Health Policy Review

Analysis of Growth of Interventional Techniques in Managing Chronic Pain in the Medicare Population: A 10-Year Evaluation from 1997 to 2006

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Background: Recent reports of the United States Government Accountability Office (GAO), the Medicare Payment Advisory Commission (MedPAC), and the Office of Inspector General (OIG) expressed significant concern with overall fiscal sustainability of Medicare and exponential increase in costs for interventional pain management techniques.

Interventional pain management (IPM) is an evolving specialty amenable to multiple influences. Evaluation and isolation of appropriate factors for increasing growth patterns have not been performed.

Study Design: Analysis of the growth of interventional techniques in managing chronic pain in Medicare beneficiaries from 1997 to 2006.

Objective: To evaluate the use of all interventional techniques.

Methods: The standard 5% national sample of the CMS carrier claim record data for 1997, 2002, and 2006 was utilized. This data set provides information on Medicare enrollees in the fee-for-service Medicare program. Current procedural technology (CPT) codes for 1997, 2002, and 2006 were used to identify the number of procedures performed each year, and trends in expenditures.

Results: Interventional techniques increased significantly in Medicare beneficiaries from 1997 to 2006. Overall, there was an increase of 137% in patients utilizing IPM services with an increase of 197% in IPM services, per 100,000 Medicare beneficiaries. The majority of the increases were attributed to exponential growth in the performance of facet joint interventions.

There was a 13.9-fold difference in the increase between the state with the lowest rate and the state with the highest rate in utilization patterns of interventional techniques (California 37% vs. Connecticut 514%), with an 11.6-fold difference between Florida and California (431% vs. 37% increase). In 2006, Florida showed a 12.7-fold difference compared to Hawaii with the lowest utilization rate.

Hospital outpatient department (HOPD) expenses constituted the highest increase with fewer patients treated either in an ambulatory surgery center (ASC) or in-office setting. Overall HOPD payments constituted 5% of total 2006 Medicare payments, in contrast to 57% of total IPM payments, an 11.4-fold difference.

Limitations: The limitations of this study include a lack of inclusion of Medicare participants in Medicare Advantage plans and potential documentation, coding, and billing errors.

Conclusion: This study shows an overall increase of IPM services of 197% compared to an increase of 137% in patients utilizing IPM services from 1997 to 2006.

Key words: Interventional techniques, interventional pain management, facet joint injections, epidural steroid injections, sacroiliac joint injections, chronic pain, chronic spinal pain, ambulatory surgery center (ASC), hospital outpatient department (HOPD)

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The United States Government Accountability Office (GAO) in a letter to the Senate on September 26, 2008, informed the Senate that rapid spending growth for Medicare Part B - which covers physician and other patient services - has heightened concerns about the long-range fiscal sustainability of Medicare (1). In addition, Medicare Part B expenditures are expected to increase over the next decade at an average annual rate of about 8%, which is faster than the projected 4.8% annual growth rate in the national economy over this time (2). In another report (3) in September 2008, the Department of Health and Human Services, Office of Inspector General (OIG), reported that Medicare paid over $2 billion in 2006 for interventional pain management (IPM) procedures (4). This report also showed that from 2003 to 2006, the number of Medicare claims for facet joint injections, increased by 76% (3,5). Overall, payments for facet joint injections increased from $141 million in 2003 to $307 million in 2006, representing both physician and facility payments. Friedly et al (6) documented that between 1994 and 2001, there was a 271% increase in lumbar epidural steroid injections and a 231% increase in facet injections. They also showed that the total inflation-adjusted reimbursed costs (professional fees only), for lumbosacral injections increased from $24 million to over $175 million. Manchikanti et al (7-11) in multiple publications have shown an increase in interventional techniques. Friedly et al (12) also showed significant geographic variation in epidural steroid injection use in Medicare patients in the United States. They reported that in 2001, there was a 7.7-fold difference between the state with the lowest rate (Hawaii at 5.2 per 1,000) and the state with the highest rate (Alabama at 39.9 per 1,000). The variation among health referral regions, which are small in size, was even greater, with an 18.4-fold difference from 5.6 per 1,000 in Honolulu, Hawaii, to 103.6 per 1,000 in Palm Springs, California. Higher statewide rates of epidural steroid injections were associated with significantly higher rates of lumbar surgery.

A number of investigations by the Federal Bureau of Investigations (FBI) and the OIG have found inappropriate activity related to interventional techniques. In one such case, a physician was convicted on multiple counts of healthcare fraud for IPM procedures (13). The findings of the OIG report (3) also illustrated that 63% of facet joint injection services allowed by Medicare in 2006 did not meet Medicare program requirements, resulting in approximately $96 million in improper payments. Medicare allowed an additional $33 million in improper payments for associated facility claims. Facet joint injection services provided in an office were more likely to have an error than those provided in an ambulatory surgery center (ASC) or hospital outpatient department (HOPD). The error rates were lower in a facility setting compared to an office setting (71% vs. 51%). Further, based on specialty error rate in an office setting, IPM -09 scored the best with a 12% error rate, whereas several specialties scored a 100% error rate and anesthesiology had a 63% error rate, pain medicine -72 with a 56% error rate, and physical medicine and rehabilitation with a 50% error rate. Finally, the OIG report also illustrated that approximately 35% of the Medicare facet joint injections were performed by non-interventional pain physicians, 19% by general practitioners, internists, and family practice physicians, while the remaining 16% were performed by orthopedic surgeons, neurologists, and rheumatologists (3). Manchikanti et al (7-11) showed approximately one-fourth of all interventional procedures were performed by non-interventional physicians.

IPM is an evolving speciality. It is defined as the "discipline of medicine devoted to the diagnosis and treatment of pain related disorders principally with the application of interventional techniques in managing subacute, chronic, persistent, and intractable pain, independently or in conjunction with other modalities of treatment" (14). The Medicare Payment Advisory Commission (MedPAC) also defined interventional techniques as minimally-invasive procedures including: percutaneous precision needle placement, with placement of drugs in targeted areas or ablation of targeted nerves; and some surgical techniques for the diagnosis and management of chronic, persistent, or intractable pain such as laser or endoscopic discectomy, intrathecal infusion pumps, and spinal cord stimulators.

At present, to be board certified by pain medicine subspecialty, the primary board certifications must be in anesthesiology, physical medicine and rehabilitation, or neurology and psychiatry. Occasionally, other specialists have been admitted to the certification, but interventional techniques are frequently performed by physicians in multiple other specialities. Interventional techniques are also performed in multiple settings, namely offices, ASCs, and HOPDs. HOPDs and ASCs are considered as facility settings, whereas non-facility

settings include physician offices. The publication of the fee schedule has changed significantly since 1997 including multiple new codes, significantly higher payments for procedures performed in an office setting to cover office overhead, and payment rate settings for HOPDs and ASCs (15-38).

Chronic pain in the United States is highly prevalent with substantial economic impact. It has been stated that chronic pain affects more adults in the United States than diabetes, heart disease, and cancer combined (39). The prevalence studies have shown that in the adult population chronic pain ranges from 2% to 40%, with a median point prevalence of 15% (40,41). Persistent pain has been reported with an overall prevalence of 20% of primary care patients, with approximately 48% reporting back pain, which was persistent in 49% of the patients 12 months later (42,43). The literature has consistently described the high prevalence of chronic persistent pain with associated functional and psychological disabilities, and health, social, and economic impact (44-88).

The primary purpose of this study is to evaluate the use of all interventional techniques including epidural injections, adhesiolysis procedures, facet joint interventions, sacroiliac joint injections, disc procedures, vertebral augmentation procedures, implantables, and other types of nerve blocks. Trigger point injections, intraarticular injections, surgical decompressions, and fusions were not included. In this evaluation we sought to identify trends in the number of procedures, reimbursement, and speciality involvement.

Methods

The study was performed utilizing the standard 5% national sample of the Centers for Medicare and Medicaid Services (CMS) Carrier Claim Record (formerly Physician/Supplier Part B) for 1997, 2002, and 2006. This data set is a sample of those enrolled in the fee-for-service Medicare program. The CMS's 5% sample data set is therefore unbiased and unpredictable in terms of any patient characteristics, but does allow for tracking patients over time and across databases and also provides data for individual states. CMS makes the 5% sample available to researchers, as the 100% data set is too large and is not feasible to use for research purposes. Even though previous studies (6,12) used only patients aged 65 or older, in this study we have used all patients enrolled in Medicare. A significant proportion of patients below the age of 65 receive IPM services. Medicare represents the single largest healthcare payor in the United States, with over 43 million beneficiaries in 2006 (89). Thus, the procedures performed on the Medicare beneficiaries represent a large proportion of the procedures for chronic pain being performed in the United States. Results from the 5% sample were multiplied by 20 to yield estimates for the entire Medicare beneficiary population. Rates were calculated based on Medicare beneficiaries for the corresponding year and are reported as procedures per 100,000 Medicare beneficiaries.

For analysis, the CPT procedure codes for interventional techniques were identified for years 1997, 2002, and 2006. The data were tabulated based on the place of service – HOPD, ASC, or office. The calculated data included Medicare beneficiaries, number of Medicare patients receiving IPM services, number of visits per patient, total allowed charges for IPM services, and average allowed charges per visit. Further, facility charges were identified for HOPDs, ASCs, and offices (office facility portion as overhead expense = total office payment minus physician payment). HOPD facility payments were estimated based on national payment rates with considering modifiers, due to non-availability of HOPD data in Carrier Claim Records.

From the national sample of the CMS data set, patient diagnoses were identified based on the most commonly used to the least commonly used. The data was analyzed by each state.

For the purposes of this study allowed charges were used to estimate the costs for Medicare for these procedures. Costs were also adjusted for healthcare inflation using the U.S. Bureau of Labor Statistics Consumer Price Index for Medical Care Services, and represent costs for 2006 (90).

IPM specialties were described as those providers designated in interventional pain management -09, pain medicine -72, anesthesiology -05, physical medicine and rehabilitation -25, neurology -13, psychiatry -26, orthopedic surgery -20, and neurosurgery -14 (91). For general physicians - general practice -01, family practice -08, and internal medicine -11 were utilized. All other providers were considered as other physicians and providers.

Statistical Analysis

The data were analyzed using SPSS (9.0) statistical software, Microsoft Access 2003, and Microsoft Excel (2003). For the comparison, the Z test was used. The procedure rates were calculated per 100,000 Medicare beneficiaries.

Results

Population Characteristics

As illustrated in Table 1, the number of Medicare patients receiving interventional techniques increased from 478,640 in 1997 to 1,289,040 in 2006 with an increase of 169% from 1997 to 2006. Medicare patients receiving IPM services per 100,000 increased 137% from 1997 to 2006. Overall, IPM services increased 235%, whereas services per 100,000 increased 197%. Proportionately, Medicare beneficiaries receiving IPM services increased from 1.24% in 1997 to 2.97% in 2006, an increase of 140%. There was no significant change in average visits per patient.

Figure 1 illustrates the number of patients receiv-

Table 1. *Characteristics of Medicare beneficiaries and interventional pain management (IPM) services.*

	1997	2002	2006	% of change	
				2002-2006	1997-2006
U.S. Population (in thousands)	267,784	288,369	299,395	3.8%	11.8%
≥ 65 years **(in thousands)**	34,933	35,602	37,125	4.3%	6.3%
Percent	13.0%	12.3%	12.4%	0.8%	-4.9%
Medicare Beneficiaries (in thousands)	38,465	40,503	43,339	7.0%	12.7%
% of Medicare beneficiaries to U.S. population	14.4%	14.0%	14.5%	3.6%	0.8%
≥ 65 years (**in thousands**)	33,636	34,698	36,317	4.7%	8.0%
Percent	87.4%	85.7%	83.8%	-2.2%	-4.2%
< 65 years (**in thousands**)	4,829	5,805	7,022	21%	45%
Percent	12.6%	14.3%	16.2%	13.3%	28.6%
IPM Services					
Number of Medicare patients receiving IPM services	478,640	837,240	1,289,040	54.0%	169.3%
% of Medicare beneficiaries	1.24%	2.07%	2.97%	43.5%	139.5%
IPM patients per 100,000	1,244	2,067	2,947	42.6%	136.9%
Number of visits	1,032,820	1,766,960	2,840,380	60.7%	175.0%
IPM visits Per 100,000	2,685	4,363	6,554	50.2%	144.1%
Services	1,377,000	2,472,920	4,610,360	86.4%	234.8%
IPM services per 100,000	3,580	6,106	10,638	74.2%	197.2%
Average visits per patient	**2.2 ± 2.2**	**2.1 ± 1.84**	**2.2 ± 1.95**	--	--

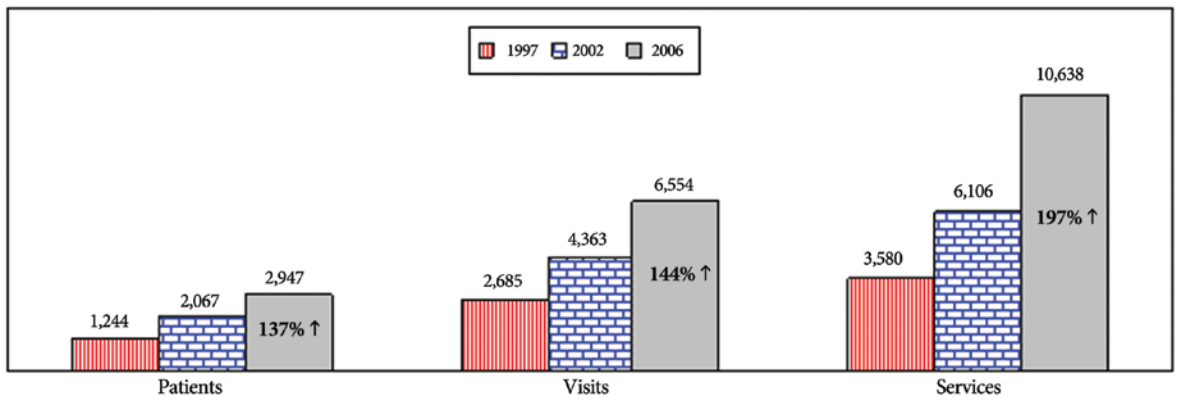

Fig. 1. *Number of Medicare patients receiving IPM services, visits, and services per 100,000 Medicare beneficiaries.*

ing IPM services with a 137% increase from 1997 to 2006, visits increasing 144%, and services increasing 197% per 100,000 Medicare beneficiaries.

Figure 2 illustrates the number of Medicare patients and services by age group (≥ 65 or < 65) per 100,000 Medicare beneficiaries. There is a higher proportion of patients in IPM settings below age 65 receiving services increasing from 1,522 in 1997 to 3,553 in 2006, a 133% increase, whereas the patients aged 65 or older increased from 1,204 to 2,862, a 138% increase. Further, the utilization of the procedures was higher for patients under the age of 65 with 4.5 services per patient in 2006, compared to per patient services of 3.35 services per patient aged 65 or older.

Table 2 illustrates utilization of IPM services by demographic characteristics. Overall, services increased 333% for Medicare beneficiaries younger than 65 years, whereas the services increased only 212% for the patients aged 65 or older. The female Medicare beneficiaries represented a larger proportion and were receiving IPM services more frequently than the male beneficiaries (224% vs. 160%) from 1997 to 2006.

Utilization Characteristics

Table 3 illustrates a summary of frequency of utilization of various categories of interventional techniques in the Medicare beneficiaries population in 1997, 2002, and 2006. The increase in number of services was within the range of increased Medicare beneficiaries receiving IPM services per 100,000 (117%) for epidural procedures, less for intrathecal implantable pumps, and other types of nerve blocks, while there was a significant increase for facet joint interventions, disc decompression, vertebral augmentation procedures, and spinal cord stimulators. Total services per 100,000 Medicare beneficiaries increased 197%,

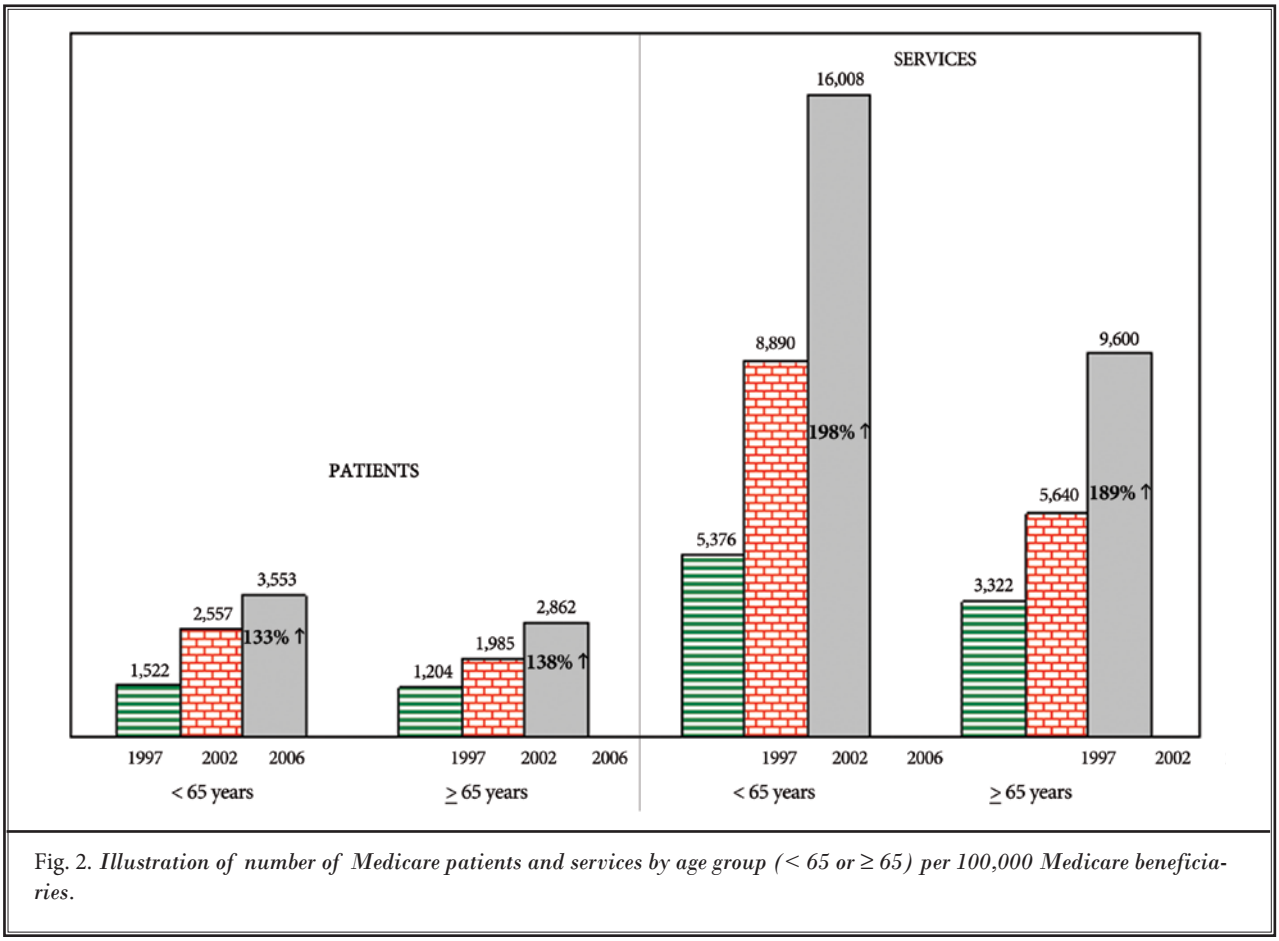

Fig. 2. *Illustration of number of Medicare patients and services by age group (< 65 or ≥ 65) per 100,000 Medicare beneficiaries.*

Table 2. *Utilization IPM services by demographic characteristics.*

	1997			2002			2006			Change from 2002-2006			Change from 1997-2006		
	Medicare (1,000s)	Patients	Services	Medicare (1,000s)	Patients	Services	Medicare (1,000s)	Patients	Services	Medicare (1,000s)	Patients	Services	Medicare (1,000s)	Patients	Services
Total	38,465	478,640	1,377,000	40,503	837,240	2,472,920	43,339	1,289,040	4,610,360	7.0%	54%	86%	12.7%	169%	235%
Age (years)															
< 65	4,829	73,500	259,600	5,805	148,440	516,060	7,022	249,500	1,124,080	21.0%	68%	118%	45.4%	239%	333%
% over total	12.55%	15.36%	18.85%	14.33%	17.73%	20.87%	16.20%	19.36%	24.38%	13.0%	9%	17%	29.1%	26%	29%
Per 100,000		1,522	5,376		2,557	8,890		3,553	16,008		43%	85%		133%	198%
≥ 65	33,636	405,140	1,117,400	34,698	688,800	1,956,860	36,317	1,039,540	3,486,280	4.7%	51%	78%	8.0%	157%	212%
% over total	87.45%	84.64%	81.15%	85.67%	82.27%	79.13%	83.80%	80.64%	75.62%	-2.2%	-2%	-4%	-4.2%	-5%	-7%
Per 100,000		1,204	3,322		1,985	5,640		2,862	9,600		47%	74%		138%	189%
Gender															
Male	15,655	172,500	493,280	17,761	295,860	829,720	19,140	457,520	1,569,700	7.8%	55%	89%	22.3%	165%	218%
% over total	40.70%	36.04%	35.82%	43.85%	35.34%	33.55%	44.16%	35.49%	34.05%	0.7%	0%	1%	8.5%	-2%	-5%
Per 100,000		1,102	3,151		1,666	4,672		2,390	8,201		43%	76%		117%	160%
Female	22,810	306,140	883,720	22,742	541,380	1,643,200	24,199	831,520	3,040,660	6.4%	54%	85%	6.1%	172%	244%
% over total	59.30%	63.96%	64.18%	56.15%	64.66%	66.45%	55.84%	64.51%	65.95%	-0.6%	0%	-1%	-5.8%	1%	3%
Per 100,000		1342	3874		2,381	7,225		3,436	12,565		44%	74%		156%	224%
Race															
African-American	3,308	29,100	81,360	3,872	53,080	150,820	4,320	83,080	328,900	11.6%	57%	118%	30.6%	185%	304%
% over total	8.60%	6.08%	5.91%	9.56%	6.34%	6.10%	9.97%	6.45%	7.13%	4.3%	2%	17%	15.9%	6%	21%
Per 100,000		880	2,459		1,371	3,895		1,923	7,613		40%	95%		119%	210%
White	33,426	423,740	1,189,800	31,953	746,140	2,185,420	36,235	1,142,580	3,937,260	13.4%	53%	80%	8.4%	170%	231%
% over total	86.90%	88.53%	86.41%	78.89%	89.12%	88.37%	83.61%	88.64%	85.40%	6.0%	-1%	-3%	-3.8%	0%	-1%
Per 100,000		1,268	3,560		2,335	6,839		3,153	10,866		35%	59%		149%	205%
Other	1,731	25,800	105,840	4,678	38,020	136,680	2,784	63,380	344,200	-40.5%	67%	152%	60.8%	146%	225%
% over total	4.50%	5.39%	7.69%	11.5%	4.54%	5.53%	6.42%	4.92%	7.47%	-44.4%	8%	35%	42.7%	-9%	-3%
Per 100,000		1,490	6,114		939	3,375		2,277	12,364		180%	323%		53%	102%

Table 3. *Summary of the frequency of utilizations of various categories of interventional procedures (excluding continuous epidurals, intraarticular injections, and trigger point and ligament injections) in the Medicare beneficiaries in 1997, 2002, and 2006.*

	1997 Services	2002 Services	2006 Services	Change from 2002 to 2006	Change from 1997 to 2006
Epidural procedures	768,360 (55.8%)	1,179,800 (47.7%)	1,879,060 (40.8%)	59%	145%
Per 100,000 Medicare beneficiaries	1,998	2,913	4,336	49%	117%
Percutaneous adhesiolysis	NA	14,760 0.6%	17,500 (0.4%)	19%	NA
Per 100,000 Medicare beneficiaries	NA	36	41	11%	
Facet joint interventions	233,200 (16.9%)	607,760 (24.6%)	1,688,180 (36.6%)	178%	624%
Per 100,000 Medicare beneficiaries	606	1,501	3,895	160%	543%
Sacroiliac joint interventions	NA	100,820 (4.1%)	208,980 (4.5%)	107%	NA
Per 100,000 Medicare beneficiaries	NA	249	482	94%	
Discography	7,820 (0.6%	19,060 (0.8%)	22,820 (0.5%)	20%	192%
Per 100,000 Medicare beneficiaries	20	47	53	12%	159%
Disc decompressions	440 (0.0%)	1,540 (0.1%)	2,060 (0.04%)	34%	368%
Per 100,000 Medicare beneficiaries	1	4	5	25%	316%
Vertebroplasty/Kyphoplasty	NA	26,140 (1.1%)	88,900 (1.9%)	240%	NA
Per 100,000 Medicare beneficiaries	-	65	205	218%	-
Intrathecal implantable pumps	5,000 (0.4%)	6,740 (0.3%)	7,240 (0.2%)	7%	45%
Per 100,000 Medicare beneficiaries	13	17	17	0%	29%
Spinal cord stimulators	5,640 (0.4%)	14,340 (0.6%)	39,280 (0.9%)	174%	596%
Per 100,000 Medicare beneficiaries	15	35	91	156%	518%
Other types of nerve blocks	356,540 (25.9%)	501,960 (20.3%)	656,340 (14.2%)	31%	84%
Per 100,000 Medicare beneficiaries	927	1,239	1,514	22%	63%
Total	1,377,000	2,472,920	4,610,360	86%	235%
Per 100,000 Medicare beneficiaries	3,580	6,106	10,638	74%	197%

( ) = percentage or total

compared to the increase of the Medicare patients utilizing IPM services per 100,000 of 139.5%.

Figure 3 illustrates increases of procedures characterized as other types of nerve blocks, facet joint interventions, epidurals, and overall totals per 100,000 Medicare beneficiaries.

Reimbursement (Cost) Characteristics

Table 4 illustrates data for 2002 and 2006, characteristics of physician and facility reimbursement by place of services. These reimbursements include allowed charges, which are adjusted to inflation for year 2006 (90). This table also illustrates the number

of patients, visits, and services based on the setting. Overall total allowed charges increased for all the procedures performed in ASC settings 97%, 60% for HOPD settings, and 164% for in-office settings.

Place of Service Characteristics

Table 5 illustrates the results of place of service characteristics for all 3 settings. In 2006, the number of patients receiving IPM services per 100,000 Medicare

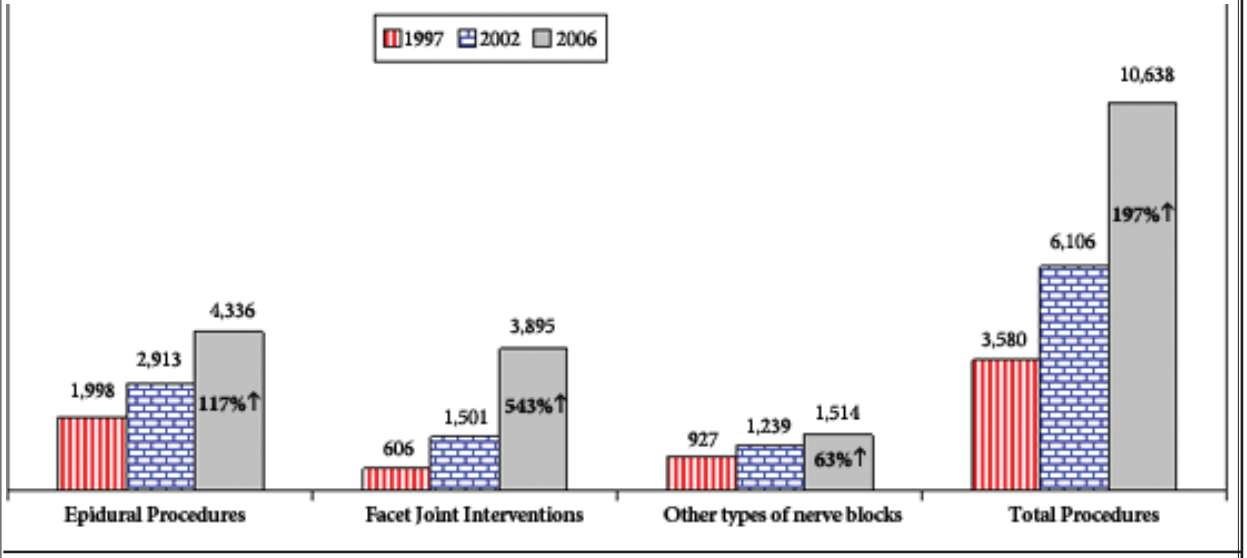

Fig. 3. Number of procedures per 100,000 Medicare beneficiaries.

Table 4. *Characteristics of physician and facility reimbursement by place of services (allowed charges adjusted to inflation).*

Place of service	2002		2006		% of change in Services from 2002	% of change in allowed charges from 2002
	Services	Allowed Charges	Services	Allowed Charges		
ASC SETTINGS						
Physicians	386,720	$41,668,369	857,840	$89,991,141	122%	116%
Facility	410,140	$131,696,305	933,840	$250,989,079	128%	91%%
Total	**410,140**	**$173,364,674**	**933,840**	**$340,980,220**	**128%**	**97%%**
HOPD SETTINGS						
Physicians	1,112,060	$115,679,946	1,422,720	$178,553,463	28%	54%
Facility#	1,112,060	$482,407,248	1,422,720	$779,914,223	28%	62%
Total	**1,112,060**	**$598,087,194**	**1,422,720**	**$958,467,685**	**28%**	**60%**
IN-OFFICE SETTINGS						
Physicians	974,140	$81,831,841	2,329,800	$201,972,527	139%	147%
Office overhead	974,140	$125,947,525	2,329,800	$346,842,253	139%	175%
Total	**974,140**	**$207,779,366**	**2,329,800**	**$548,814,780**	**139%**	**164%**
OVER ALL (ALL SETTINGS)						
Physicians	2,472,920	$239,180,156	4,610,360	$470,517,131	86%	97%
Facility including office overhead	2,472,920	$740,051,078	4,610,360	$1,377,745,551	86%	86%
Grand Total	**2,472,920**	**$979,231,234**	**4,610,360**	**$1,848,262,682**	**86%**	**70%**
Services Per 100,000	6,106		10,638		74%	

Table 5. *Place of service characteristics.*

Place of Service	1997	2002	2006	Per 100,000 Medicare Beneficiaries			% of change from	
				1997	2002	2006	2002-2006 (5 years)	1997-2006 (10 years)
ASC								
Patients	47,680	134,280	260,400	124	332	601	81%	385%
Visits	103,100	270,800	523,060	268	669	1,207	81%	350%
Services	116,500	386,720	857,840	303	955	1,980	107%	554%
HOPD								
Patients	295,420	462,580	576,300	768	1,142	1,330	16%	73%
Visits	562,780	835,600	1,001,280	1,463	2,063	2,311	12%	58%
Services	729,160	1,112,060	1,422,720	1,896	2,746	3,283	20%	73%
OFFICE SETTING								
Patients	170,680	303,040	547,780	444	748	1,264	69%	185%
Visits	389,100	661,180	1,316,060	1,012	1,632	3,037	86%	200%
Services	531,340	974,140	2,329,800	1,381	2,405	5,376	124%	289%

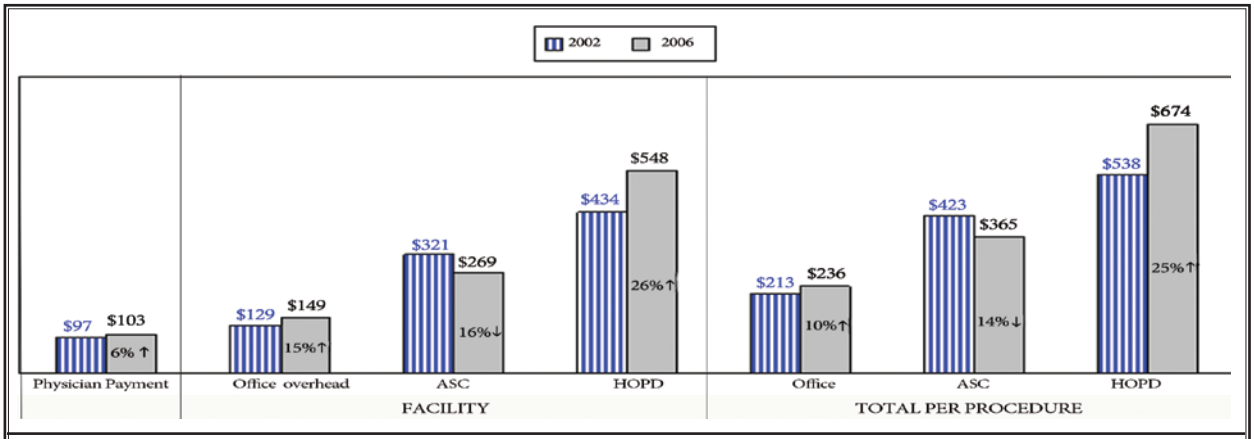

Fig. 4. *Allowed charges per procedure (inflation adjusted), change from 2002 to 2006.*

beneficiaries were 1,330 in HOPD settings, double that of ASC settings with 601.

Figure 4 and Table 6 illustrate the characteristics of average charges per patient, per visit, and per service in HOPD, ASC, and office settings. Also illustrated are charges in an office setting, ASC, and HOPD setting for total allowed charges per patient, which are the highest in HOPD and lowest in office settings. Per service based on CPT code declined 3% in ASC settings for physicians, 16% for facility, with an overall decrease of 14%. In contrast, for the HOPD settings, per service code for physician charges increased by 21%, and facility charges by 26%, with an overall increase of 25%. Similarly, in office settings, increases were seen though less than in HOPD settings with a 3% increase for physician charges per service, office overhead charges of 15%, and overall increase of 10% from 2002 to 2006. Fig. 4 illustrates charges in HOPD, ASC, and office settings. Also illustrated are charges in an office setting, ASC, and HOPD setting for total allowed charges per patient, which are the highest in HOPD and lowest in office settings.

Table 6. *Characteristics of average charges per patient, per visit, and per service by place of service.*

Place of Service	2002	2006	% of change from 2002
ASC			
Physicians charges	$ 41,668,369	$ 89,991,141	116%
Per Patient	$ 310.31	$ 345.59	11%
Per Visit	$ 153.87	$ 172.05	12%
Per Service/Code	*$ 107.75*	*$ 104.90*	*-3%*
Facility Charges	$ 131,696,305	$ 250,989,079	91%
Per Patient	$ 913.42	$ 983.81	8%
Per Visit	$ 436.77	$ 463.95	6%
Per Service/Code	*$ 321.10*	*$ 268.77*	*-16%*
Total Charges	$ 173,364,674	$ 340,980,220	97%
Per Patient	$ 1,202.42	$ 1,336.55	11%
Per Visit	$ 574.97	$ 630.30	10%
Per Service/Code	*$ 422.70*	*$ 365.14*	*-14%*
HOPD			
Physician Charges	$ 115,679,946	$ 178,553,463	54%
Per Patient	$ 250.08	$ 309.83	24%
Per Visit	$ 138.44	$ 178.33	29%
Per Service/Code	*$ 104.02*	*$ 125.50*	*21%*
Facility Charges	$ 482,407,248	$ 779,914,223	62%
Per Patient	$ 1,042.86	$ 1,353.31	30%
Per Visit	$ 577.32	$ 778.92	35%
Per Service/Code	*$ 433.80*	*$ 548.19*	*26%*
Total Charges	$ 598,087,194	$ 958,467,685	60%
Per Patient	$ 1,292.94	$ 1,663.14	29%
Per Visit	$ 715.76	$ 957.24	34%
Per Service/Code	*$ 537.82*	*$ 673.69*	*25%*
OFFICE SETTING			
Physician Charges	$ 81,831,841	$ 201,972,527	147%
Per Patient	$ 270.04	$ 368.71	37%
Per Visit	$ 123.77	$ 153.47	24%
Per Service/Code	*$ 84.00*	*$ 86.69*	*3%*
Overhead Charges	$ 125,947,525	$ 346,842,253	175%
Per Patient	$ 415.61	$ 633.18	52%
Per Visit	$ 190.49	$ 263.55	38%
Per Service/Code	*$ 129.29*	*$ 148.87*	*15%*
Total Charges	$ 207,779,366	$ 548,814,780	164%
Per Patient	$ 685.65	$ 1,001.89	46%
Per Visit	$ 314.26	$ 417.01	33%
Per Service/Code	*$ 213.30*	*$ 235.56*	*10%*

In 2006, HOPD total facility charges were $779,914,223 compared to overall facility expenditures for IPM services of $1,377,745,551 (57%). In comparison Medicare benefit payments by type of service in 2006 were 5% for HOPD services, an 11.4-fold difference compared to all IPM Services (Fig. 5) (92).

Specialty Characteristics

Table 7 and Fig. 6 illustrate procedural characteristics based on specialty. Overall increases in services were a 74% per 100,000 Medicare beneficiaries from 2002 to 2006. However, for general physicians the increases were 349% compared to 69% for IPM and 40% for other specialties for an overall increase of 74%.

As shown in Fig. 6, utilization of IPM services by speciality per year increased exponentially for general physicians by 70%, compared to an increase of 13.8% for IPM physicians, an overall increase of 14.8%.

Characteristic by State

Table 8 and Fig. 7 illustrate the number of overall services and services per 100,000 Medicare beneficiaries. The average increase of services from 1997

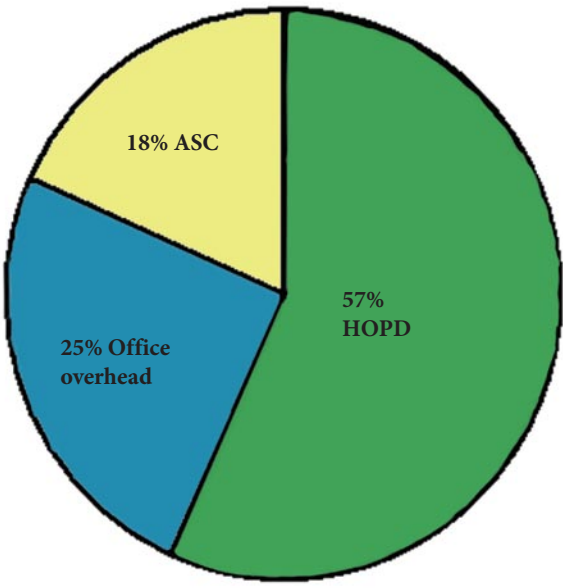

Fig. 5. *Medicare payments for facility services by type of facility in 2006.*

Table 7. *Utilization of IPM services by speciality groups.*

Speciality	2002 Services	2006 Services	Increases from 2002-2006 (5-year period)
Interventional pain management	1,999,000 (80.8%)	3,618,300 (78.5%)	81%
Per 100,000 Medicare beneficiaries	4935	8349	69%
General physicians	85,140 (3.4%)	409,400 (8.9%)	381%
Per 100,000 Medicare beneficiaries	210	945	349%
Other Specialties	388,780 (15.7%)	582,660 (12.6%)	50%
Per 100,000 Medicare beneficiaries	960	1344	40%
Total	2,472,920	4,610,360	86%
Per 100,000 Medicare beneficiaries	6,106	10,638	74%

Interventional Pain Management - Anesthesiology, Pain Management, Neurology, Neurosurgery, Orthopedic Surgery, Physical Medicine and Rehabilitation, and Psychiatry; General Physicians - General Practice, Family Practice & Internal Medicine; Others – all other providers

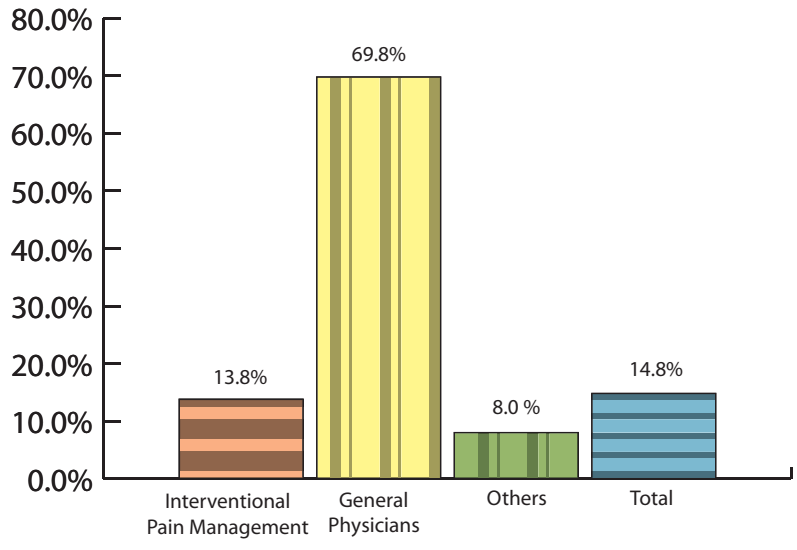

Fig. 6. *Utilization of IPM services by speciality per year (from 2002 to 2006, per 100,000 Medicare beneficiaries).*

Table 8. *Number of services and services per 100,000 Medicare beneficiaries provided by state.*

State	1997 Services	1997 Rate	2002 Services	2002 Rate	2006 Services	2006 Rate	Change from 2002-2006	Change from 1997-2006
Connecticut	5,300	1,043	16,600	3,051	33,960	6,407	110%	514%
Florida	143,840	5,274	314,940	10,428	861,620	27,979	168%	431%
Delaware	2,520	2,384	6,620	5,911	15,500	11,757	99%	393%
Utah	5,000	2,560	13,640	7,104	27,760	11,286	59%	341%
Hawaii	800	512	2,960	1,728	3,740	2,201	27%	330%
South Carolina	16,480	3,081	44,300	6,534	86,360	12,814	96%	316%
West Virginia	6,660	1,999	15,560	4,322	29,780	8,242	91%	312%
Louisiana	16,520	2,788	34,100	5,664	70,280	11,260	99%	304%
Wyoming	1,500	2,394	4,720	7,008	6,540	9,528	36%	298%
Ohio	42,540	2,527	82,580	5,314	176,260	9,913	87%	292%
Vermont	1,620	1,893	2,840	3,108	6,800	7,387	138%	290%
Alaska	960	2,629	1,340	2,927	5,000	10,066	244%	283%
North Carolina	29,220	2,722	81,260	6,829	137,260	10,416	53%	283%
Massachusetts	18,000	1,901	33,620	3,778	71,260	7,259	92%	282%
Minnesota	11,100	1,736	22,280	3,802	42,800	6,001	58%	246%
Indiana	27,000	3,233	62,800	7,388	101,720	11,026	49%	241%
New Hampshire	4,720	2,918	10,000	6,098	19,580	9,898	62%	239%
Mississippi	14,280	3,505	30,560	7,897	54,240	11,749	49%	235%
Michigan	67,940	4,960	142,440	11,137	247,520	16,386	47%	230%
South Dakota	3,600	3,053	6,120	5,070	11,820	9,921	96%	225%
Texas	97,460	4,506	207,020	8,851	383,280	14,598	65%	224%
Maryland	20,240	3,266	36,900	5,651	73,220	10,341	83%	217%
Colorado	11,900	2,690	26,040	5,198	45,900	8,502	64%	216%
Montana	4,020	3,021	11,280	7,185	14,380	9,477	32%	214%
Maine	4,460	2,146	9,620	4,201	16,040	6,668	59%	211%
Missouri	32,300	3,823	55,040	7,388	108,660	11,690	58%	206%
New Mexico	5,680	2,569	11,340	3,857	21,580	7,824	103%	205%
Illinois	47,220	2,911	91,560	5,659	151,020	8,817	56%	203%
Oregon	6,360	1,333	11,660	2,389	21,800	3,943	65%	196%
Virginia	25,420	2,992	53,800	6,038	88,620	8,706	44%	191%
Tennessee	29,520	3,705	50,400	6,866	101,620	10,705	56%	189%
Kentucky	22,240	3,691	39,360	6,140	72,000	10,361	69%	181%
Wisconsin	23,100	2,998	47,380	6,759	69,640	8,292	23%	177%
Nebraska	7,980	3,179	15,240	5,956	20,960	8,424	41%	165%
Kansas	16,700	4,309	25,600	6,790	46,240	11,376	68%	164%
District of Columbia	1,560	2,049	2,300	3,101	3,280	5,400	74%	164%
Washington	15,920	2,247	29,960	4,380	49,640	5,862	34%	161%
Arkansas	19,120	4,436	28,380	5,828	56,020	11,554	98%	160%
Iowa	15,000	3,153	28,160	6,459	40,580	8,206	27%	160%
Alabama	37,280	5,629	79,100	10,491	111,360	14,420	37%	156%
Rhode Island	3,700	2,185	5,200	3,021	8,380	5,420	79%	148%
North Dakota	2,940	2,861	5,940	5,755	6,880	7,024	22%	146%
Nevada	6,360	2,976	14,340	5,411	22,280	7,263	34%	144%

Table 8 cont. *Number of services and services per 100,000 Medicare beneficiaries provided by state.*

State	1997 Services	1997 Rate	2002 Services	2002 Rate	2006 Services	2006 Rate	Change from 2002-2006	Change from 1997-2006
Pennsylvania	72,420	3,474	115,840	5,698	181,440	8,416	48%	142%
New Jersey	39,940	3,378	74,660	6,016	98,940	7,968	32%	136%
Oklahoma	20,160	4,056	34,640	6,779	52,740	9,528	41%	135%
New York	87,560	3,302	128,540	4,912	203,180	7,244	47%	119%
Arizona	23,280	3,658	36,480	4,606	65,400	8,023	74%	119%
Georgia	44,320	5,098	67,700	7,791	118,760	11,045	42%	117%
Idaho	7,540	4,839	11,720	6,783	16,380	8,749	29%	81%
California	202,840	5,426	188,440	4,989	317,300	7,422	49%	37%
U.S.	1,377,000	3,580	2,472,920	6,106	4,610,360	10,638	74%	197%

Rate - per 100,000 Medicare beneficiaries

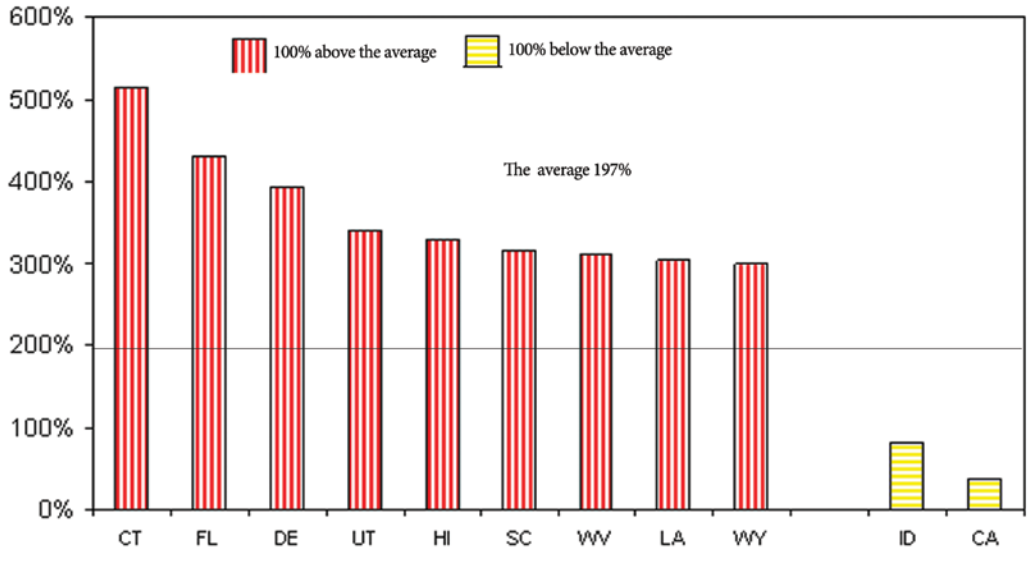

Fig. 7. *Percentage of increase in services per 100,000 Medicare beneficiaries from 1997 to 2006.*

to 2006 was 197% for the United States, an annual percent increase of 19.7%. The states with increases greater than 100% of average (i.e. ≥ 297%) include Connecticut, Florida, Delaware, Utah, Hawaii, South Carolina, West Virginia, Louisiana, and Wyoming. In contrast, decreases of 100% (i.e., < 97%) were seen only in 2 states, namely California with a 37% increase and Idaho with an 81% increase. The remaining states showed increases of 6% to 95%.

There was a 13.9-fold difference between the state with the lowest rate – California (37%), and the state with the highest rate – Connecticut (514%) from 1997 to 2006. Florida had 11.6-fold increase compared to California (431% vs. 37% increase).

Table 9 illustrates state by state characteristics based on highest rate of services per 100,000 Medicare beneficiaries for 2006. The average difference for the United States for services per 100,000 beneficiaries

Table 9. *State by state characteristics based on highest rate of services per 100,000 Medicare beneficiaries for 2006.*

	Services per 100,000 Medicare Beneficiaries (2006)	Fold difference from the lowest state
Florida	27,979	12.7
Michigan	16,386	7.4
Texas	14,598	6.6
Alabama	14,420	6.6
South Carolina	12,814	5.8
Delaware	11,757	5.3
Mississippi	11,749	5.3
Missouri	11,690	5.3
Arkansas	11,554	5.2
Kansas	11,376	5.2
Utah	11,286	5.1
Louisiana	11,260	5.1
Georgia	11,045	5.0
Indiana	11,026	5.0
Tennessee	10,705	4.9
North Carolina	10,416	4.7
Kentucky	10,361	4.7
Maryland	10,341	4.7
Alaska	10,066	4.6
South Dakota	9,921	4.5
Ohio	9,913	4.5
New Hampshire	9,898	4.5
Wyoming	9,528	4.3
Oklahoma	9,528	4.3
Montana	9,477	4.3
Illinois	8,817	4.0
Idaho	8,749	4.0
Virginia	8,706	4.0
Colorado	8,502	3.9
Nebraska	8,424	3.8
Pennsylvania	8,416	3.8
Wisconsin	8,292	3.8
West Virginia	8,242	3.7
Iowa	8,206	3.7
Arizona	8,023	3.6
New Jersey	7,968	3.6
New Mexico	7,824	3.6
California	7,422	3.4
Vermont	7,387	3.4
Nevada	7,263	3.3
Massachusetts	7,259	3.3
New York	7,244	3.3
North Dakota	7,024	3.2
Maine	6,668	3.0
Connecticut	6,407	2.9
Minnesota	6,001	2.7
Washington	5,862	2.7
Rhode Island	5,420	2.5
District of Columbia	5,400	2.5
Oregon	3,943	1.8
Hawaii	2,201	1.0
U.S.	10,638	4.8

was 4.8-fold with the lowest rate of services in Hawaii. Fifteen states had above average increases. As shown in this table, Florida presented with 27,979 services per 100,000 Medicare beneficiaries compared to Hawaii with 2,201 services per 100,000 beneficiaries, a 12.7-fold geographic difference.

Characteristics of Primary Diagnosis

Table 10 illustrates the primary diagnosis codes (the first diagnosis listed) used. The diagnosis code of 724.4, used for lumbar radiculitis, dominated with 16.1% of the total usage, followed by diagnosis of lumbar spinal stenosis 724.02 with 9.3% of charges, with 724.2 a non-specific low back pain code occupying 9.2% of the charges, followed by lumbar facet joint pain code of 721.3 of 7.9%, and lumbar intervertebral disc disease 722.52 of 7.2% of the billings.

Overall Growth Patterns

As shown in Fig. 8, the U.S. population over age 65 increased 6.3% from 1997 to 2006 with the U.S. population increasing 11.8%, while Medicare benefi-

Table 10. *Primary diagnosis codes (first diagnosis) used.*

ICD Diagnosis	1997	Percent	2002	Percent	2006	Percent
7244	60,940	12.7%	131,760	15.7%	196,880	15.3%
72402	38,860	8.1%	88,140	10.5%	125,840	9.8%
7242	66,560	13.9%	69,720	8.3%	105,120	8.2%
72252	17,880	3.7%	55,680	6.7%	91,420	7.1%
7213	7,420	1.6%	27,740	3.3%	73,040	5.7%
72210	17,700	3.7%	36,820	4.4%	55,620	4.3%
73313	1,460	0.3%	12,180	1.5%	39,100	3.0%
7202	1,820	0.4%	15,440	1.8%	33,900	2.6%
3556	5,800	1.2%	18,840	2.3%	27,660	2.1%
7234	7,260	1.5%	16,240	1.9%	26,760	2.1%
72283	5,860	1.2%	17,040	2.0%	25,860	2.0%
7231	6,600	1.4%	9,500	1.1%	19,440	1.5%
7210	1,940	0.4%	5,680	0.7%	18,280	1.4%
7243	12,980	2.7%	14,220	1.7%	16,120	1.3%
7246	1,200	0.3%	6,460	0.8%	15,580	1.2%
7295	7,200	1.5%	8,800	1.1%	13,280	1.0%
8404	2,120	0.4%	8,240	1.0%	12,600	1.0%
V5849	480	0.1%	4,740	0.6%	12,280	1.0%
7224	2,300	0.5%	7,120	0.9%	11,980	0.9%
71596	1,780	0.4%	9,360	1.1%	11,600	0.9%
7248	4,240	0.9%	5,680	0.7%	11,180	0.9%
7292	10,700	2.2%	10,320	1.2%	10,040	0.8%
79093	40	0.0%	3,920	0.5%	9,860	0.8%
71941	2,580	0.5%	5,520	0.7%	9,520	0.7%
7245	15,020	3.1%	8,700	1.0%	8,380	0.7%
7220	1,960	0.4%	4,320	0.5%	7,900	0.6%
72273	2,700	0.6%	6,740	0.8%	6,540	0.5%
33383	2,760	0.6%	5,180	0.6%	6,520	0.5%
7238	140	0.0%	3,320	0.4%	6,220	0.5%
8054	480	0.1%	2,120	0.3%	6,060	0.5%
8052	300	0.1%	1,560	0.2%	5,840	0.5%
7230	1,140	0.2%	3,180	0.4%	5,740	0.4%
72400	11,620	2.4%	7,400	0.9%	5,480	0.4%
71946	1,800	0.4%	4,580	0.5%	4,380	0.3%
7262	480	0.1%	1,700	0.2%	4,360	0.3%
71945	2,420	0.5%	2,880	0.3%	4,280	0.3%
3558	1,900	0.4%	2,900	0.3%	4,240	0.3%
71595	400	0.1%	1,780	0.2%	4,000	0.3%
Others	149,800	31.3%	191,720	22.9%	236,140	18.3%
Total	478,640	100.0%	837,240	100.0%	1,289,040	100.0%

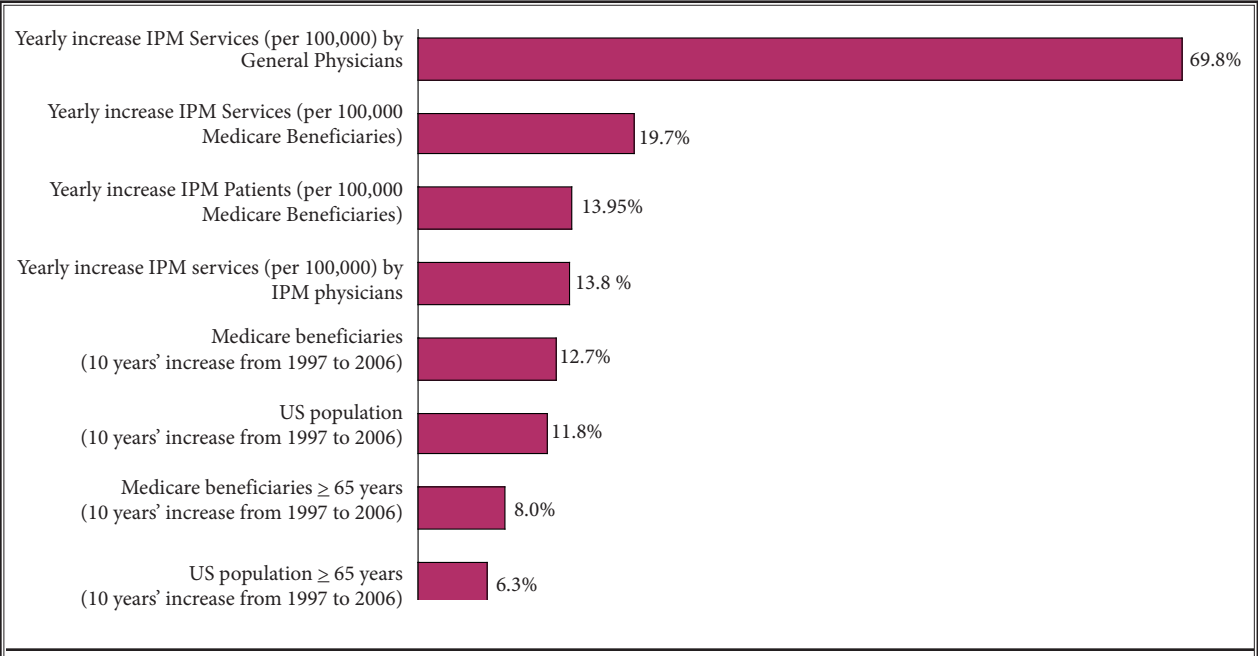

Fig. 8. *Illustration of overall growth patterns (percent) from 1997 to 2006 in Medicare beneficiaries.*

ciaries increased by 12.7%. However, the increase of Medicare beneficiaries above 65 years was 8% compared to 45% for less than 65 years of age compared to overall U.S. population. The proportion of patients receiving IPM services per 100,000 Medicare beneficiaries increased 139.5%.

Discussion

Interventional techniques for chronic pain have increased dramatically over a period of 10 years from 1997 to 2006. The increases were present in all settings, by all types of specialists. However increases were substantially higher for cost data in-office settings, followed by ASCs. The increases resulted in approximately $2 billion in overall payments for interventional techniques in the United States for physicians and all types of facilities (3).

Over this period of 10 years, patients utilizing IPM services per 100,000 Medicare beneficiaries increased 137%, whereas IPM services increased 197%. The study also showed an exponential increase in facet joint interventions. The majority of the funding for interventional techniques went to hospital settings with hospital payments alone higher than the office portion of the facility payment or office overhead and ASC facility payments ($482 vs. $258 million in 2002 and $780 vs. $598 million in 2006) even though the number of patients treated are significantly less when ASCs and offices are combined. There also has been a significant increase (349% or 69.8% per year) in general physicians performing interventional techniques from 2002 to 2006. HOPD revenues from Medicare expenses in 2006 were 5% of the total Medicare spending, whereas they constituted 57% of expenses for IPM procedures, an 11.4-fold difference.

There was a 13.9-fold difference in the increase between the state with the lowest rate and the state with the highest rate in utilization patterns of interventional techniques (California vs. Connecticut) from 1997 to 2006. Further, in 2006 there was a 12.7-fold difference between the states with the highest rate in utilization pattern of interventional techniques (Florida) compared to Hawaii with the lowest utilization rate. Overall the increase in services from 2002 to 2006 in Medicare beneficiaries per 100,000 was 74% whereas for general physicians the increase was 349%, and 69% for interventional pain physicians, it was 69%, with a 5-fold difference between general physicians and IPM specialists.

The results of this evaluation of growth patterns

are similar to previous evaluations by others (3,6,12) as well as our own evaluations (7,10), however, they differ in other aspects. Friedly et al (6,12) focused on the escalating use of injection therapies coupled with a lack of evidence in managing chronic low back pain and geographic variation in epidural steroid injections. However, they (6) have reached inaccurate conclusions (93).

The critics of IPM continue to claim that there is no proof that interventional techniques work, and that there is no proof that low back pain, chronic pain, or radiculitis or sciatica have increased. However, disability and economic impact are increasing (50,52-62,65,67), Further, there is evidence of increased awareness and diagnostic accuracy and some evidence of increasing prevalence (55). Understanding of impact of chronic pain has changed over the years, specifically with its comorbid disorders and functional limitations. In fact, in an evaluation of the prevalence and determinants of pain and pain-related disability in urban and rural settings in Southeastern Ontario, 76% reported some pain over the past 6 months (50). High pain intensity with low pain interference was seen in 26% (Grade II) and high pain intensity with high pain interference was seen in 17% (Grades III and IV). Of those reporting pain, 49% reported chronic pain defined as pain for a minimum of 90 days over the past 6 months, which represented 37% of the sample. While annual prevalence of chronic low back pain ranges from 15% to 45%, with a point prevalence of 30% (40-44,47,48,62,63), the lifetime prevalence of spinal pain, which also includes neck and thoracic pain, has been reported as 54% to 80% (40,46,62-68). In addition, studies of the prevalence of low back pain and neck pain (62,67) and its impact on general health showed 25% of patients reporting Grade II to IV low back pain with high pain intensity and disability versus 14% with neck pain. It also has been shown in studies evaluating chronic low back pain that the average age-related prevalence of persistent low back pain is approximately 15% in adults, whereas it was 27% in the elderly (40-48). Historically, back pain research has primarily focused on younger working adults, but now there is clear evidence that back pain is one of the most frequent complaints in older persons (40-47) and is an independent correlate of functional limitations (40,52), perceived difficulty in performing daily activities (53), and a risk factor for future disability. Finally, the conventional belief that most episodes of low back pain will be short-lived (80% to 90% of attacks resolving in about 6 weeks irrespective of the administration or type of treatment), with only 5% to 10% of patients developing persistent back pain, has been questioned, with modern evidence showing that chronic persistent low back pain and neck pain in adults and the elderly are seen in 25% to 60% of patients, one year or longer after the initial episode (69-83). In addition, the health and economic impact of chronic pain has been stressed more frequently (40,52-61,84-88). Finally, advances in understanding of the structural basis of chronic spinal pain (40) and evidence-based medicine (EBM) may have increased utilization (40,94-133) as well as increasing the understanding of interventional pain management and, as a result, more appropriate utilization. Consequently, IPM has recently been defended (134-139).

However, what is being ignored is increasing surgical procedures and the costs related to the surgical interventions themselves and failed surgical procedures as well (140-156). In recent years, surgical discectomies, decompressions, and spinal fusions have represented the largest portion of the U.S. spine market with 2003 expenditures of $2.5 billion in the United States of the estimated $3 billion for the worldwide spine market (140). In the year 2002, more than 1 million spinal procedures were performed in the U.S. (140,154). In fact, Weinstein et al (142), in a study of the United States' trends and regional variations in lumbar spine surgery from 1992 to 2003, showed that lumbar fusion rates have increased steadily since 1992 from 0.3 per 1,000 enrollees in 1992 to 1.1 per 1,000 enrollees in 2003. They also showed that Medicare spending for inpatient back surgery more than doubled over the decade. In 2003, lumbar fusion accounted for 47% of total spending for back surgery, which was an increase of 14% over 1992. Further, a significant proportion of patients continue to have problems after surgical interventions even worse than before. It has been shown that epidural fibrosis may account for as much as 20% to 36% of all cases of failed back surgery syndrome (145,146,157,158) with 8% to 16% of these patients having facet joint pain and a significant proportion with sacroiliac joint pain (124), all of which may exponentially increase the need for interventional techniques based on the results of surgeries. Even then, surgical rates are increasing with only emerging evidence (159-163).

Geographic variations were seen in this study; however, they were not similar to Friedly et al's (12) report. Friedly et al showed a 7.7-fold difference be-

tween Hawaii and Alabama for epidural injections, whereas our study showed a 13.9-fold difference between Connecticut and California and a 11.6-fold difference between Florida and California using the increases from 1997 to 2006 between the state with the lowest rate and the state with the highest rate in utilization patterns for all interventional techniques. The average difference for the United States for services per 100,000 Medicare beneficiaries was 4.8-fold with the lowest rate of services in Hawaii. Fifteen states had above average increases. In addition, in comparison with state wise characteristics for 2006 for 100,000 Medicare beneficiaries, Florida utilized 27,979 services, whereas Hawaii utilized 2,201 with a 12.7-fold difference in utilization patterns from the highest state to the lowest state. Connecticut, which showed significant increases in comparison, showed a 2.9-fold difference indicating changing patterns of utilization in Connecticut, but not in Florida.

Our data also agrees with the OIG report (3) that there is an explosion in facet joint blocks along with a great proportion of non-interventional physicians performing these procedures, and a significant proportion of general physicians performing these procedures in an in-office setting. The major and important differences between in-office setting and facility setting include credentialing and the necessity to demonstrate appropriate indications and medical necessity for procedures performed in facilities.

There are several limitations to our study. These include the lack of inclusion of participants in Medicare Advantage plans and potential coding errors. In contrast to previous studies (6,12), in this study, we employed all patients receiving Medicare either below the age of 65 or over the age of 65. This inclusion is highly important because patients below the age of 65 represent a significant proportion of patients receiving interventional techniques with higher frequency (4.50 vs. 3.35 services per patient) in 2006. Since the data set does not contain HOPD facility charges, we estimated the facility charges for outpatient hospitals, as others have in the past (6). Another limitation is that some of the variation may be related to coding errors and diagnostic ambiguity. However, we have used actual data not only for physician services, but also for the facility portion of the office services, and ASCs. Further, all previous evaluations were outdated, whereas our data is within the last 2 years with the latest data available. As described by Friedly et al (12) the geographic variations may be based on physician supply as well as local practice conventions, training styles, or other factors. Another limitation is that some of the variations may be related to coding errors, diagnostic ambiguity, or local conventions (6,12,164,165). However, due to the heightened auditing practices and attention to compliance with the OIG report, it appears that this will not have any effect on our data synthesis. Nonetheless, studies that have examined the accuracy of Medicare claims data for various diagnosis and procedures including interventional techniques have generally found that the claims data have a good deal of accuracy in capturing procedures and diagnosis codes, with positive predictive values ranging from 62% to 95% (6,12,166-170). Further, this data correlated well with utilization data provided by CMS (171).

Thus, there are multiple causes for the increase in costs for interventional techniques which range from an explosion of certain procedures and inappropriate use, but also are due to increased costs associated with increasing numbers of Medicare beneficiaries utilizing IPM services and the evidence shown that interventional techniques are effective.

To combat the problem of overuse, and to some extent abuse, the OIG (3) has recommended strengthening program safeguards to prevent improper payment for IPM services. Consequently, to do so, CMS should establish local carrier determinations (LCDs) across the country based on reasonable LCDs which have been shown certain IPM procedures to be effective without compromising patient access and care (172) and which assist carriers in developing ways to scrutinize claims for IPM services in all settings with a special focus on in-office settings. In addition, radiographic imaging guidance must be mandatory for interventional techniques except for peripheral nerve blocks and carriers should carefully monitor the frequency limits of diagnostic and therapeutic procedures. Other aspects include monitoring of documentation, coding, and medical necessity criteria. Finally, Congress should enact IPM procedure standards which should only be performed in either a facility setting or in an accredited office and only by well-trained, qualified physicians. These steps will improve the standards, access, and quality of physicians performing these procedures without increasing the cost for the program, and may even lead to improved care, reduced costs, and eliminate the necessity to continually reduce reimbursements for physicians and facilities for interventional techniques.

Conclusion

Interventional techniques increased significantly in Medicare beneficiaries from 1997 to 2006. Overall, there was an increase of 137% in patients utilizing IPM services per 100,000 Medicare beneficiaries, with an increase of 197% for IPM services. The study also showed an exponential increase in facet joint interventions, sacroiliac joint blocks. The majority of the reimbursement for interventional techniques goes to the procedures performed in HOPDs. There also has been significant increase in general physicians performing interventional techniques from 2002 to 2006.

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