Health Policy Review

Utilization of Interventional Techniques in Managing Chronic Pain in the Medicare Population: Analysis of Growth Patterns from 2000 to 2011

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Background: Reports from the United States Government Accountability Office (GAO), the Institute of Medicine (IOM), the Medicare Payment Advisory Commission (MedPAC), and the Office of Inspector General (OIG) continue to express significant concern with the overall fiscal sustainability of Medicare and the exponential increase in costs for chronic pain management.

Study Design: The study is an analysis of the growth of interventional techniques in managing chronic pain in Medicare beneficiaries from 2000 to 2011.

Objective: To evaluate the use of all interventional techniques in chronic pain management.

Methods: The study was performed utilizing the Centers for Medicare and Medicaid Services (CMS) Physician Supplier Procedure Summary Master Data from 2000 to 2011.

Results: Interventional techniques for chronic pain have increased dramatically from 2000 to 2011. Overall, the increase of interventional pain management (IPM) procedures from 2000 to 2011 went up 228%, with 177% per 100,000 Medicare beneficiaries.

The increases were highest for facet joint interventions and sacroiliac joint blocks with a total increase of 386% and 310% per 100,000 Medicare beneficiaries, followed by 168% and 127% for epidural and adhesiolysis procedures, 150% and 111% for other types of nerve blocks and finally, 28% and 8% increases for percutaneous disc procedures. The geometric average of annual increases was 9.7% overall with 13.7% for facet joint interventions and sacroiliac joint blocks and 7.7% for epidural and adhesiolysis procedures.

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

Conclusion: Interventional techniques increased significantly in Medicare beneficiaries from 2000 to 2011. Overall, there was an increase of 177% in the utilization of IPM services per 100,000 Medicare beneficiaries, with an annual geometric average increase of 9.7%. The study also showed an exponential increase in facet joint interventions and sacroiliac joint blocks.

Key words: Interventional techniques, interventional pain management, facet joint injections, epidural steroid injections, sacroiliac joint injections, chronic pain, chronic spinal pain

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Though the true burden of chronic pain has not been accurately estimated due to numerous variations in the definition, severity, and interference with activities of daily living and ability to work, the estimates of chronic pain ranged from 11% to 55% (1,2). It has been documented that chronic persistent pain can cause significant impairment of the ability to perform physical activities, psychological health, and performance of social responsibilities including work and family life (1-20). The report from the Institute of Medicine (IOM) report on relieving pain in America (4) noted that not only is the magnitude of pain in the United States astounding with more than 100 million Americans with pain that persists for weeks to years, the estimated financial costs are enormous. Gaskin and Richard (20) described the economic cost of pain in the United States based on the 2008 medical expenditure survey with a total cost ranging from $560 to $635 billion in 2010. In addition, the value of the productivity lost due to pain ranged from $299 to $335 billion. Consequently, they concluded that the annual cost of pain was greater than the annual cost of heart disease ($309 billion), cancer ($243 billion), and diabetes ($188 billion). In addition, disability secondary to chronic pain is also enormous and continues to increase (21). The proportion of disabled individuals, along with costs related to disability, is increasing in the United States. Disability is manifested as physical and psychological impairment. Martin et al (5) also evaluated health care expenditures in the United States in 2005 for treating back and neck problems. They found these expenditures to total approximately $86 billion, with an increase of 65% between 1997 and 2005 with a 49% increase in the number of patients seeking spine related care. Freburger et al (7), during an evaluation in North Carolina, showed significant increases in low back pain from 3.9% in 1992 to 10.2% in 2006.

Various modalities of treatments offered to manage chronic pain including imaging, interventional techniques, drug use, physical therapy, surgery, and other treatments have increased substantially over the past decade (22-43). Interventional techniques are thus considered one of the major components contributing to increasing expenditures among patients with chronic pain. The literature addressing the effectiveness of multiple interventional techniques in managing chronic pain, specifically of spinal pain, continues to emerge. Even then, it has been debated in reference to effectiveness, appropriate medical necessity, and indications (22-28,30,36-39,44-53). Consequently, among various interventions, interventional techniques also have been the focus of attention for payors, public policy health experts, and researchers (22-26,29,38,44-60). In fact, the Office of Inspector General (OIG) of the U.S. Department of Health and Human Services (HHS) has focused its attention on interventional techniques for several years (51,52). The OIG evaluation (51) in 2008 showed that Medicare paid over $2 billion in 2006 for interventional pain management (IPM) procedures, and from 2003 to 2006 the number of Medicare claims for facet joint injections increased by 76%. Overall, payments for facet joint injections increased from $141 million in 2003 to $307 million in 2006, representing both physician and facility payments. The investigation on transforaminal epidural injections from 2003 to 2007 showed increases of expenditures from $57 million in 2003 to $141 in 2007. However, of major concern in both investigations was that 63% of facet joint injection services and 34% of transforaminal epidural injections did not meet the medical necessity criteria, resulting in improper payments of approximately $129 million for facet joints and $45 million for transforaminal epidural injections. Evaluation by Noridian administrators, contractor for multiple western states in the United States, showed an inordinately high proportion of denials ranging from 61% to 95% for facet joint interventions and from 75% to 100% for vertebral augmentations procedures from June 1, 2012, to August 31, 2012.

Manchikanti et al (25) assessed the analysis of growth of interventional techniques in managing chronic pain in the Medicare population showing that interventional techniques increased significantly in Medicare beneficiaries from 1997 to 2006, with an increase of 137% in patients utilizing IPM services with an increase of 197% in IPM services per 100,000 Medicare beneficiaries. They also showed substantial differences in the growth of individual procedures, with the majority of growth being attributed to facet joint interventions, along with a substantial difference in the increase between the state with the lowest rate and the state with the highest rate in utilization patterns of interventional techniques, with a 13.9-fold difference in increase. This evaluation showed hospital outpatient department (HOPD) expenses constituted the highest increase with fewer patients treated than either in an ambulatory surgery center (ASC) or in-office setting. Hospital payments constituted 5% of the total Medicare payments in 2006, along with 57% of the total IPM payments.

Abbott et al (26) in an assessment of utilization characteristics of spinal interventions investigated

whether relatively few providers are responsible for a disproportionately high percentage of interventional spine procedures in privately issued plans and quantified any such findings. With a large database, they showed that there were 9 principle specialties performing these procedures with anesthesiology accounting for 49.2% of the procedures, followed by physiatry at 12.5%, pain management at 12%, and family practice at 10.2%. This study concluded that the highest 10% of providers which encompassed those providers performing greater than or equal to 5.08 procedures per patient per year, performed 36.6% of the total spinal procedures performed, whereas the highest 20% providers, which encompasses those providers with greater than or equal to 3.75 procedures, accounted for 57.6% of all spinal procedures. There may be major difficulties in understanding this data and the conclusions derived. The procedures varied based on if they assessed a patient during a year, which includes diagnostic and therapeutic procedures, or if they assessed them in a year after stabilization with only therapeutic procedures. There are also differences in the frequency of procedures performed based on whether they are neurolytic procedures or injection procedures. Obviously, if one practices a 3 injection philosophy without following the outcomes, they will obtain a favorable rating. Overall, in any frequency assessment of utilization based on specialty with conclusions leading to over users, outcomes also need to be assessed. However, greater than 5 procedures in a year, including diagnostic and therapeutic procedures, may be considered excessive by multiple guidelines and policies.

Manchikanti et al (22) in a recent assessment with an analysis of utilization trends and Medicare expenditures from 2000 to 2008 showed that Medicare recipients receiving spinal interventional techniques increased 107.8%, with an annual average increase of 9.6%. Whereas spinal interventional techniques increased 186.8%, with an annual average increase of 14.1% per 100,000 beneficiaries. The study results suggested explosive increases in spinal interventional techniques from 2000 to 2008, with some slowing of growth in later years.

In the modern era of health care reform regulations and numerous measures to control health care costs, it is not only that any interventions must be performed with appropriate medical necessity when indicated, but, overuse, abuse, and fraud must be avoided (45-52,61).

Consequently, this study was undertaken with a primary purpose to evaluate the use of all interventional techniques applied in chronic pain management, including spinal and non-spinal interventions; however, with exclusion of minor procedures such as intraarticular injections, trigger point injections, peripheral nerve blocks, and the exclusion of major interventions of implantables and vertebral augmentation procedures. Surgical procedures or other conservative modalities including physical therapy, occupational therapy, chiropractic, etc., were not included. Thus, in this evaluation, we sought to identify trends in interventional techniques in the Medicare population from 2000 to 2011.

Methods

The study was performed utilizing the Centers for Medicare and Medicaid Services (CMS) Physician Supplier Procedure Summary Master Data from 2000 to 2011 (29). The data were purchased from the CMS by the American Society of Interventional Pain Physicians. This study was conducted with internal resources of the primary author's practice without any external funding either from industry or elsewhere. The CMS's 100% data set is therefore unbiased and unpredictable in terms of any patient characteristics. Even though previous studies (59,60) 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 (22-25). Medicare represents the single largest health care payors in the United States, with over 46.9 million beneficiaries in 2011 (62). Thus, the procedures performed on the Medicare beneficiaries represent a large proportion of the procedures for chronic pain being performed in the United States. Rates were calculated based on Medicare beneficiaries for the corresponding year and are reported as procedures per 100,000 Medicare beneficiaries.

For analysis, the Current Procedural Terminology (CPT) procedure codes for interventional techniques were identified for years 2000 to 2011. The data was then tabulated based on the place of service – facility (ASC, HOPD) or non-facility (office). The calculated data included number of IPM services and rate of services per 100,000 Medicare beneficiaries.

Various 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, constituting interventional pain management; orthopedic surgery -20 and neurosurgery -14 as a surgical group; radiology specialties as a separate group; all

other physicians as another group; and all other providers were considered as other providers.

Statistical Analysis

The data were analyzed using SPSS (9.0) statistical software, Microsoft Access 2003, and Microsoft Excel 2003. The procedure rates were calculated per 100,000 Medicare beneficiaries.

Results

Population Characteristics

As illustrated in Table 1, the number of Medicare beneficiaries increased from 39.632 million in 2000 to 46.918 million in 2011 with an increase of 18% compared to 7% of the U.S. population.

Utilization Characteristics

Table 2 illustrates a summary of the frequency of utilization in various categories of interventional techniques in the Medicare beneficiaries from 2000 to 2011.

Overall, the increase in IPM procedures from 2000 to 2011 showed 228% with 177% per 100,000 Medicare beneficiaries. The increases were highest for facet joint interventions and sacroiliac joint blocks with 386% total and 310% per 100,000 Medicare beneficiaries, followed by 168% and 127% for epidural and adhesiolysis procedures, 150% and 111% for other types of nerve blocks and finally, 28% and 8% increases for disc procedures. The geometric average of annual increases was 9.7% overall with 13.7% for facet joint interventions and sacroiliac joint blocks and 7.7% for epidural and adhesiolysis procedures.

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

Year	U.S. Population (,000)	≥ 65 years (,000)	Percent	Medicare Beneficiaries (,000)	% to U.S. population	IPM Services		
						Services*	*% of Change from Previous year*	Rate per 100,000 Medicare Beneficiaries
Y2000	282,172	35,077	12.40%	39,632	14.00%	1,469,495	-	3,708
Y2001	285,040	35,332	12.40%	40,045	14.00%	1,760,456	*19.8%*	*4,396*
Y2002	288,369	35,605	12.30%	40,503	14.00%	2,183,052	*24.0%*	*5,390*
Y2003	290,211	35,952	12.40%	41,126	14.20%	2,559,323	*17.2%*	*6,223*
Y2004	292,892	36,302	12.40%	41,729	14.20%	3,335,047	*30.3%*	*7,992*
Y2005	295,561	36,752	12.40%	42,496	14.40%	3,660,699	*9.8%*	*8,614*
Y2006	299,395	37,264	12.40%	43,339	14.50%	4,146,124	*13.3%*	*9,567*
Y2007	301,290	37,942	12.60%	44,263	14.70%	4,111,127	*-0.8%*	*9,288*
Y2008	304,056	38,870	12.80%	45,412	14.90%	4,433,411	*7.8%*	*9,763*
Y2009	307,006	39,570	12.90%	45,801	14.90%	4,645,679	4.8%	10,143
Y2010	308,746	40,268	13.00%	46,914	15.20%	4,578,977	*-1.4%*	*9,760*
Y2011	313,848	41,122	13.10%	46,918	14.90%	4,815,673	*5.2%*	*10,264*
Change	11%	17%	6%	18%	7%	228%		177%
Geometric average annual change	1.00%	1.50%		1.50%	0.6%	11.4%		9.7%

*(Excluding continuous epidurals, intraarticular injections, trigger point and ligament injections, peripheral nerve blocks, vertebral augmentation procedures, and implantables)

Table 2. *Summary of the frequency of utilizations of various categories of interventional procedures in the Medicare population from 2000 to 2011.*

	Epidural and adhesiolysis procedures		Facet joint interventions and SI joint blocks		Disc Procedures (discography & disc decompression)		Other types of nerve blocks		Total*	
	Services	Rate	Services	Rate	Services	Rate	Services	Rate	Services	*Rate*
2000	860,787 (79%)	*2,172*	424,796 (67%)	*1,072*	14,983 (87%)	*38*	168,929 (42%)	*426*	1,469,495 (72%)	*3,708*
2001	1,013,552 (78%)	*2,531*	543,509 (62%)	*1,357*	17,229 (87%)	*43*	186,166 (38%)	*465*	1,760,456 (69%)	*4,396*
2002	1,199,324 (74%)	*2,961*	708,186 (58%)	*1,748*	20,194 (81%)	*50*	255,348 (30%)	*630*	2,183,052 (64%)	*5,390*
2003	1,370,862 (71%)	*3,333*	884,035 (53%)	*2,150*	24,362 (80%)	*59*	280,064 (27%)	*681*	2,559,323 (60%)	*6,223*
2004	1,637,494 (65%)	*3,924*	1,354,242 (46%)	*3,245*	24,263 (79%)	*58*	319,048 (26%)	*765*	3,335,047 (54%)	*7,992*
2005	1,776,153 (65%)	*4,180*	1,501,222 (47%)	*3,533*	27,950 (78%)	*66*	355,374 (26%)	*836*	3,660,699 (54%)	*8,614*
2006	1,870,440 (63%)	*4,316*	1,896,688 (40%)	*4,376*	27,432 (75%)	*63*	351,564 (26%)	*811*	4,146,124 (49%)	*9,567*
2007	1,940,454 (62%)	*4,384*	1,820,695 (46%)	*4,113*	25,688 (73%)	*58*	324,290 (30%)	*733*	4,111,127 (52%)	*9,288*
2008	2,041,155 (61%)	*4,495*	1,974,999 (46%)	*4,349*	27,735 (70%)	*61*	389,522 (29%)	*858*	4,433,411 (51%)	9,763
2009	2,136,035 (59%)	*4,664*	2,111,700 (46%)	*4,611*	25,929 (69%)	*57*	372,015 (67%)	*812*	4,645,679 (49%)	*10,143*
2010	2,226,486 (57%)	*4,746*	1,937,582 (48%)	*4,130*	22,003 (62%)	*47*	392,906 (34%)	*838*	4,578,977 (52%)	*9,760*
2011	2,309,906 (58%)	*4,923*	2,064,227 (50%)	*4,400*	19,104 (61%)	*41*	422,436 (66%)	*900*	4,815,673 (48%)	*10,264*
Change	168%	*127%*	386%	*310%*	28%	*8%*	150%	*111%*	228%	*177%*
Geometric average annual change	9.40%	*7.7%*	15.50%	*13.7%*	2.20%	*0.7%*	8.7%	*7.0%*	11.4%	9.7%

Rate - IPM services per 100,000 Medicare Beneficiaries
( )facility percentage
*(Excluding continuous epidurals, intraarticular injections, trigger point and ligament injections, peripheral nerve blocks, vertebral augmentation procedures, and implantables)

Figure 1 illustrates distribution of procedural characteristics from 2000 to 2011.

Specialty Characteristics

Tables 3 and 4 illustrate procedural characteristics based on the specialty. Overall increases were 228% with 177% per 100,000 Medicare beneficiaries. For IPM, these increases were 254% and 199%; for surgical specialties, including neurosurgery and orthopedic surgery, increases were 134% and 98%; for radiology, they were 215% and 166%; for other physicians, they were 76% and 48%; and for other providers, they were

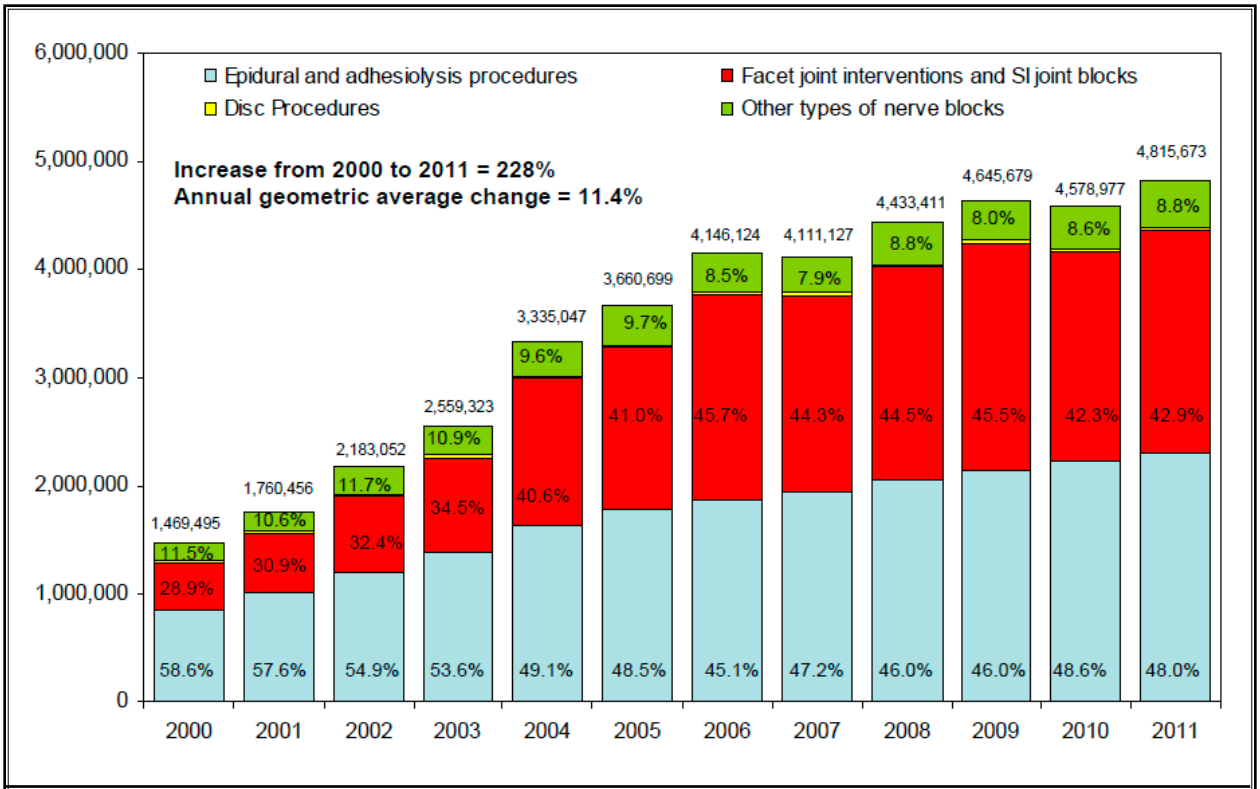


Fig. 1. *Illustration of distribution of procedural characteristics by type of procedures from 2000 to 2011.*

310% and 246% increase overall and per 100,000 Medicare beneficiaries. Figure 2 illustrates distribution of specialty characteristics.

Discussion

Interventional techniques for chronic pain have increased dramatically from 2000 to 2011. The increases were present in all settings; by all types of specialists. Over this period from 2000 to 2011, beneficiaries increased 18%, whereas overall IPM services increased 228% and 177% per 100,000 Medicare beneficiaries. The study also showed an exponential increase in facet joint interventions with a rate of 310% increase per 100,000 beneficiaries and annual geometric average growth of 13.7%, more than any other modality. Overall, average annual geometric increases were 9.7% per 100,000 Medicare beneficiaries. Year to year increases showed plateauing or decline in recent years, but increased by 5% from 2010 to 2011.

The results of this evaluation of growth patterns are similar to previous evaluations (22-26,59,60) although they differ in select aspects. Friedly et al (59,60) 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 reaching inaccurate conclusions (63). Abbott et al (27) utilized basically an inappropriate concept and hypothesis.

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, radiculitis, or sciatica have increased (30,37). However, disability and economic impact are escalating (3-6,15-21), further, evidence of increased awareness and diagnostic accuracy (45-50,53,61,64-66). Understanding of the 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 (67). High pain intensity with low pain interference was seen in 26% (Grade II) and high pain intensity with high pain interference was seen

Table 3. Frequency of utilization of interventional pain management techniques from 2000 to 2011, in Medicare recipients.

Specialty	Interventional Pain Management (interventional pain management, pain medicine, anesthesiology, physiatry, neurology, and psychiatry)		Surgical (neuro & orthopedic)		Radiology (interventional & diagnostic)		Other Physicians		Other Providers (CRNA, NP & PA)		Total	
	Services	Rate	Services	Rate	Services	Rate	Services	Rate	Services	Rate	Services*	Rate
2000	1,176,541 (80.1%)	2,969	84,392 (5.7%)	213	40,491 (2.8%)	102	152,834 (10.4%)	386	15,237 (1.0%)	38	1,469,495	3,708
2001	1,389,569 (78.9%)	3,470	98,037 (5.6%)	245	48,978 (2.8%)	122	203,348 (11.6%)	508	20,524 (1.2%)	51	1,760,456	4,396
2002	1,755,521 (80.4%)	4,334	115,497 (5.3%)	285	62,295 (2.9%)	154	226,776 (10.4%)	560	22,963 (1.1%)	57	2,183,052	5,390
2003	2,098,053 (82.0%)	5,102	126,040 (4.9%)	306	77,160 (3.0%)	188	236,135 (9.2%)	574	21,935 (0.9%)	53	2,559,323	6,223
2004	2,718,622 (81.5%)	6,515	160,035 (4.8%)	384	91,892 (2.8%)	220	338,339 (10.1%)	811	26,519 (0.8%)	64	3,335,047	7,992
2005	2,976,908 (81.3%)	7,005	174,261 (4.8%)	410	101,586 (2.8%)	239	377,014 (10.3%)	887	30,930 (0.8%)	73	3,660,699	8,614
2006	3,196,190 (77.1%)	7,375	192,971 (4.7%)	445	110,472 (2.7%)	255	608,444 (14.7%)	1,404	38,047 (0.9%)	88	4,146,124	9,567
2007	3,405,892 (82.8%)	7,695	205,178 (5.0%)	464	111,423 (2.7%)	252	349,013 (8.5%)	788	39,621 (1.0%)	90	4,111,127	9,288
2008	3,670,828 (82.8%)	8,083	232,405 (5.2%)	512	117,388 (2.6%)	258	369,597 (8.3%)	814	43,193 (1.0%)	95	4,433,411	9,763
2009	3,879,520 (83.5%)	8,470	262,496 (5.7%)	573	123,228 (2.7%)	269	335,669 (7.2%)	733	44,766 (1.0%)	98	4,645,679	10,143
2010	3,917,426 (85.6%)	8,350	213,844 (4.7%)	456	121,127 (2.6%)	258	274,711 (6.0%)	586	51,869 (1.1%)	111	4,578,977	9,760
2011	4,159,585 (86.4%)	8,866	197,624 (4.1%)	421	127,614 (2.6%)	272	268,358 (5.6%)	572	62,492 (1.3%)	133	4,815,673	10,264
Change	254%	199%	134%	98%	215%	166%	76%	48%	310%	246%	228%	177%
Geometric average annual change	12.2%	10.5%	8.0%	6.4%	11.0%	9.3%	5.3%	3.6%	13.7%	12.0%	11.4%	9.7%

Rate - IPM services per 100,000 Medicare Beneficiaries
( )percentage of row total
*(Excluding continuous epidurals, intraarticular injections, trigger point and ligament injections, peripheral nerve blocks, vertebral augmentation procedures, and implantables)

Table 4. *Frequency of utilization of interventional pain management techniques from 2000 to 2011, in Medicare recipients.*

Specialty	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
01 - Anesthesiology	1,011,773	1,191,891	1,277,160	1,331,136	1,366,464	1,502,779	1,518,295	1,518,326	1,521,678	1,563,161	1,432,130	1,406,632
02 - Interventional Pain Management	-	-	-	89,631	360,217	394,987	500,776	732,563	998,062	1,148,080	1,214,619	1,311,404
03 - Pain Management	-	4,890	197,670	310,634	489,038	534,963	561,862	472,778	388,065	335,436	413,976	533,757
04 - Physical Medicine and Rehabilitation	104,894	123,087	183,630	245,944	374,572	404,111	465,509	523,334	600,757	665,273	690,303	740,661
05 - Neurology	57,476	66,782	91,607	116,056	124,025	135,041	142,995	150,991	155,404	161,273	160,160	160,910
06 - Psychiatry	2,398	2,918	5,454	4,652	4,306	5,027	6,753	7,900	6,862	6,297	6,238	6,221
Interventional Pain Management	**1,176,541**	**1,389,569**	**1,755,521**	**2,098,053**	**2,718,622**	**2,976,908**	**3,196,190**	**3,405,892**	**3,670,828**	**3,879,520**	**3,917,426**	**4,159,585**
Percent	80.1%	78.9%	80.4%	82.0%	81.5%	81.3%	77.1%	82.8%	82.8%	83.5%	85.6%	86.4%
Rate	2,969	3,470	4,334	5,102	6,515	7,005	7,375	7,695	8,083	8,470	8,350	8,866
07 - Neurosurgery	21,539	24,516	32,126	31,421	43,467	48,219	55,752	60,424	78,021	103,286	63,410	46,481
08 - Orthopedic Surgery	62,853	73,521	83,371	94,619	116,568	126,042	137,219	144,754	154,384	159,210	150,434	151,143
Surgery	84,392	98,037	115,497	126,040	160,035	174,261	192,971	205,178	232,405	262,496	213,844	197,624
Percent	5.7%	5.6%	5.3%	4.9%	4.8%	4.8%	4.7%	5.0%	5.2%	5.7%	4.7%	4.1%
Rate	213	245	285	306	384	410	445	464	512	573	456	421
14 - Interventional Radiology	3,590	3,518	4,058	4,948	5,460	6,352	7,721	9,581	12,278	15,571	13,404	11,091
15 - Diagnostic Radiology	36,901	45,460	58,237	72,212	86,432	95,234	102,751	101,842	105,110	107,657	107,723	116,523
Radiology	**40,491**	**48,978**	**62,295**	**77,160**	**91,892**	**101,586**	**110,472**	**111,423**	**117,388**	**123,228**	**121,127**	**127,614**
Percent	2.8%	2.8%	2.9%	3.0%	2.8%	2.8%	2.7%	2.7%	2.6%	2.7%	2.6%	2.6%
Rate	102	122	154	188	220	239	255	252	258	269	258	272
09 - Family Practice	16,619	20,121	28,228	31,950	47,025	53,016	102,912	60,795	56,709	67,142	63,966	67,879
10 - General Practice	18,226	17,555	16,613	21,173	32,690	36,937	149,839	35,848	23,427	22,761	22,198	20,338
11 - Internal Medicine	22,714	25,345	30,112	34,710	64,407	70,244	129,329	69,365	85,723	93,238	68,455	64,445
12 - Rheumatology	29,777	34,473	35,916	33,965	36,739	41,467	42,419	42,779	36,614	27,900	20,935	20,106
13 - Osteopathic Manipulative Therapy	1,865	4,196	5,392	6,271	7,089	8,428	10,612	12,098	9,782	8,024	6,716	5,721
16 - Emergency Medicine	2,812	5,274	5,682	9,777	9,079	10,330	22,516	16,888	11,109	11,415	11,213	11,921
17 - General Surgery	7,734	7,038	7,906	7,125	8,634	9,711	18,609	25,992	14,720	10,940	8,940	9,181
Others	53,087	89,347	96,927	91,164	132,676	146,881	132,208	85,248	131,513	94,249	72,288	68,767
Other Physicians	**152,834**	**203,348**	**226,776**	**236,135**	**338,339**	**377,014**	**608,444**	**349,013**	**369,597**	**335,669**	**274,711**	**268,358**
Percent	10.4%	11.6%	10.4%	9.2%	10.1%	10.3%	14.7%	8.5%	8.3%	7.2%	6.0%	5.6%
Rate	386	508	560	574	811	887	1,404	788	814	733	586	572

Table 4 (cont.). *Frequency of utilization of interventional pain management techniques from 2000 to 2011, in Medicare recipients.*

Specialty	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
18 - CRNA	14,656	18,667	19,272	16,690	15,953	18,747	19,945	19,348	19,712	20,318	21,936	20,700
19 - NP	362	907	1,765	2,529	5,508	6,257	10,240	10,452	14,585	15,205	18,957	28,117
20 - PA	219	950	1,926	2,716	5,058	5,926	7,862	9,821	8,896	9,243	10,976	13,675
CRNA, NP & PA	**15,237**	**20,524**	**22,963**	**21,935**	**26,519**	**30,930**	**38,047**	**39,621**	**43,193**	**44,766**	**51,869**	**62,492**
Percent	1.0%	1.2%	1.1%	0.9%	0.8%	0.8%	0.9%	1.0%	1.0%	1.0%	1.1%	1.3%
Rate	38	51	57	53	64	73	88	90	95	98	111	133
Total	1,469,495	1,760,456	2,183,052	2,559,323	3,335,047	3,660,699	4,146,124	4,111,127	4,433,411	4,645,679	4,578,977	4,815,673
Rate	3708	4396	5390	6223	7992	8614	9567	9288	9763	10143	9760	10264

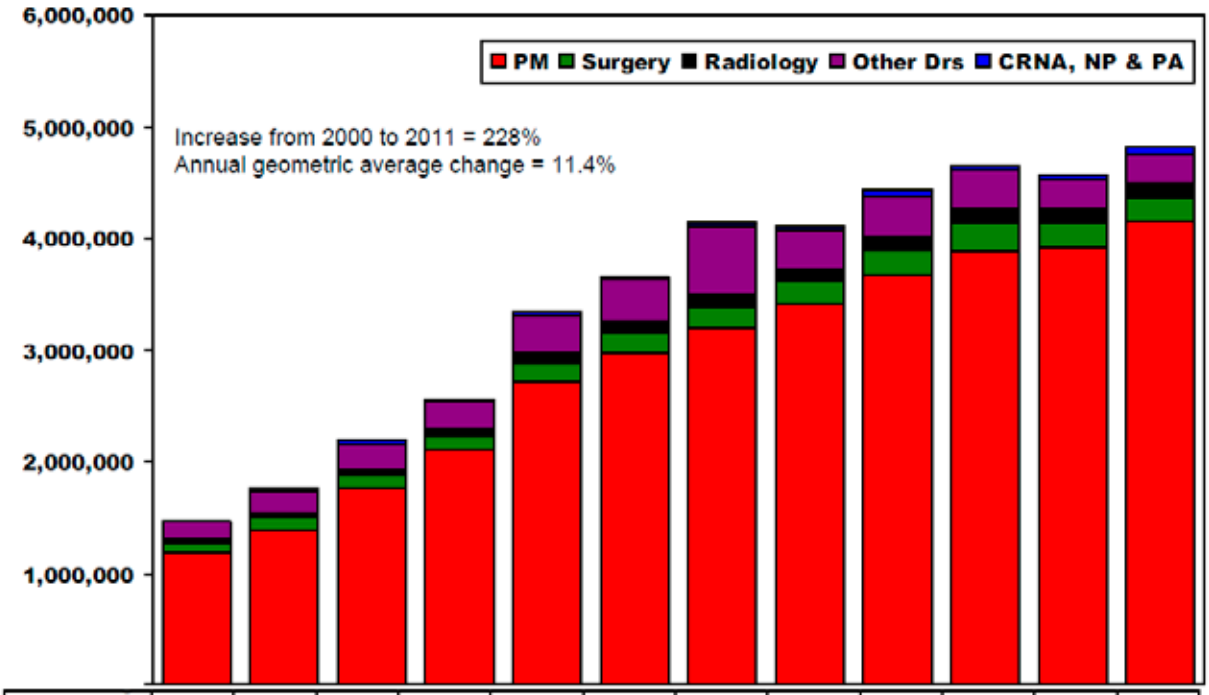
Rate - IPM services per 100,000 Medicare beneficiaries
( ) percentage of row total
* (Excluding continuous epidurals, intraarticular injections, trigger point and ligament injections, peripheral nerve blocks, vertebral augmentation procedures, and implantables)
CRNA = certified registered nurse anesthetist
NP = nurse practitioner
PA = physician assistant

in 17% (Grades III and IV) (67). 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 the annual prevalence of chronic low back pain ranges from 15% to 45% with a point prevalence of 30%, the lifetime prevalence of spinal pain, which also includes neck and thoracic pain, has been reported as 54% to 80% (1-20). In addition, studies of the prevalence of low back pain and neck pain (68,69) 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 (70). Advances in the understanding of the structural basis of chronic spinal pain (61,71-75) and evidence-based medicine (EBM) may have increased utilization (45-50,53,61,64-69,76-100) as well as increasing the understanding of IPM and, as a result, more appropriate utilization.

However, what has been ignored is a myriad of modalities, surgical interventions, and their pace of escalation. In fact, it was shown that between 1999 and 2008, the mean inflation-adjusted annual expenditures on medical care for spine patients increased by 95% from $487 to $950. Most of the increase was accounted for by increased costs for medical specialists, as opposed to primary care physicians. In addition, the mean inflation-adjusted annual expenditures on chiropractic care were relatively stable, whereas physical therapy was the most costly service overall (28). Further, it was also shown that the supply of chiropractors and utilization of chiropractic services by older US adults varied widely by region (27). Increased chiropractic supply was associated with increased chiropractic use.

It was also shown that surgical utilization with complex surgeries and costs have been increasing exponentially (42,43). Consequently, increases in IPM procedures and expenses are not out of sync with overall chronic pain management. Overall, among the multiple causes for the increases in costs for interventional techniques, inappropriate utilization or providing these procedures without medical necessity have been described most commonly.

To combat the problem of overuse and to some extent, abuse, OIG (51,52) has recommended strengthening program safeguards to prevent improper payments for IPM services. Consequently, CMS has established local car-



Specialty (%)	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Pain Management	80.1%	78.9%	80.4%	82.0%	81.5%	81.3%	77.1%	82.8%	82.8%	83.5%	85.6%	86.4%
Surgery	5.7%	5.6%	5.3%	4.9%	4.8%	4.8%	4.7%	5.0%	5.2%	5.7%	4.7%	4.1%
Radiology	2.8%	2.8%	2.9%	3.0%	2.8%	2.8%	2.7%	2.7%	2.6%	2.7%	2.6%	2.6%
Other Physicians	10.4%	11.6%	10.4%	9.2%	10.1%	10.3%	14.7%	8.5%	8.3%	7.2%	6.0%	5.6%
CRNA, NP & PA	1.0%	1.2%	1.1%	0.9%	0.8%	0.8%	0.9%	1.0%	1.0%	1.0%	1.1%	1.3%

Fig. 2. *Utilization of interventional pain management techniques by speciality from 2000 to 2011, in Medicare recipients.*

rier determinations (LCDs) across the country based on reasonable LCDs, which have shown certain IPM procedures to be effective without compromising patient access and care. As illustrated by Noridian administrators' assessment of various procedures recently, it appears that inappropriate application of rules and regulations may affect the access. Overall, steps to improve the standards, access, and quality of physicians performing these procedures will improve care without increasing the cost for the program. At the same time, certain types of so-called increases in access, such as for nurse anesthetists as recently published by CMS, will be counterproductive due to increasing utilization and provision of inappropriate care when performed by untrained and unqualified personnel.

Our data agrees with the OIG report (51) stating that there is an explosion in facet joint blocks along with a great proportion of non-interventional physicians performing these procedures. The important differences between an 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; for example the lack of inclusion of participants in Medicare Advantage plans and potential coding errors. In contrast to previous studies (59,60) we employed all patients receiving Medicare either below the age of 65 or over the age of 65. This inclusion is extremely 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 (25).

Conclusion

Interventional techniques increased significantly in Medicare beneficiaries from 2000 to 2011. Overall,

there was an increase of 177% in utilizing IPM services per 100,000 Medicare beneficiaries, with an annual geometric average increase of 9.7%. The study also showed an exponential increase in facet joint interventions and sacroiliac joint blocks.

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Conflict of Interest

Dr. Falco is a Consultant for St. Jude Medical Inc. and Joimax Inc.

Dr. Benyamin is a consultant with Bioness and Nevro; serves on the advisory boards of Vertos Medical and Nuvo Pharma; teaches/lectures for Vertos Medical, Boston Scientific, Neurotherm, and Bioness; and receives research/grants from Alfred Mann Foundation, Teknon Foundation, Spinal Restoration, Inc., Bioness, Boston Scientific, Vertos Medical, Medtronic, Kimberly Clarke, Epimed, BioDelivery Sciences International, Inc., Theravance, Mundipharma Research, Cephalon/Teva, AstraZeneca, and Purdue Pharma, LP.

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