**Integrated Healthcare Association**
**Medical Device Value Assessment and Purchasing (VAP) Project**

Summary Report on Pilot Project, 2006-08

## Executive Summary

In May 2006, the Integrated Healthcare Association (IHA) completed a two-year project in Orange County on assessment and purchasing strategies for orthopedic, spine and cardiac devices. The key objective of this project was to better understand challenges to market efficiency with respect to purchasing these devices and to promote strategies that would help hospital systems address these challenges. IHA also sought to develop the organizational capabilities to collect and compare data across health systems, and to develop benchmarks that can be scaled to cover the entire state.

There were three primary components to the project:

- Working a third-party data consultant, IHA collected 2006 patient-level data from three participating health systems representing 13 hospitals in the Orange County area. These data were aggregated to calculate average implant cost, procedure costs and revenues, and other indicators. Project reports compared individual facility results to other participating hospitals and to the benchmark results.
- In cooperation with the California Hospital Association (CHA), IHA surveyed California hospitals on their adoption of various purchasing strategies considered to be "best practice," for example, disclosing and limiting physician conflicts of interest in device selection.
- IHA and CHA co-sponsored a Medical Device Conference bringing together leaders from the hospital, medical device, physician and insurance sectors to discuss ways to improve coordination and align financial incentives for these high-value medical devices.

Significant variation in average implant costs exists both within and among health systems. Considerable variance also exists in payment rates for similar procedures across the principal types of insurers covering these procedures, e.g. traditional Medicare, Medicare Advantage and commercial HMO and PPO insurers. Combined, these translate into differences between facilities in financial contribution margins for the procedures, overall and by type of insurer. Variation did not result from differences in case-mix.

The statewide survey showed a strong majority of hospitals are now sharing price information with physicians and have limited the number of vendors used for device purchases. About half have implemented technology assessment committees, require physician disclosure of conflicts of interest and set price caps on devices.

Based on its success in Orange County, IHA has been awarded a second two-year project grant from the Blue Shield of California Foundation. This grant will allow IHA to expand its data collection effort—at no charge to participating facilities—to hospitals across the state. The grant will additionally support the continuing collaborative effort between IHA and California hospital leaders to promote adoption of best practice purchasing strategies.

## Project Overview

High-profile medical devices such as cardiac and orthopedic implants offer significant clinical benefits when used appropriately but create financial and strategic challenges to the health care system. Prices for medical devices have been rising at rates substantially higher than reimbursements from Medicare, are marketed to surgeons by vendors using a variety of financial incentives, are difficult to compare across facilities due to contractual confidentiality clauses that inhibit transparency, and are placing financial strains on hospitals, health plans, and ultimately on consumers who use their services.

In an effort to better understand the key issues facing the assessment and adoption of new medical technology, IHA launched the Value Assessment and Purchasing project (VAP) in 2006. Its central objective was to assess the challenges impeding market efficiency in device-intensive services, including data needs and misaligned financial incentives, to collect benchmark data on performance in one geographic locale, and to develop the organizational capabilities needed to scale the VAP project to the entire state. The first part of the project focused on the most-common and best-available hospital data systems and the relationships among them. The goal of this component was to identify opportunities for improving data quality and comparability, promote the ability of disparate data systems to communicate with one another, and create benchmarks for performance. The second part of the project focused on increasing awareness on the part of hospitals and physicians in the variability of prices, costs, revenues and profitability, and the potential gains from closer physician-hospital cooperation.

IHA recruited three health systems to participate in this pilot demonstration. The first was a five-facility hospital system in Long Beach and Orange County, another had three facilities in Orange County, and a final participant with five facilities in Orange County. IHA contracted with a third-party data consultant, Aspen Health Metrics, to collect and aggregate patient-level data from each of the participating hospitals. The IHA team worked closely with Aspen to create a reporting framework that would ensure an "apples-to-apples" comparison of joint, spine, and cardiac procedures at each facility. Once a benchmark template was created for each procedure using diagnostic-related groups (DRGs) and ICD-9-CM procedure codes, sample reports were shared with orthopedists, cardiologists, and management teams at each of the health systems.

Through their participation in the VAP project, hospitals had the ability to (1) compare the cost of the medical device implants, total costs, and reimbursements with national and local benchmarks; (2) access best practice strategies for device management and hospital-physician collaboration, and (3) facilitate discussions with their administrative and physician teams using a reporting structure designed by a neutral third-party.

## Data Collection and Analysis

### Targeted Procedures and Performance Metrics

Project participants were able to compare cost, utilization, and clinical indicators for total joint, cardiac, and spine procedures involving 8,635 procedures in their hospitals. By comparison, for all hospitals in California in 2006, 152,000 of these procedures were performed.

**Table 1—Targeted Procedures**

| | |
|---|---|
| **Cardiovascular Surgery** | |
| DRG 104 | Cardiac Valve with Cardiac Cath |
| DRG 105 | Cardiac Valve without Cardiac Cath |
| | |
| **Orthopedic Surgery** | |
| DRG 544<br>ICD-9-CM: 81.51 | Major Joint & Limb Reattachment Procedures of Lower Extremity – Total Hip Replacement |
| DRG 544<br>ICD-9-CM: 81.52 | Major Joint & Limb Reattachment Procedures of Lower Extremity – Partial Hip Replacement |
| DRG 544<br>ICD-9-CM: 81.54 | Major Joint & Limb Reattachment Procedures of Lower Extremity – Total Knee Replacement |
| DRG 545<br>ICD-9-CM: 81.53 | Hip Revisions |
| DRG 545<br>ICD-9-CM: 81.55 | Knee Revisions |
| | |
| **Spine Surgery** | |
| DRG 498 | Spinal Fusion Except Cervical w/o CC – Lumbar Fusion |
| DRG 520 | Cervical Spine Fusion w/o CC |
| | |
| **Cardiac Rhythm Management** | |
| DRG 515 | Cardiac Defibrillator Implant w/o Cardiac Cath |
| DRG 551 | Permanent Pacemaker Implant w MCV Dx or AICD Lead or Generator |
| DRG 552 | Other Permanent Pacemaker Implant w/o MCV Dx |
| | |
| **Interventional Cardiac Procedures** | |
| DRG 557 | Percutaneous Cardiovascular Procedures w DES w MCV Dx |
| DRG 558 | Percutaneous Cardiovascular Procedures w DES w/o MCV Dx |

Participants were able to examine variations within and among health systems, as well as compare themselves against a national benchmark. Indicators of interest included average implant cost per case, average implant cost as a percentage of total reimbursement, supply costs, total variable costs, length of stay, reimbursement by payer, and contribution margin by payer.

**Table 2--Reported Performance Metrics**

- Annual number of procedures in each hospital
- Procedure costs
  - Total variable costs associated with each type of procedure
  - Implant cost
  - Supply cost
  - Pharmacy and IV cost
  - Other costs per case

**Table 2--Reported Performance Metrics**

- Implant cost per case by implant vendor (manufacturer)
- Reimbursement per case
  - Medicare fee-for-service
  - Medicare HMO
  - Commercial HMO/PPO
- Contribution margin (profit, not accounting for hospital overhead expenses)
  - Medicare fee-for-service
  - Medicare HMO
  - Commercial HMO/PPO
- Implant costs as % of total variable costs
- Implant costs as % of total reimbursement per case
- Utilization
  - Length of stay
  - Medicare length of stay
- Clinical and demographic indicators
  - Average patient severity of illness
  - Co-morbidity
  - Complications rate
  - Mortality
  - Other measures of case mix severity
  - Average patient age

## Example: Total Hip Replacement

Attachment A provides an example of one project report, displaying actual data for DRG 554 [ICD-9-CM 81.51]: Total Hip Replacement. This report illustrates the variation found across hospitals in costs, utilization, reimbursement, and other dimensions of performance. Total hip replacement excludes the partial replacement or resurfacing of diseased hips and the replacement of failed replacements from earlier surgeries (secondary replacement).

Taking Hospital A as an example, the report shows the importance of the implant itself in the cost structure and ultimately in the financial performance of hip replacement. Average variable costs for primary hip replacement are $10,527, of which almost half, $5,061, are comprised of the implant components themselves. Total procedure and implant costs are much higher for the same surgery in some other nearby facilities, for example in Hospital J ($19,197 and $11,606).

Within Hospital A, costs per implant (implants in hip replacement technically are composites with multiple components) range from a low of $4025 per patient for Vendor 3 up to $5,600 for Vendor 7. This hospital gives the largest market share (48%) to its highest-cost vendor. The range in device costs across vendors is substantially greater in some hospitals. In Hospital J, for example, average device costs range from a low of $7062 to a high of $12,001 with the high-priced vendor again receiving the largest market share. It is evident from these numbers that market shares are driven by physician rather than by hospital management preferences.

There is considerable variance in payment rates for similar procedures across the principal types of insurers covering total hip replacement, including traditional (fee-for-service) Medicare, Medicare Advantage (Medicare HMOs), and commercial HMO and PPO insurers. In Hospital

A, the Medicare HMOs contract for substantially lower reimbursement rates than the hospitals obtain from fee-for-service Medicare (which pays on the basis of Diagnosis Related Groups) or from commercial insurers. In many of the other hospitals, the greatest divergence is between commercial insurance and Medicare, with hospitals able to extract much higher payment rates from commercial plans than they can obtain from either traditional Medicare or Medicare Advantage. In Hospital J, for example, the average reimbursement per case from commercial insurers is $31,052, compared to $12,057 from fee-for-service Medicare and $17,189 from Medicare Advantage plans. It should be noted that these hospitals also receive hip replacement patients covered by other forms of payment, including Medicaid, uninsured (self-pay), and miscellaneous payers such as workers compensation.

Differences among hospitals in levels of costs and reimbursements translate into differences in financial contribution margins, overall and by type of insurer.[1] Hospital A is able to obtain a favorable contribution margin from Medicare fee-for-service ($4270) as well as commercial insurers ($4653), while Hospital J, for example, obtains a very attractive contribution margin of $12,080 from commercial insurers but loses an average of $8244 on fee-for-service Medicare patients (not even accounting for overhead expenses). As a group, these hospitals earn modest contribution margins from traditional Medicare, lose money even at the variable cost level on Medicare Advantage, and reap substantial positive margins on commercially insured patients receiving total hip replacements.

The differences among hospitals are due to many factors, but do not seem tied to differences in case mix. Case mix severity, measured in terms of various different indexes and indicators, does not vary substantially across these hospitals (although of course severity varies substantially among individual patients). None of these facilities is an academic medical center that receives substantial referrals of especially ill patients. Finally, primary hip replacement is a procedure where severity does not vary as much as in, for example, secondary hip replacement (surgery after failure of primary replacement).

The differences observed between Hospital A and Hospital J, for example, may be due in part to the substantially larger volume of procedures in the former (as well as to contracting strategies that differ among systems). Comparing Hospital A with Hospital E, each with similar scale, reveals other differences. In particular, Hospital E is able to obtain substantially higher reimbursements per case from commercial insurers, and hence earns a much higher contribution margin per case for commercially insured patients ($16,927) and average reimbursement rate for all patients ($17,082) than does Hospital A ($4,653 and $14,439, respectively).

## Device Management Strategies Used by Hospitals

The VAP project studied the range of strategies employed by participating hospitals, and by other hospitals in the state, to improve the efficiency and quality of the device-intensive

[1] Contribution margin measures the difference between reimbursement and variable costs for each patient. It does not account for the need on the part of the hospital to cover its overhead administrative costs (except those that can be assigned to particular clinical departments). The measure also excludes hospital losses from services provided to uninsured patients and to patients covered by Medicaid (which pays at very low levels).

orthopedic, spine, and cardiac procedures included in the project's purview. This assessment included meetings with administrative and clinical leaders, review of existing documentation, discussions with industry consultants, and a statewide survey of hospital executives (conducted jointly with the California Hospital Association). It was immediately evident that hospitals varied considerably in the breadth and depth of the management attention paid to medical devices, with some evincing a high level of sophistication while others were at the early stages of gathering data and ideas.

Challenges and strategic responses included:

1. **Adoption of system-wide contracting:** Some hospital systems contract with device vendors on a system-wide basis, while others permit individual hospitals to contract individually. This clearly reflects larger dimensions of the systems' structure and strategy, especially the extent to which they sought to develop a common governance structure and economies of scale in operations. With the limited information received, it was not possible to evaluate the impact of system-wide contracting, but informal discussions suggested that those able to contract on a system level did achieve scale economies to obtain more favorable treatment from manufacturers and distributors.

2. **Physician engagement:** There was a wide variation in physician engagement with hospital supply chain management and in price negotiations with the device manufacturers. Although the principal decision maker in device selection, the surgeon does not pay for the implant and rarely has interest in the product costs involved. Many hospitals seek to present comparative data on implant prices, costs, and reimbursement to their surgeons as a first step toward physician engagement, but find providing apples-to-apples comparisons is challenging, requiring sophisticated adjustments for product and clinical differences.

3. **Physician conflicts of interest.** There is a high degree of concern for conflicts of interest among members of the medical staffs, who frequently earn significant sums as consultants for the device companies whose products they favor. Only in hospitals where the physicians are members of multispecialty group practices, and where the group practice has an understanding of device cost issues, is it possible to limit consulting arrangements. Elsewhere, hospitals are interested in disclosure of consulting arrangements, both from the physicians themselves and from the device vendors (as a condition of contracting). There is strong push-back against these efforts.

4. **Device price transparency.** Many device firms have inserted price confidentiality clauses into their contracts with hospitals, often in obscure locations such as on invoices that do not come to the attention of senior management but which can be enforced once paid. These confidentiality clauses prevent hospitals from disclosing the prices paid for individual device components to any third party, including GPOs, consultants, health insurance plans, surgeons on their medical staffs, and patients. There has been litigation and threats of litigation concerning the enforceability of these clauses, which are of high concern among hospital administrators in California. Selected hospitals are seeking to purge these clauses from all contracts, but are encountering considerable resistance.

5. **Technology Assessment Committees**: Some hospitals have multidisciplinary committees composed of surgeons, administrators, and sometimes representatives from their GPO to assess the clinical value and cost added by new medical technologies, including devices. These committees do not conduct technology assessment of the data-intense style used by FDA and by CMS and private insurers for coverage. Rather, they provide a forum for the surgeons to talk amongst themselves about the clinical value and economic cost of items that vendors bring into the facility (or that a physician proposes using after being exposed to the technology at a conference). The greatest value to these committees may be cultural, in fostering a sense among the surgeons that choice of device is a matter of legitimate concern to all the medical staff and to the hospital, and not merely a personal choice for the individual surgeon (especially in the presence of consulting relationships).

6. **Price cap**: Some hospitals set a price cap by type of device and allow all vendors to sell into the facility. This avoids the need to interfere with surgeon device preferences and the related factors including training and consulting relationships. However, price caps can create an incentive for vendors to restrict marketing of newer devices.

7. **Vendor-limitation:** Some health systems limit the number of vendors with whom they contract for a particular class of device in order to pursue volume discounts. This strategy generates considerable push-back from surgeons who must change to another vendor and may result in fewer price concessions by incumbent vendors in subsequent round of contracting (to the extent they view their incumbency as secure from competition).

8. **Vendor presence in the OR:** Surgeons are dependent on vendor sales representatives to be present in the operating rooms and cath labs to explain recent modifications in device components, instrumentation, and features. This presence gives vendor reps an opportunity to suggest use of higher-priced, typically newer, devices even if these have not been shown to offer clinical improvements. Personal relationships often develop between the physicians and the vendor reps, which complicate efforts by hospital administration to manage supply chain costs. Some hospitals seek to clearly identify who in the OR is a hospital employee, who a member of the medical staff, and who is a device vendor, using different colors in the surgical gowns. One system is considering directly training an OR medical device technician who would provide on-site help with device functionality while being a hospital employee, trained by the contracted vendors on the latest technology.

## Survey of Device Management Strategies

In the fall of 2007, IHA and the California Hospital Association (CHA) jointly sponsored an online survey of hospital executives. Survey questions were designed to elicit information on the strategies they have chosen to manage supply costs and foster cooperation with physicians and surgeons around the selection of orthopedic and cardiac implants. The Chief Executive and Chief

Financial Officers of CHA member hospitals were invited to respond. IHA received 55 responses from individuals representing 88 hospitals, 38% of the 232 hospitals in California with an orthopedic and/or cardiac service line.

Tables 3 and 4 display survey results for general practices and for those practices which may vary by device type. Results indicate a strong majority of hospitals have taken steps to share device price information with physicians, and have attempted to limit the number of vendors used for device purchases. About half have implemented technology assessment committees, required physician disclosure of conflicts of interest and set price caps on devices.

**Table 3—General Strategies**

| Current Hospital Medical Device Strategy | % of CA Hospitals |
|---|---|
| Technology assessment committee | 55% |
| Pre-approval needed before vendor receives payment | 36% |
| Share device prices with MDs | 84% |
| Invest savings (from lower costs) in OR | 36% |
| Disclose MD conflicts of interest | 47% |
| Limit MD conflicts of interest | 20% |

**Table 4—Practices that Vary by Device Type**

| | Total Joint Replacement | Cardiac | Spine |
|---|---|---|---|
| Limit # of Vendors | 69% | 74% | 65% |
| Set a price-cap on devices | 45% | 45% | 43% |
| Kit pricing | 44% | 36% | 33% |
| Premium use rebates | 44% | 5% | 8% |

## Medical Device Conference, May 2008

IHA and the California Hospital Association co-sponsored the 2008 Medical Device Conference to bring together leaders from the hospital, medical device, physician, and insurance sectors to discuss ways to improve coordination and align incentives among the principal stakeholders in the technology-intensive services. The forum allowed stakeholders to discuss opportunities for improved clinical processes, supply chain management techniques, and support policy reform, and to learn more about the potential challenges and return for implementing the types of device management strategies discussed above.

Topics covered by the conference's 30 speakers included: orthopedic and cardiac service lines and registries, comparative efficacy evaluation, conflicts of interest, price transparency, and aligning financial incentives between surgeons and hospitals. The conference agenda and all speaker slides are available at www.iha.org/events.

## Future Activities

IHA has received authorization from its Board of Directors and financial support from the Blue Shield of California Foundation (BSCF) to extend and expand the VAP program. The new VAP program will have three principal components. (1) Extend performance data collection, analysis, and comparison statewide through 2010, (2) expand the identification and analysis of strategies supply chain management and improved physician-hospital collaboration, and (3) pilot of new payment method from health plans to the physicians and hospitals that provide device-intensive procedures, using bundled "episode of care" principles.

**DRG 554 [ICD-9-CM 81.51]: Total Hip**

**Attachment A**

| | National Benchmark | IHA Benchmark | Hospital A | Hospital B | Hospital C | Hospital D | Hospital E | Hospital F | Hospital G | Hospital H | Hospital I | Hospital J | Hospital K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Annual Volume** | 27 | 107 | 153 | 121 | 267 | 283 | 157 | 107 | 45 | 61 | 54 | 40 | 19 |
| **COST** | | | | | | | | | | | | | |
| **Total Variable Cost per Case** | $10,709 | $11,587 | $10,527 | $10,162 | $10,367 | $10,542 | $9,919 | $12,008 | $17,988 | $11,587 | $14,559 | $19,197 | $13,029 |
| **Implant Cost per Case** | $5,865 | $5,944 | $5,061 | $5,205 | $5,944 | $5,280 | $5,201 | $5,311 | $8,853 | $6,444 | $8,300 | $11,606 | $8,481 |
| Supply Cost per Case | $754 | $955 | $591 | $702 | $759 | $823 | $772 | $1,054 | $2,346 | $1,154 | $1,776 | $2,086 | $955 |
| Pharmacy & IV Variable Cost Per Case | $454 | $501 | $680 | $443 | $352 | $501 | $452 | $608 | $1,019 | $468 | $389 | $610 | $512 |
| Other Cost per Case | $3,490 | $3,939 | $4,194 | $3,811 | $3,392 | $3,939 | $3,494 | $5,036 | $5,770 | $3,521 | $4,094 | $4,897 | $3,082 |
| **Implant Cost by Type of Implant*** | | | | | | | | | | | | | |
| Implant Cost per Case - Porous | | | $5,055-66% | $4,100-26% | $4,567-35% | U | U | U | U | $6,519 | U | U | U |
| Implant Cost per Case - Metal on Metal | | | $5,540-5% | $5,754-51% | $7,483-51% | U | U | $6,350-5% | U | NA | U | U | U |
| Implant Cost per Case - Ceramic on Ceramic | | | $5,700-18% | $5,700-18% | $0-0% | U | $6,680-3% | U | U | $5,761 | U | U | U |
| **Implant Cost and Market Share by Vendor**** | | | | | | | | | | | | | |
| Vendor 1 | | | | | | $7577-1% | | | | | $6,857-11% | $9,941-2% | |
| Vendor 2 | | | $5140-25% | $5800-2% | $6700-55% | $5191-76% | | $6423-24% | $10,581-37% | | $9,075-30% | $12,001-87% | |
| Vendor 3 | | | $4025-13% | | $4500-36% | | | | | | $7,425-5% | | $8,358-73% |
| Vendor 4 | | | $4100-2% | | | $5952-3% | $3206-1% | | $9,167-6% | $5,129-44% | $7,672-29% | | |
| Vendor 5 | | | $4945-12% | $5125-48% | | $4965-20% | $5006-94% | $4463-10% | $11,046-6% | | $9,283-25% | $7,062-3% | |
| Vendor 6 | | | | $5700-50% | | | | | | | | | |
| Vendor 7 | | | $5600-48% | | $4350-9% | | $5522-5% | $4630-66% | $8,056-51% | $8,035-56% | | $10,546-8% | $8,816-27% |
| **REIMBURSEMENT** | | | | | | | | | | | | | |
| **Average reimbursement per case** | $12,936 | $14,439 | $14,439 | $11,981 | $13,230 | $14,375 | $17,082 | $18,610 | $16,797 | $13,728 | $14,716 | $18,262 | $12,705 |
| Average Reimbursement - Medicare FFS | $10,775 | $12,380 | $14,718 | $11,213 | $13,458 | $12,380 | $12,111 | $13,573 | $16,587 | $11,960 | $12,275 | $12,057 | $18,155 |
| Average Reimbursement - Medicare HMO | $11,375 | $12,841 | $9,758 | $12,255 | $12,862 | $9,897 | $3,863 | | $13,591 | $12,819 | $14,717 | $17,189 | $18,829 |
| Average Reimbursement - Commercial | $16,151 | $17,627 | $14,979 | $10,976 | $16,359 | $17,244 | $26,730 | $25,735 | $21,196 | $12,796 | $17,627 | $31,052 | $20,554 |
| **Contribution Margin per Case - Medicare FFS** | $167 | $1,694 | $4,270 | $1,265 | $3,528 | $1,980 | $2,477 | $1,694 | ($1,136) | $333 | ($837) | ($8,244) | $5,694 |
| **Contribution Margin per Case - Medicare HMO** | $1,486 | ($148) | $1,518 | $1,843 | $3,137 | ($1,151) | ($5,152) | NA | ($4,851) | $329 | ($625) | ($1,084) | $6,170 |
| **Contribution Margin per Case - Commercial** | $6,004 | $4,995 | $4,653 | $889 | $4,995 | $6,931 | $16,927 | $13,372 | $3,107 | $1,459 | $2,373 | $12,080 | $7,150 |
| **Implant Cost as % of Total Variable Cost** | 55% | 52% | 48% | 51% | 57% | 50% | 52% | 44% | 49% | 56% | 57% | 61% | 65% |
| **Implant Cost as % of Total Reimbursement** | 45% | 41% | 35% | 43% | 45% | 37% | 30% | 29% | 53% | 47% | 56% | 64% | 67% |
| **UTILIZATION (Inliers Only)** | | | | | | | | | | | | | |
| Average Length of Stay | 3.9 | 3.7 | 3.9 | 3.3 | 3.2 | 3.5 | 3.9 | 3.7 | 4.5 | 3.9 | 3.6 | 4.0 | 3.5 |
| Medicare Average Length of Stay | 4.3 | 4.0 | 4.2 | 3.5 | 3.2 | 3.7 | 4.2 | 3.9 | 5.4 | 4.0 | 4.1 | 4.4 | 3 |
| **CLINICAL** | | | | | | | | | | | | | |
| Average Patient Severity*** | 1.67 | 1.63 | 1.63 | 1.92 | 1.75 | 1.68 | 1.63 | 1.88 | 1.84 | 1.53 | 1.22 | 1.63 | 1.53 |
| Comorbidity Rate | 42% | 40% | 40% | 51% | 40% | 44% | 41% | 49% | 47% | 28% | 15% | 35% | 26% |
| Complication Rate | 5% | 8% | 8% | 8% | 14% | 9% | 6% | 8% | 4% | 8% | 0% | 5% | 5% |
| % Mortality | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| % Outlier | 1% | 2% | 1% | 0% | 2% | 1% | 1% | 4% | 4% | 3% | 2% | 0% | 5% |
| % Osteoarthrosis | 90% | 93% | 92% | 94% | 93% | 93% | 87% | 93% | 89% | 97% | 93% | 93% | 90% |
| % Rheumatoid Arthritis | 3% | 3% | 2% | 3% | 3% | 6% | 9% | 5% | 13% | 5% | 2% | 0% | 0% |
| % Aseptic Necrosis | 11% | 8% | 12% | 6% | 6% | 8% | 12% | 8% | 27% | 12% | 6% | 8% | 21% |
| % Fractures | 4% | 3% | 3% | 7% | 3% | 3% | 3% | 3% | 7% | 3% | 4% | 3% | 5% |
| **DEMOGRAPHIC** | | | | | | | | | | | | | |
| Average Patient Age | 64.9 | 65.6 | 69.5 | 72.4 | 65.5 | 65.1 | 67.5 | 65.6 | 64.3 | 69.5 | 66.4 | 60.5 | 56.7 |
| **Gender** | | | | | | | | | | | | | |
| % Male | 48% | 41% | 41% | 39% | 50% | | | | 36% | 43% | 44% | | |
| % Female | 52% | 59% | 59% | 61% | 50% | | | | 64% | 57% | 56% | | |
| **Payer** | | | | | | | | | | | | | |
| % Medicare FFS | 59% | 40% | 50% | 27% | 3% | 41% | 40% | 52% | 43% | 40% | 18% | 35% | 10% |
| % Medicare HMO | 0% | 13% | 12% | 45% | 13% | 7% | 16% | 0% | 17% | 22% | 33% | 5% | 10% |
| % Commercial | 11% | 15% | 16% | 12% | 73% | 19% | 15% | 14% | 9% | 14% | 16% | 20% | 15% |

**Data range is 1/1/2006 - 12/31/2006**

* Data is representative of the type of implants used at each hospital. If left blank, the hopsital did not use this type of implant for the procedure.

U = Hospital was not able to provide data regarding the procedure of interest.

** Data is shown for hospitals who purchase devices from each vendor. If left blank, the hospital did not purchase a device from this vendor.

*** Average Patient Severity-average severity for patients, as calculated using the severity of illness grouper. Refined Diagnosis Groups (R-DRGs) from Health Systems Consultants is used to calculate severity.

The grouper classifies patients into severity categories using an algorithm that considers age, sex and certain comorbid conditions for each DRG. There are three severity groups for medical DRGs and four severity groups for procedural DRGs.

The classifications are as follows: 1. Minor 2. Moderate 3. Major 4. Catastrophic