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United States Government Accountability Office
Washington, DC 20548

May 14, 2012

The Honorable Orrin Hatch
Ranking Member
Committee on Finance
United States Senate

Subject: *Medicare: Trends in Beneficiaries Served and Hospital Resources Used in Implantable Medical Device Procedures*

Dear Senator Hatch:

The use of implantable medical devices (IMD) among Medicare beneficiaries is widely recognized as a way to prolong and improve the quality of life for patients that receive them.[1] In 2009, about 1.6 million IMD procedures were performed on beneficiaries under traditional, fee-for-service Medicare at a cost of roughly $20 billion. Orthopedic and cardiac implantations—the most common IMD procedures provided to beneficiaries—accounted for nearly all IMD-related Medicare spending in that year. With beneficiaries expected to live longer and innovations in IMD technology, the use of orthopedic and cardiac IMDs is likely to continue to have important implications for hospital services paid for by Medicare.

The number of hospital admissions for IMD procedures, the duration of hospital stays, and the location to which patients are discharged are influenced by such factors as age and health status. In that light, you expressed interest in obtaining descriptive information about changes in the demographics of Medicare beneficiaries undergoing major IMD procedures and their use of hospital and postacute care resources. In this report, we examined three trends for Medicare beneficiaries who received orthopedic or cardiac IMDs: (1) hospital admission rates, by age and health status; (2) hospital lengths of stay, by health status; and (3) discharge disposition following admission for these procedures, by health status.

Our review of orthopedic IMD procedures focused on those related to knees, hips, shoulders, and lumbar fusions. We defined knee, hip, and shoulder replacement procedures as stays where the procedure was a primary elective new total knee, total hip, or total shoulder replacement. We defined lumbar fusion procedures as stays where the procedure was a primary elective initial lumbar or lumbosacral

[1]We define IMDs as artificial devices implanted entirely within the body that are intended to remain there permanently. However, some of these devices have a limit to their effective life span and will require replacement.

fusion with a posterior technique.[2,3] Our review of cardiac IMDs focused on procedures related to certain devices used to treat blocked coronary arteries—drug-eluting stents—or heart rhythm problems—automatic implantable cardioverter defibrillators (AICD) and dual-chamber pacemakers. The orthopedic IMD procedures we studied are nearly always performed in the hospital inpatient setting. However, procedures involving drug-eluting stents, AICDs, and dual-chamber pacemakers can be performed in either inpatient or outpatient settings. We focused only on inpatient trends in the use of cardiac IMDs. Further research on topics such as readmission rates[4] and revisions[5] would be needed to understand the full impact of orthopedic and cardiac IMD use patterns.

To examine trends for Medicare beneficiaries who received orthopedic or cardiac IMDs, we obtained hospital discharge data on individuals age 65 and over from the Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) files from 2003 through 2009.[6,7] To calculate trends in Medicare hospital admission rates, we divided the number of inpatient IMD procedures performed on these individuals by the total number of Medicare Part B beneficiaries age 65 or over during the same period, as reported by the Centers for Medicare & Medicaid Services (CMS).[8] We sorted beneficiaries into four age cohorts—65 to 69, 70 to 74, 75 to 79, and 80 or older—and categorized beneficiary health status as good or fair, poor, or very poor based on the patient's condition at admission and other factors.[9]

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[2]Lumbar and lumbosacral fusions are those that involve certain vertebrae in the lower region of the spine. Posterior fusions refer to how the surgeon approaches the spine—through the lower back.

[3]We excluded (1) partial joint replacements and procedures involving more than one joint, (2) replacement surgeries needed when the effective performance of some devices declines, (3) lumbar fusion procedures that did not use the posterior technique, and (4) other types of spinal fusions, such as those related to the cervical spine.

[4]Research has found an increase in 30- and 90-day all-cause readmission rates for total hip replacement patients in recent years. Xueya Cai, et al., "Clinical Characteristics and Outcomes of Medicare Patients Undergoing Total Hip Arthroplasty, 1991-2008," *Journal of the American Medical Association* 305, no. 15 (2011): 1560-1567.

[5]Revisions, procedures that replace part or all of an IMD, accounted for 8.9 percent of all orthopedic IMD procedure Medicare expenditures in 2004 and 11.0 percent in 2009, increasing from about $0.5 billion to about $1 billion. Some revisions may reflect device recalls. From 2005 through 2009, orthopedic and cardiovascular devices constituted 12 and 15 percent of medical device recalls, respectively. See GAO, *Medical Devices: FDA Should Enhance Its Oversight of Recalls,* GAO-11-468 (Washington, D.C.: June 14, 2011).

[6]Medicare covers virtually all of the population age 65 and over. We defined Medicare admissions as those of individuals who are in that age cohort.

[7]The NIS is designed as a representative 20 percent sample of all hospitals. It contains hospital discharge data provided by states that participate in HCUP. In 2009, 44 states provided data from about 1,000 hospitals. NIS data do not include outpatient procedures.

[8]We define Medicare admission rates as admissions per 10,000 Medicare Part B beneficiaries. Among other things, Medicare Part B covers the physicians' services used in IMD procedures.

[9]Across all procedure types, we assigned health status using several patient variables, including a beneficiary's principal and secondary diagnosis, procedures codes, age, sex, and discharge disposition. Patient demographics, such as secondary diagnoses, can be risk factors for in-hospital complications and mortality. For example, research on patients undergoing bilateral total knee arthroplasty has shown that the presence of congestive heart failure and pulmonary hypertension have been associated with increased risk for adverse outcome. See Ya-Lin Chiu, et al., "Bilateral Total Knee Arthroplasty: Risk Factors for Major Morbidity and Mortality," *Anesthesia & Analgesia*, July 13, 2011.

To analyze trends in average lengths of stay, we excluded beneficiaries with hospital stays of zero days and outliers with exceedingly long stays. To examine trends in discharge disposition, we stratified beneficiaries into those discharged to home or self-care, to home for home health care, and to inpatient rehabilitative facilities, such as a skilled nursing facility (SNF) or an inpatient rehabilitation facility (IRF).[10] In addition, we reviewed relevant journal articles and CMS regulations. We determined that the data we used were sufficiently reliable for the purposes of our analysis by performing appropriate electronic data checks.

We conducted this performance audit from March 2011 to April 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Results in Brief

Overall, orthopedic IMD admission rates were substantially higher in 2009 compared with 2003, while admission rate patterns among cardiac IMDs were mixed. Admission rates rose for each of the orthopedic IMDs in our study, with knee replacement rates growing 6.7 percent per year. The picture for inpatient cardiac IMD procedures was more mixed; admission rates for dual-chamber pacemakers decreased steadily while rates for AICDs and drug-eluting stents increased through 2006 and generally declined thereafter, in part reflecting a shift of surgeries to the outpatient setting. While the proportion of both orthopedic and cardiac IMD beneficiaries in poor or very poor health grew throughout our period of study, this trend was far more evident for cardiac IMD beneficiaries after 2007.

Even with the increase in admissions of IMD beneficiaries in poorer health, overall lengths of stay for the IMD procedures we studied generally did not rise. Average lengths of stay for orthopedic IMD beneficiaries decreased from 2003 through 2009, while the lengths of stay for cardiac IMD beneficiaries fell through 2007 but increased thereafter. For all orthopedic IMD procedures in our study, lengths of stay declined during the period for beneficiaries in all reported health status groups. From 2003 through 2007, the average length of stay decreased among cardiac IMD beneficiaries in each health status group. From 2007 to 2009, average lengths of stay patterns varied by health status and specific cardiac IMD procedure.

Poorer health status and reductions in lengths of stay for inpatient IMD beneficiaries were not accompanied by an increase in discharges to rehabilitative facilities. Rather, the proportion of orthopedic IMD beneficiaries discharged to home health care increased substantially while the proportion discharged to a skilled nursing or rehabilitation facility dropped sharply. The discharge disposition pattern for cardiac IMD beneficiaries remained relatively stable throughout the study period, with a large majority of cardiac IMD beneficiaries discharged to home or self-care.

[10]Discharge disposition indicates the postacute care, if any, a beneficiary received directly after discharge. However, beneficiaries can receive a series of postacute care services in various settings.

Background

IMD Device Descriptions

In 2009, procedures related to knees, hips, shoulders, and the spine accounted for 98 percent of Medicare's orthopedic IMD expenditures. Typically, hip, knee, and shoulder implants have a variety of components and are made up of different materials, which may be configured in various ways to make the total device. For example, for a hip replacement with four different components, there are several configurations and materials (metal, plastic, and ceramic) that can be used, as well as different ways to secure the implant (cemented in place or fitted into the bone with new bone growth to hold the implant in place). Lumbar fusion surgeries may involve many different IMDs; some of the most common IMDs used in lumbar fusions include screws, rods, cages, and bone morphogenetic protein (BMP).[11]

In 2009, procedures involving pacemakers, AICDs, and stents represented most Medicare spending on cardiac IMD procedures. A pacemaker monitors a patient's underlying heart rhythm and delivers an electrical pulse to cause the heart to beat at the desired rate. An AICD is similar to the pacemaker in design, but it is capable of delivering a higher energy electrical pulse—called a defibrillation shock—to correct more serious, rapid, and sustained heart rhythm irregularities. A coronary stent is a wire mesh tube used to prop open a blocked coronary artery. Drug-eluting stents are coated with drugs that slowly release and are intended to help keep the artery open.

Medicare IMD Spending and Overall Lengths of Stay

In Medicare's traditional fee-for-service program, spending on IMD procedures performed in the inpatient and outpatient settings has grown at the same rate as spending for other hospital services.[12] As we previously reported, from 2004 through 2009, expenditures for IMD procedures rose from about $16 billion to about $20 billion, an increase of 4.3 percent per year—a rate equal to that of Medicare spending for other hospital care. Spending on orthopedic IMD procedures performed grew substantially faster than that for cardiac IMD procedures. From 2004 through 2009, Medicare hospital expenditures related to orthopedic IMD devices increased 8.1 percent per year, while expenditures related to cardiac IMD procedures increased 1.2 percent yearly.[13]

A factor that contributes to Medicare inpatient spending is beneficiaries' length of stay. From 2003 through 2009, average hospital lengths of stay declined for Medicare beneficiaries overall. For instance, the average annual decrease in length of stay ranged from 0.6 percent to 7.0 percent for 10 hospital inpatient services that

[11]Screws and rods are used to hold the spine still to aid the fusion process. Cages placed between two vertebrae and BMP, a synthetic bone-forming protein, are often used together to promote fusion in lumbar fusion surgeries.

[12]In 2011, about three quarters of all beneficiaries were in fee-for-service Medicare and the rest were enrolled in private health plans under the Medicare Advantage program.

[13]See GAO, *Medicare: Lack of Price Transparency May Hamper Hospitals' Ability to Be Prudent Purchasers of Implantable Medical Devices*, GAO-12-126 (Washington, D.C.: Jan. 13, 2012).

ranked among those with the highest number of non-IMD elective admissions in 2009. The proportion of beneficiaries admitted with poor or very poor health also increased for each of those 10 services from 2003 to 2009.

Discharge Disposition after IMD Procedures

After receiving an orthopedic or cardiac IMD, Medicare beneficiaries can be discharged home or to one of several postacute care settings. Numerous factors such as age, functional status, and whether the beneficiary lives alone can affect the decision about where a beneficiary is discharged. Those discharged to home or self-care require minimal postacute care or only need to receive services, such as physical therapy, on an outpatient basis. Other beneficiaries who are discharged home but require a higher, or more intense, level of postacute care may receive home health care services, such as intermittent skilled nursing and physical therapy. Orthopedic and cardiac IMD beneficiaries may also be discharged to inpatient facilities such as SNFs or IRFs for rehabilitation services. In general, the cost of postacute care is more expensive for individuals discharged to SNFs and IRFs than to home, with or without home health care or outpatient rehabilitation services.

Inpatient Admission Rates Increased Consistently across Orthopedic IMDs, but Varied across Cardiac IMDs; IMD Procedures for Beneficiaries in Poor or Very Poor Health Were Increasingly Common, a Trend More Pronounced Among Cardiac IMD Beneficiaries

Admission Rates for Orthopedic IMD Procedures Increased Steadily

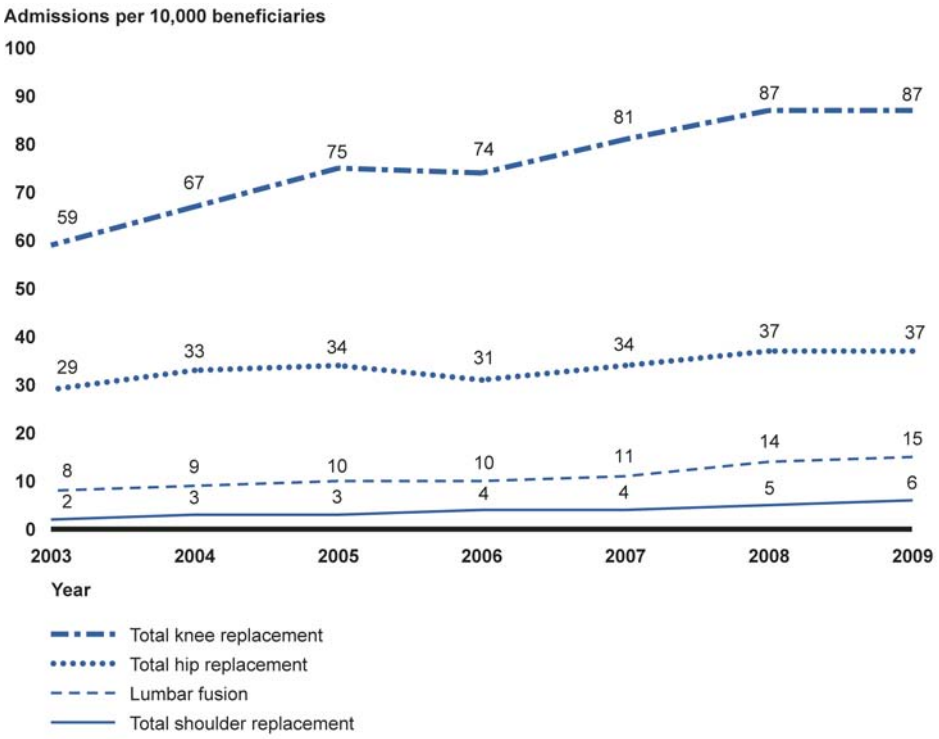
- Admission rates for knee, hip, and shoulder replacements and lumbar fusion procedures increased steadily overall among Medicare beneficiaries from 2003 through 2009. (See fig. 1.)

    - The admission rate for knee replacements, by far the most common orthopedic procedure of those we studied, rose substantially from 2003 through 2009. The admission rate increased from 59 to 87 per 10,000 beneficiaries, an average annual increase of 6.7 percent.

    - The admission rate for hip replacements, the second most common orthopedic procedure studied, grew moderately over the study period. The admission rate increased from 29 to 37 per 10,000 beneficiaries, an average annual increase of 4.1 percent.

    - Although shoulder replacements and lumbar fusions were far less common than knee or hip replacements, their admission rates grew most rapidly during the time period, with shoulder replacement and lumbar fusion admissions growing at annual rates of 20.1 percent and 11.0 percent, respectively.

Figure 1: Medicare Admission Rates for Orthopedic Implantable Medical Devices, 2003-2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

- Increases in knee replacement surgeries have been attributed to changes in medical practice, enhanced awareness of the benefits of knee replacements, increased patient satisfaction rates, and an increasing prevalence of osteoarthritis, which in turn may be related to an increase in obesity rates.[14]

  - According to the National Institutes of Health, 85 percent of beneficiaries who undergo knee replacement surgery are satisfied with the results.[15]

  - The rate of obesity among Medicare beneficiaries who received a knee replacement was higher than those who received the other IMD procedures studied; they also experienced the largest increase in obesity rates over the time period.[16]

[14]C. Mehrotra, P. Remington, T. Naimi, W. Washington, and R. Miller, "Trends in Total Knee Replacement Surgeries and Implications for Public Health, 1990–2000," *Public Health Reports* 120 (2005): 278-282. S. Kurtz, F. Mowat, K. Ong, N. Chan, et. al, "Prevalence of Primary and Revision Total Hip and Knee Arthroplasty in the United States from 1990 through 2002," *Journal of Bone and Joint Surgery;* July 2005; 87, 7; ProQuest Medical Library, pg. 1487.

[15]Patient satisfaction rates are even greater for hip and shoulder replacements at 90 percent and 97 percent, respectively. See: E. Fisher, J. Bell, I. Tomek, A. Esty, and D. Goodman, "Trends and Regional Variation in Hip, Knee, and Shoulder Replacement," *Dartmouth Atlas Surgery Report* (2010).

[16]Obesity appears to be undercoded in hospital data given the much higher prevalence in the general population. See http://www.hcup-us.ahrq.gov/reports/statbriefs/sb20.jsp. Accessed on March 23, 2012.

- The nearly twofold increase in the admission rate for lumbar fusions may exemplify the role that new technology plays in IMD utilization. For example, from 2003 to 2009, the proportion of lumbar fusions performed with BMP, a relatively new technology, increased from approximately 7 percent to 40 percent of all such surgeries.[17]

Changes in Inpatient Admission Rates for Cardiac IMD Procedures Differed by Device

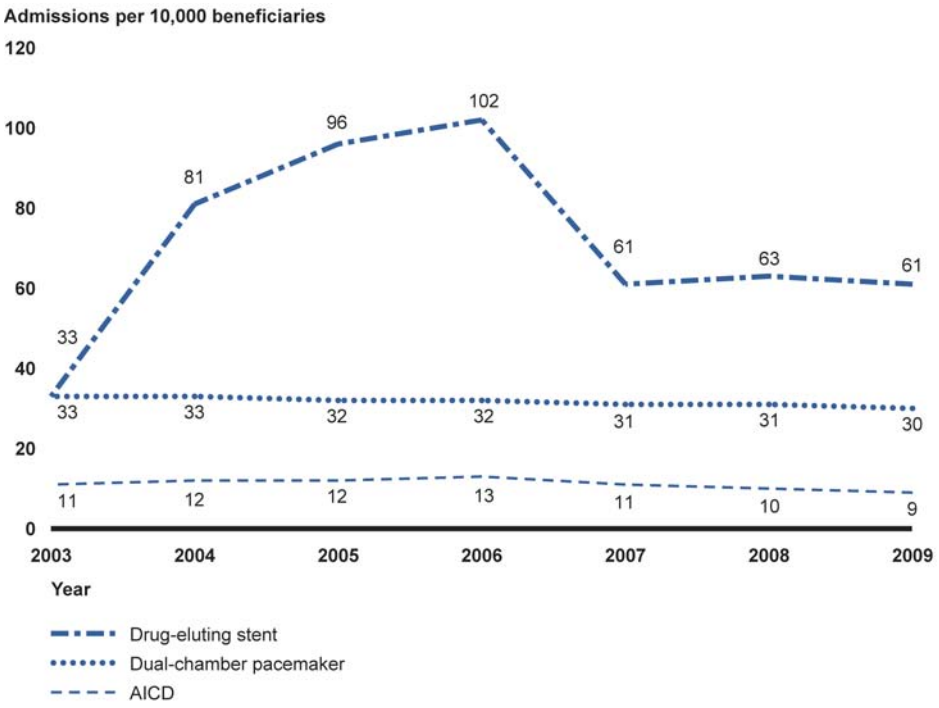
- The trends in cardiac IMD inpatient admission rates were mixed over the study period. (See fig. 2.)

    - Inpatient admission rates for drug-eluting stents increased rapidly from 2003 through 2006, declined sharply from 2006 through 2007, and remained flat thereafter. Rates for AICDs also increased through 2006 and then declined, although both the increase and subsequent decline were much more moderate.

    - In contrast, the rate of inpatient dual-chamber pacemaker admissions declined slowly and steadily.

[17]Since BMP has not been approved for use in posterior lumbar fusion, growth in usage during this period is off label.

Figure 2: Medicare Admission Rates for Cardiac Implantable Medical Devices, 2003–2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

- Decreases in the rates of cardiac IMD admissions were associated with beneficiaries receiving cardiac IMD procedures in the outpatient rather than the inpatient setting. Had the pattern of care not changed after 2006, it is likely that more beneficiaries would have been admitted to a hospital for a cardiac IMD procedure.

    - As we previously reported, Medicare claims data indicated a general shift of cardiac IMD procedures from the inpatient to the outpatient setting from 2004 through 2009, with the largest growth in outpatient cardiac IMD procedures occurring from 2007 through 2009.[18]

    - This trend coincided with Medicare Recovery Audit contractors collecting overpayments for certain inpatient cardiac IMD procedures that could have been performed in the outpatient setting, possibly prompting other hospitals to change their admission patterns.[19] Generally, Medicare pays hospitals a relatively lower rate for the same procedure when it is delivered in the outpatient rather than the inpatient setting.

[18]GAO, *Medicare: Lack of Price Transparency May Hamper Hospitals' Ability to Be Prudent Purchasers of Implantable Medical Devices*, GAO-12-126 (Washington, D.C.: Jan. 13, 2012).

[19]Recovery audit contractors conduct postpayment reviews to identify overpayments and underpayments and recoup any overpayments they identify.

- In addition to the general shift to the outpatient setting, the significant decrease in inpatient drug-eluting stent admission rates from 2006 to 2007 may have resulted from a shift to the use of bare metal stents or a decline in overall stent utilization.

Admission Rates Rose across All Age Groups for All Orthopedic IMD Procedures and Drug-Eluting Stents but Fell for AICDs and Dual-Chamber Pacemakers

- From 2003 through 2009, admission rates rose for all four orthopedic IMD procedures among every beneficiary age group. (See table 1.)
    - Rates for knee and hip replacements increased most rapidly for the youngest Medicare beneficiaries.
    - In contrast, older Medicare beneficiaries exhibited the fastest growth in shoulder replacements and lumbar fusion procedures.

Table 1: Average Annual Percentage Growth in Medicare Beneficiary Admission Rates for Orthopedic IMD Procedures, by Age, 2003-2009

	Growth in admissions			
Age	Total knee replacement	Total hip replacement	Total shoulder replacement	Lumbar fusion
65 to 69	7.9	5.9	16.5	12.2
70 to 74	6.6	3.7	23.2	11.3
75 to 79	6.8	4.7	26.0	11.2
80 or older	5.8	3.2	26.0	15.2

Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

- Across all age groups, inpatient admission rates for drug-eluting stents increased, while AICD and dual-chamber pacemaker rates declined during our study period. (See table 2.)

Table 2: Average Annual Percentage Growth in Medicare Beneficiary Admission Rates for Cardiac IMD Procedures, by Age, 2003-2009

	Growth in admissions		
Age	Drug-eluting stent	AICD	Dual-chamber pacemaker
65 to 69	10.1	-3.3	-1.3
70 to 74	10.5	-5.9	-3.0
75 to 79	11.5	-2.5	-1.9
80 or older	13.1	-4.1	-0.9

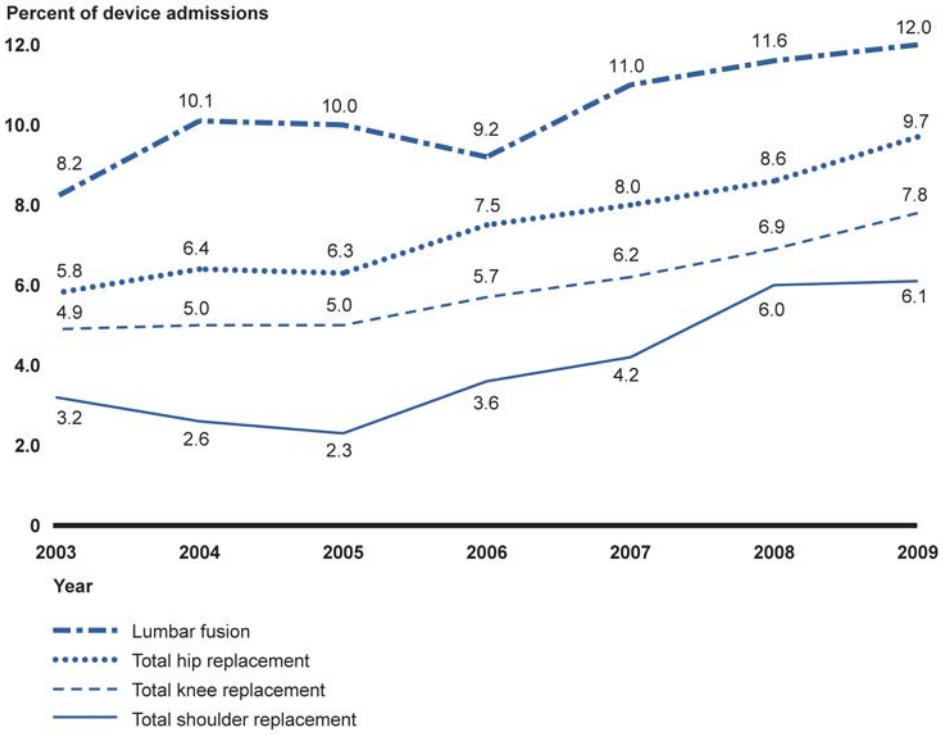
Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

Growing Share of IMD Beneficiaries Were Admitted in Poor or Very Poor Health, a Trend More Pronounced among Inpatient Cardiac IMD Beneficiaries

- We found moderate increases in the proportion of orthopedic IMD beneficiaries who were in poor health from 2003 through 2009. (See fig. 3.)
    - For the four orthopedic IMD procedures studied, the increase in the proportion of beneficiaries in poor health ranged from 2.9 to 3.9 percentage points from 2003 through 2009.

Figure 3: Proportion of Inpatient Orthopedic IMD Beneficiaries in Poor Health, by Type of Procedure, 2003-2009

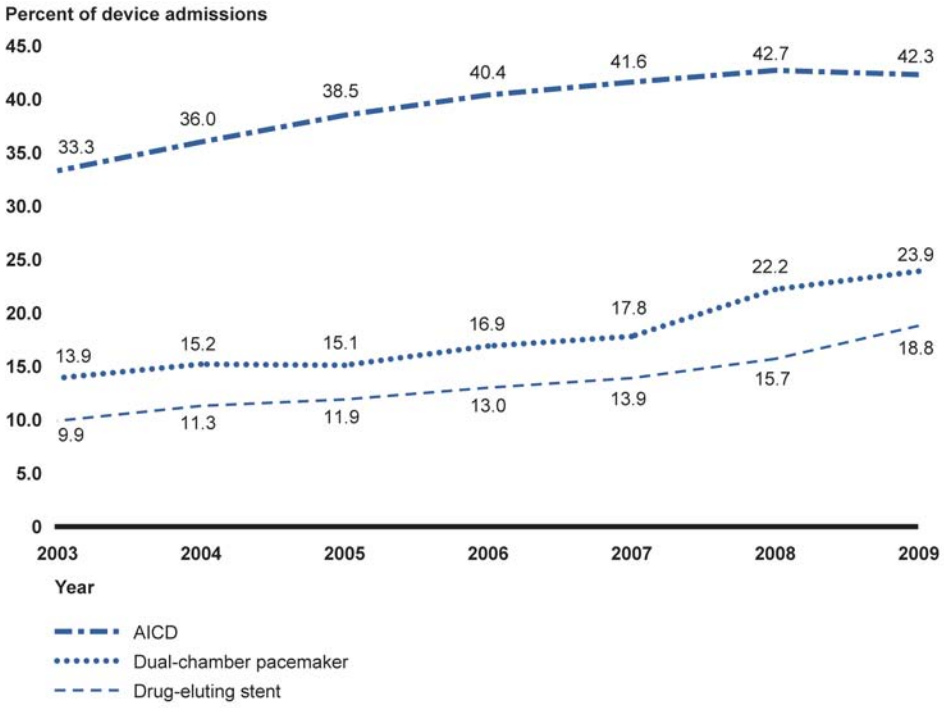


Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

- The proportion of orthopedic IMD beneficiaries in very poor health increased slightly but remained relatively low—roughly 1 percent—throughout the study period.
- We found an increase in the proportion of beneficiaries who were admitted in poor health for inpatient cardiac IMD procedures from 2003 through 2009. (See fig. 4.)
    - The percent of cardiac IMD beneficiaries in poor health rose for every type of device procedure. This was particularly evident for drug-eluting stent and dual-chamber pacemaker recipients from 2007 forward.

Figure 4: Proportion of Inpatient Cardiac IMD Beneficiaries in Poor Health, by Type of Procedure, 2003-2009

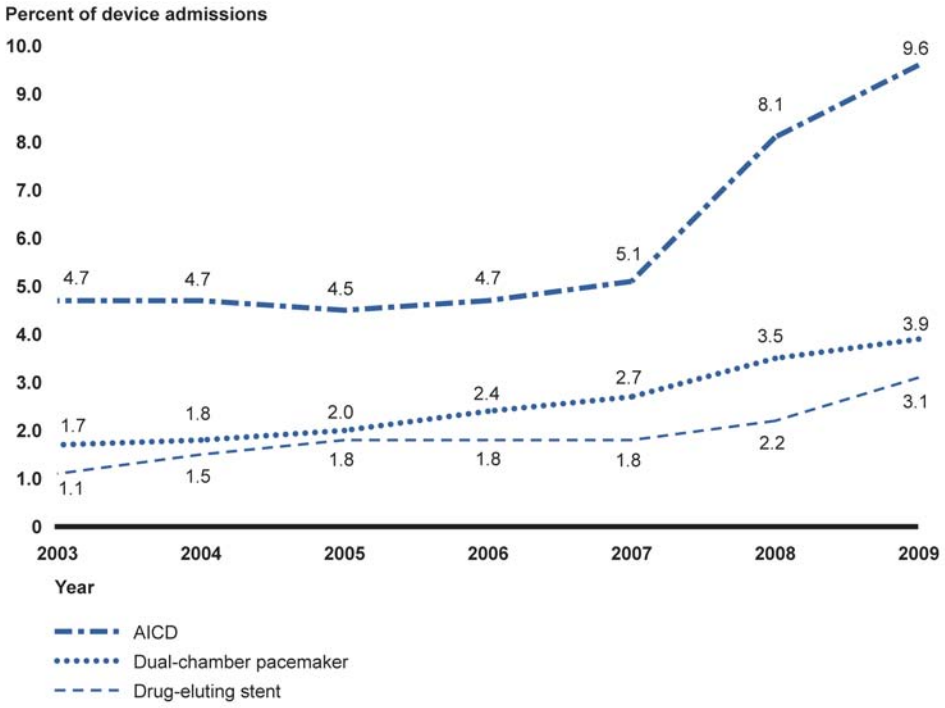


Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

- We also found an increase in beneficiaries in very poor health being admitted for each of the cardiac IMD devices from 2003 through 2009. (See fig. 5.)
    - Again, the proportion of beneficiaries admitted with very poor health increased more rapidly from 2007 forward.
    - The increase was particularly dramatic for AICDs; the share of beneficiaries that received an AICD who were in very poor health nearly doubled from 2007 through 2009.

Figure 5: Proportion of Inpatient Cardiac IMD Beneficiaries with Very Poor Health, by Type of Procedure, 2003-2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: We define Medicare admissions as those of individuals who are age 65 and over.

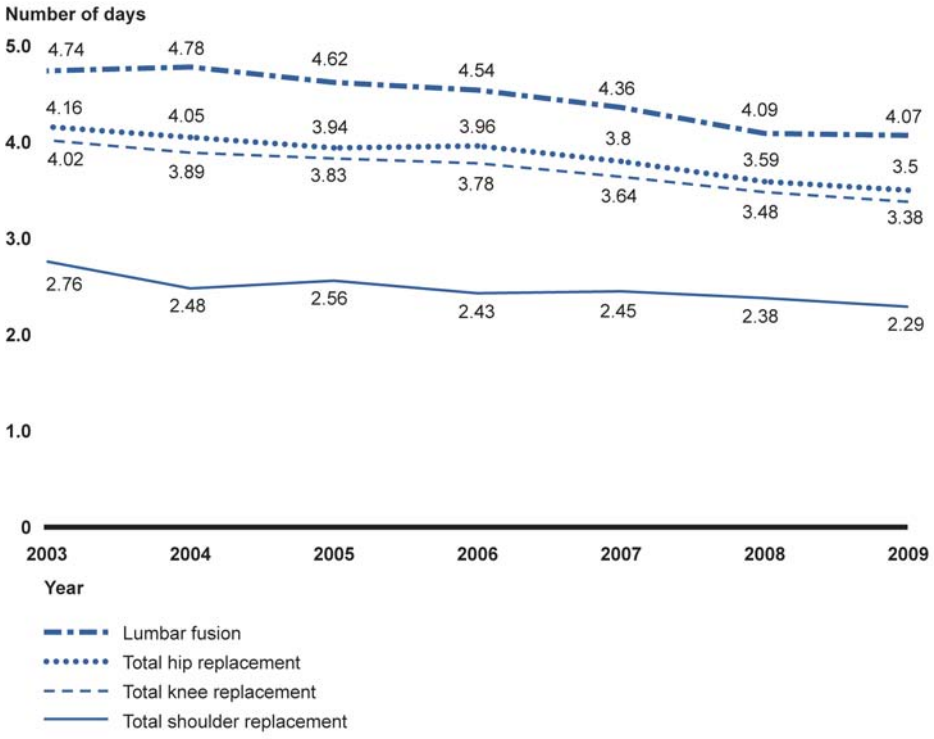
- The migration of cardiac IMD beneficiaries to the hospital outpatient setting most likely removed healthier beneficiaries from the inpatient population, leaving a greater proportion of beneficiaries in the inpatient setting with poor or very poor health.

Lengths of Stay for Orthopedic IMD Beneficiaries Fell Steadily; Stays for Cardiac IMD Beneficiaries Grew After 2007, Reflecting a Marked Decline in Patient Health Status

Lengths of Stay Consistently Declined for Orthopedic IMD Beneficiaries

- When comparing 2003 and 2009 data, we found substantial decreases in the average length of stay for all orthopedic IMD beneficiaries in our study. (See fig. 6.)
    - For example, the length of stay for knee replacement beneficiaries fell from 4.02 to 3.38 days, or 2.8 percent per year. This represented a reduction of 64 days per 100 hospital admissions.
    - The rates of decline in lengths of stay for these procedures were similar to those of non-IMD elective procedures.

Figure 6: Beneficiary Average Length of Stay, by Orthopedic IMD Procedure, 2003-2009



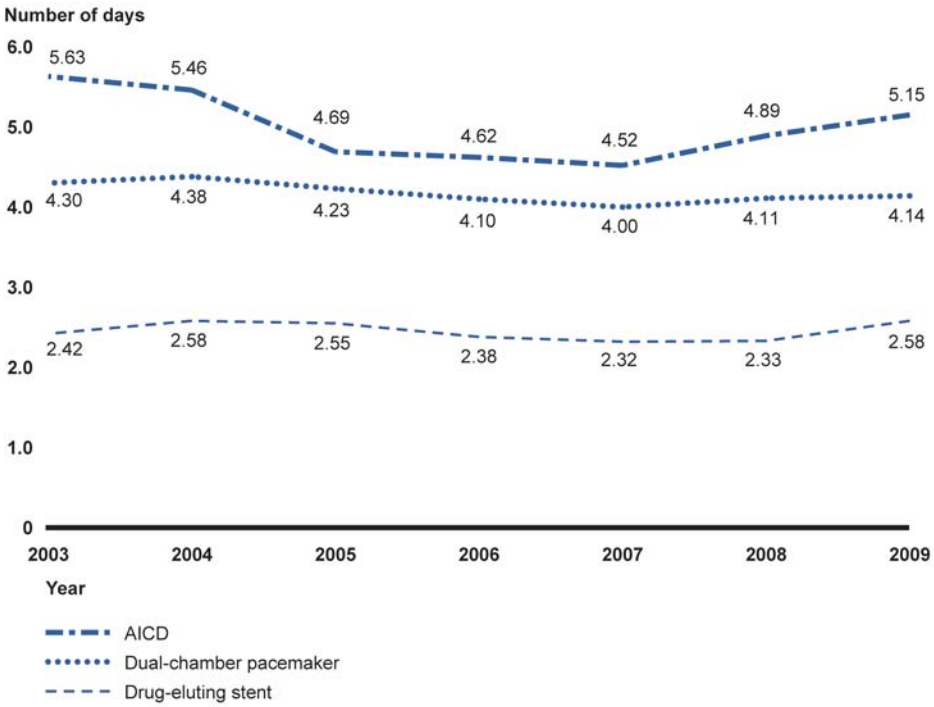
Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Lengths of stay are those of individuals who are age 65 and over.

Cardiac IMD Beneficiaries' Lengths of Stay Generally Declined through 2007, but Increased Afterward

- The average length of stay of beneficiaries admitted for cardiac IMD procedures generally declined from 2003 through 2007 but increased thereafter. (See fig. 7.)
    - For example, the length of stay for those receiving drug-eluting stents fell 1.0 percent annually from 2003 through 2007 and increased at an annual rate of 5.5 percent during the last 2 years of our study period.
- The more recent increases in length of stay for cardiac IMD beneficiaries were associated with a change in the mix of patients receiving these procedures. As cardiac IMD surgeries shifted to the outpatient setting, more of the remaining inpatient beneficiaries were in poor or very poor health.

Figure 7: Beneficiary Average Length of Stay, by Cardiac IMD Procedure, 2003-2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Lengths of stay are those of individuals who are age 65 and over.

Lengths of Stay Differed Substantially by IMD Beneficiaries' Health Status; Stays Declined across Health Status Groups

- For both orthopedic and cardiac IMD procedures, beneficiaries' lengths of stay differed substantially by health status across all years studied. Hospital stays were generally 1 to 3 days longer for beneficiaries in poor health compared with those in good or fair health.

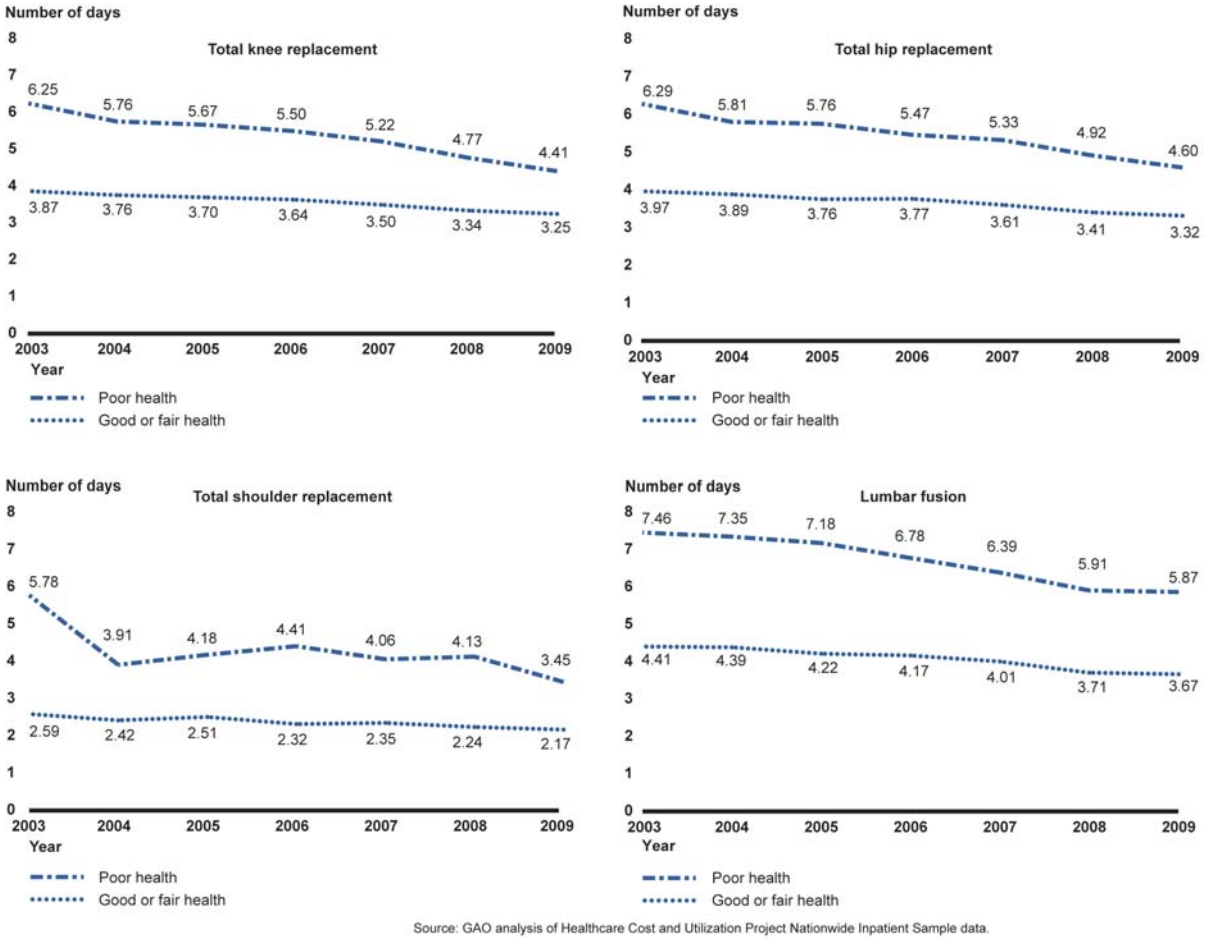
- For all IMD procedures in our study, lengths of stay declined during the period for beneficiaries in all reported health status groups, falling most dramatically for IMD beneficiaries in poor health.

- From 2003 to 2009, for each of the four types of orthopedic IMDs,

    - The average length of stay for orthopedic IMD beneficiaries decreased considerably across all health status groups.

    - Because the rate of decline in the average length of stay was greater for IMD beneficiaries in poor health compared with those in good or fair health, the differences in lengths of stay narrowed significantly by 2009. (See fig. 8.)

Figure 8: Average Length of Stay for Orthopedic IMD Beneficiaries, by Procedure and Health Status, 2003-2009

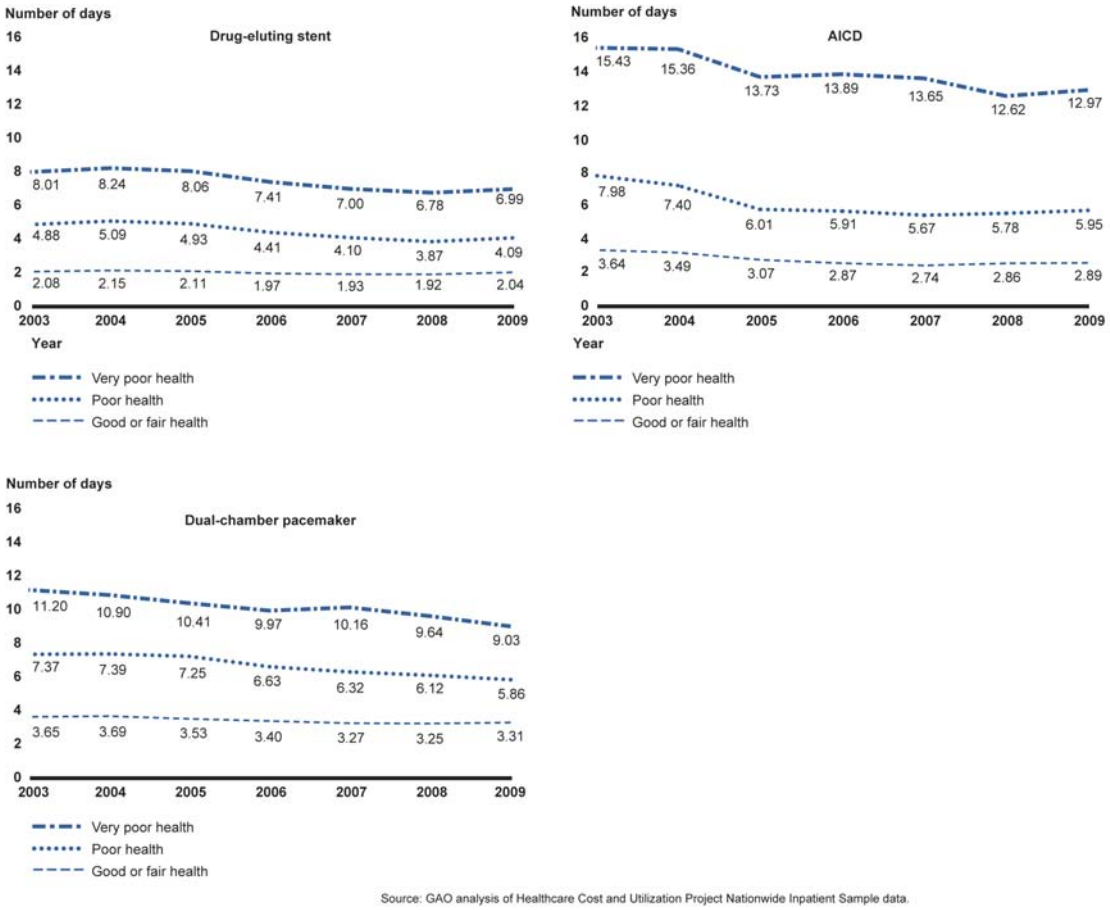


Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Lengths of stay are those of individuals who are age 65 and over. The average lengths of stay for orthopedic IMD beneficiaries in very poor health are not shown because relatively few beneficiaries were in this category.

- For the period studied, the average IMD beneficiary length of stay generally declined for all cardiac procedures and in all health status groups. (See fig. 9.)
    - From 2003 through 2007, the average length of stay for inpatient cardiac IMD beneficiaries declined for all health status groups.
    - From 2007 through 2009, the average length of stay for those in good or fair health increased but generally decreased for those in poor or very poor health.

Figure 9: Average Length of Stay for Cardiac IMD Beneficiaries, by Procedure and Health Status, 2003-2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Lengths of stay are those of individuals who are age 65 and over.

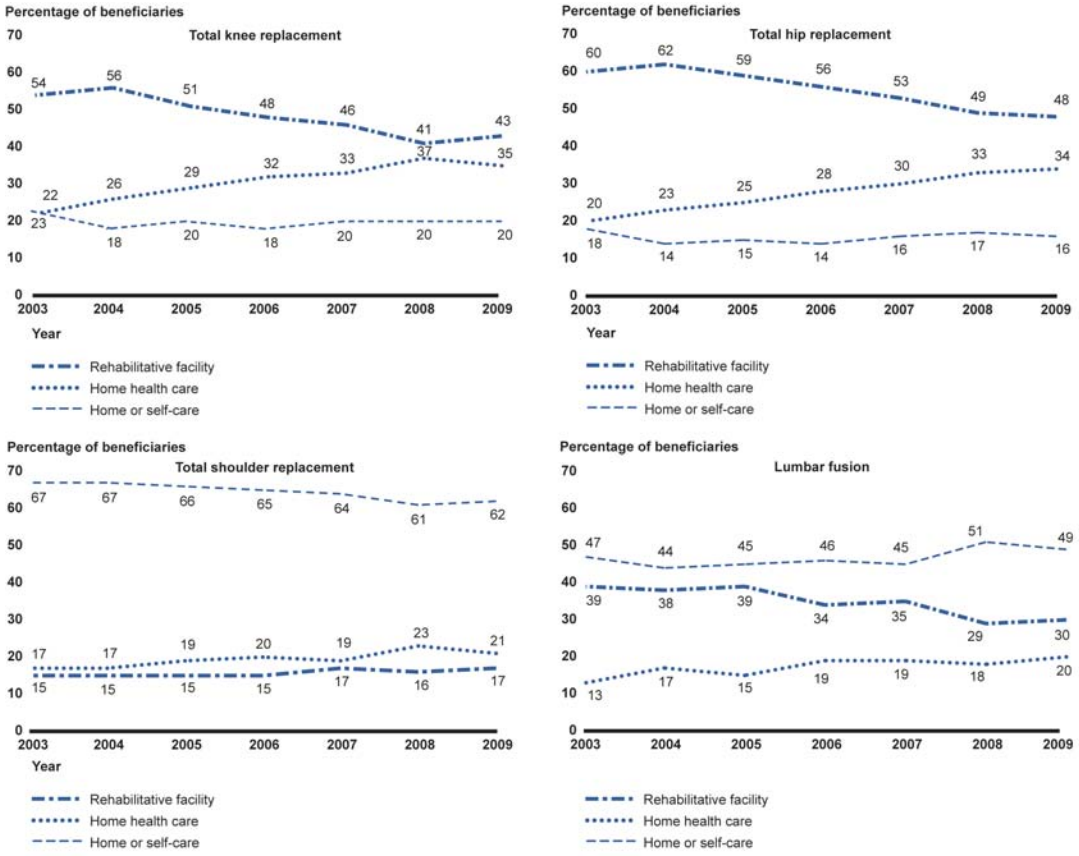
Orthopedic IMD Beneficiaries Were Increasingly Discharged to Home Health Care Rather Than Rehabilitative Facilities, while Cardiac IMD Beneficiaries' Discharge Disposition Pattern Was Relatively Unchanged

Orthopedic Beneficiaries Were Increasingly Discharged to Home Health Care

- From 2003 through 2009, an increasing percentage of inpatient orthopedic IMD beneficiaries were discharged to home health care. (See fig.10.)
    - For example, the share of beneficiaries receiving knee or hip replacements who were discharged to home health care grew from 22 to 35 percent and 20 to 34 percent, respectively.
    - At the same time, there was generally a notable reduction in the proportion that was discharged to a rehabilitative facility.

- The shift from rehabilitative facilities to home health care has the potential to lower Medicare expenditures. In 2008, the estimated overall average Medicare payment for SNF and IRF stays were $8,910 and $16,649, respectively, whereas the average payment for a home health episode of care was $2,800.[20]

Figure 10: Beneficiaries' Discharge Disposition Following Orthopedic IMD Admissions, by Procedure, 2003-2009



Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Rehabilitative facilities include inpatient rehabilitation facilities, skilled nursing facilities, and other facilities that provide rehabilitative care. Discharge dispositions are those of individuals who are age 65 and over.

- The migration of orthopedic IMD beneficiaries to home health care discharges was most evident among those in good or fair health but was also observable for those in poor health. (See table 3.)

[20]Other factors could also affect the cost of postacute care, such as readmissions.

Table 3: Discharge Disposition of Orthopedic IMD Beneficiaries, by Health Status, 2003-2009

Health status	Discharge disposition	Percentage of beneficiaries						
		2003	2004	2005	2006	2007	2008	2009
Good or fair health	Rehabilitative facility	53	54	51	47	44	40	40
	Home health care	21	25	27	31	32	35	34
	Home or self-care	25	20	22	22	23	25	25
Poor health	Rehabilitative facility	66	67	64	65	61	59	60
	Home health care	15	18	20	21	23	24	24
	Home or self-care	16	13	14	12	14	15	13

Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Rehabilitative facilities include inpatient rehabilitation facilities, skilled nursing facilities, and other facilities that provide rehabilitative care. Disposition data for orthopedic IMD beneficiaries in very poor health are not shown because relatively few beneficiaries were in this category. Discharge dispositions are those of individuals who are age 65 and over.

- The Medicare Payment Advisory Commission cited CMS actions when describing the shift in orthopedic IMD beneficiaries' discharge disposition from rehabilitation facilities to home health care.[21]
    - In 2004, CMS revised its list of conditions for determining the medical need of patients for inpatient rehabilitation services, recognizing only certain categories of patients with knee or hip replacements.[22]
    - From 2005 to 2008, CMS Medicare Recovery Audit Contractors found medically unnecessary services performed in IRFs following joint replacement surgery. This may have further reduced the amount of IRF admissions related to joint replacements.

Changes in Health Status for Inpatient Cardiac IMD Beneficiaries Were Not Associated with a Substantial Increase in Use of Postacute Care

- During our study period, the share of inpatient cardiac IMD beneficiaries discharged to a rehabilitative facility remained relatively stable. (See table 4.)
    - Between 2003 and 2007, the share of inpatient cardiac IMD beneficiaries discharged to home or self-care remained at roughly 86 percent.
    - After their general decline in health status since 2007, the share of inpatient cardiac IMD beneficiaries discharged to home or self-care began to fall slightly.

[21]See MedPAC, *Report to the Congress: Medicare Payment Policy* (Washington, D.C.: March 2011), 28, accessed October 19, 2011, http://www.medpac.gov/documents/Mar11_EntireReport.pdf.

[22]In order for an IRF to be paid under the IRF prospective payment system instead of the acute care hospital inpatient prospective payment system CMS requires that 75 percent of the facility's beneficiaries have one or more qualifying medical conditions. CMS revised the 75 percent rule by requiring that beneficiaries who receive knee or hip replacements must have undergone bilateral joint surgery, be extremely obese, or be 85 years or older at the time of admission to the IRF. *See* 69 Fed. Reg. 25752, 25775 (May 7, 2004) (relevant provisions currently codified at 42 C.F.R. § 412.29(b)(2)(xiii) (2011)) .

Table 4: Discharge Disposition of Cardiac IMD Beneficiaries, 2003-2009

	Percentage of beneficiaries						
Discharge disposition	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Home or self-care	85	86	86	87	85	84	83
Home health care	7	7	7	6	7	9	9
Rehabilitative facility	7	6	5	5	7	7	7

Source: GAO analysis of Healthcare Cost and Utilization Project Nationwide Inpatient Sample data.

Note: Discharge dispositions are those of individuals who are age 65 and over.

- The share of cardiac IMD beneficiaries who were discharged to a rehabilitative facility also remained relatively stable by health status.

Agency Comments

We obtained comments on a draft of this report from the Department of Health and Human Services. The agency responded that it had no general comments and provided technical comments, which we incorporated as appropriate.

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As we agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of it until 30 days from its date. We are sending copies of this report to the Secretary of Health and Human Services. The report will also be available at no charge on our website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-7114 or cosgrovej@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report include Rosamond Katz, Assistant Director; Luis Serna III; and Brian O'Donnell. Zhi Boon also provided valuable assistance.

Sincerely yours,

James Cosgrove
Director, Health Care

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