorx say the device makers do not discuss "competitive issues" among themselves, including the prices of implants, even as employees stand together watching their children play baseball. Still, it is in everyone's interest not to undercut the competition. In 2011, all three manufacturers had joint implant sales exceeding $1 billion and spent about only 5 percent of revenues on research and development, compared with 20 percent in the pharmaceutical industry, said Stan Mendenhall, the editor of Orthopedic Network News. They each paid their chief executives over $8 million.

"It's amazing to think there is $5 billion to $6 billion going through this little place in Northern Indiana," said Mr. Mendenhall, adding that the recession has meant only single-digit annual revenue growth rather than the double-digit growth of the past.

Device makers have used some of their profits to lobby Congress and to buy brand loyalty. In 2007, joint makers paid $311 million to settle Justice Department accusations that they were paying kickbacks to surgeons who used their devices; Zimmer paid the biggest fine, $169.5 million. That year, nearly 1,000 orthopedists in the United States received a total of about $200 million in payments from joint manufacturers for consulting, royalties and other activities, according to data released as part of the settlement.

Despite that penalty, payments continued, according to a paper published in The Archives of Internal Medicine in 2011. While some of the orthopedists are doing research for the companies, the roles of others is unclear, said Dr. Cram, one of the study's authors.

Although only a tiny percentage of orthopedists receive payments directly from manufacturers, the web of connections is nonetheless tangled.

Companies "build a personal relationship with the doctor," said Professor Robinson, the Berkeley economist. "The companies hire sales reps who are good at engineering and good at golf. They bring suitcases into the operating room," advising which tools might work best among the hundreds they carry, he said. And some studies have shown that operations attended by a company representative are more likely to use more and costlier medical equipment. While some hospitals have banned manufacturers' representatives from the operating room, or have at least blocked salesmanship there, most have not.
There are, of course, a number of factors that explain why Mr. Shopenn’s surgery in Belgium would cost many times more in the United States. In America, fees for hospitals, scans, physical therapy, and surgeons are generally far higher. And in Belgium, even private hospitals are more Spartan.

When Mr. Shopenn arrived at the hospital, he was taken aback by the contrast with NewYork-Presbyterian Hospital, where his father had been a patient a year before. The New York facility had “comfortable waiting rooms, an elegant lobby and newsstands,” Mr. Shopenn remembered.

But in Belgium, he said, “I was immediately scared because at first I thought, this is really old. The chairs in the waiting rooms were metal, the walls were painted a pale green, there was no gift shop. But then I realized everything was new. It was just functional. There wasn’t much of a nod to comfort because they were there to provide health care.”

St. Rembert’s, the private hospital in Belgium where Mr. Shopenn had his hip replaced for $13,660. Thomas Vanden Driessche for The New York Times

The pricing system in Belgium does not encourage amenities, though the country has among the lowest surgical infection rates in the world — lower than in the United States — and is known for good doctors. While most Belgian physicians and hospitals are in business for themselves, the government sets pricing and limits profits. Hospitals get a fixed daily rate and surgeons receive a fee for each surgery, which are negotiated each year between national medical groups and the state.

While doctors may charge more than the rate, few do so because most patients would refuse to pay it, said Mr. Boussaou, the hospital administrator. Doctors and hospitals must provide estimates. European orthopedists tend to make about half the income of their American counterparts, whose annual income averaged $442,450 in 2011, according to a survey by the Commonwealth Fund, a foundation that studies health policy.

Belgium pays for health care through a mandatory national insurance plan, which requires contributions from employers and workers and pays for 80 percent of each treatment. Except for the poor, patients are generally responsible for the remaining 20 percent of charges, and many get private insurance to cover that portion.

Mr. Shopenn’s surgery, which was uneventful, took place on a Tuesday. On Friday he was transferred for a week to the hospital’s rehabilitation unit, where he was taught exercises to perform once he got home.

Twelve days after his arrival, he paid the hospital’s standard price for hip replacements for foreign patients. Six weeks later he saw an orthopedist in Seattle, where he was living at the time, to remove stitches and take a postoperative X-ray. “He said there was no need for further visits, that the hip looked great, to go out and enjoy myself,” Mr. Shopenn said.

With baby boomers determined to continue skiing, biking and running into their 60s and beyond, economists predict a surge in joint replacement surgeries, and more

Staying Active

The number of hip replacements has risen
procedures for younger patients. The number of hip and knee replacements is expected to roughly double between 2010 and 2020, according to Exponent, a scientific consulting firm, and perhaps quadruple by 2030. If insurers paid $36,000 for each surgery, a fairly typical price in the commercial sector, the total cost would be $144 billion, about a sixth of the nation’s military budget last year.

So far, attempts to bring down the price of medical devices have been undercut by the industry.

When Dr. Daniel S. Elliott of the Mayo Clinic decided to continue using an older, cheaper valve to cure incontinence because studies showed that it was just as good as a newer, more expensive model, the manufacturer raised its price.

“If there was a generic, I’d be there tomorrow,” he said.

With artificial joints, cost-trimming efforts have been similarly ineffective. Medicare does not negotiate directly with manufacturers, but offers all-inclusive payments for surgery to hospitals to prompt them to bargain harder for better implant prices. Instead, hospitals complain that acquiring the implant consumes 50 percent to 70 percent of Medicare’s reimbursement, which now averages $12,099, up 25 percent from $9,645 in 1993. Meanwhile, surgeons’ fees have dropped by nearly half.

With the federal government unwilling to intervene directly, some doctors and insurance plans are themselves trying to reduce the costs by mandating preset prices or forcing more competition and transparency.

After concluding that hip replacements billed at $100,000 yielded no better results than less expensive ones, the California Public Employees’ Retirement System, or Calpers, told members that it would pay hospitals $30,000 for a hip or knee replacement, and dozens of hospitals have met that number.

Dr. Wright’s orthopedic hospital near Milwaukee has driven down payments for joints by more than 30 percent by resolving to use only two types of hip implants and requiring blind bids directly from the manufacturers; part of the savings is passed on to patients.

The Affordable Care Act tries to recoup some of the medical device manufacturers’ profits by imposing a 2.3 percent tax on their revenues, effective this year. But Brad Bishop, the executive director of OrthoWorx and a former Zimmer executive, said that the approach would harm an innovative American industry, and that the cost would ultimately be borne by joint replacement patients “whose average age is 67.” He argued that the best way to reduce the cost of joint replacement surgery was to rescind the tax and decrease government interference.

The medical device industry spent nearly $30 million last year on lobbying, according to the Center for Responsive Politics. The Senate moved to repeal the tax, and the House is expected to take it up this fall. The bill’s supporters included both senators from Indiana.

Mr. Shopenn’s new hip worked so well that a few months after returning from Belgium he needed a hernia operation — a result of too much working out at the gym. He was home by 4 p.m. the day of the outpatient surgery, but the bill came to $16,500. Though his insurance company covered the procedure, he called the hospital’s finance department for an explanation.

He remembers in particular a “surreal” discussion with a “very nice” administrator about a $750 bill for a surgical drain, which he called “a piece of plastic in a sealed bag.”
"It was mind-boggling to me that the surgery could possibly cost this much," he said, "after what I'd just done in Belgium."