Health Policy Review

Assessment of the Escalating Growth of Facet Joint Interventions in the Medicare Population in the United States from 2000 to 2011

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Background: Both the Office of Inspector General (OIG) and reports from studies of the utilization of facet joint interventions have expressed that explosive increases in facet joint interventions provided to spinal pain patients are a major concern.

Study Design: The study is designed to assess the growth of facet joint interventions in managing spinal chronic pain in Medicare beneficiaries from 2000 to 2011.

Objective: To assess the use of facet joint interventions 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: The utilization of all types of facet joint interventions increased enormously from 2000 to 2011, with an overall increase of 308% per 100,000 Medicare beneficiaries and a 13.6% average annual increase. In addition, the highest increases were seen for cervical/thoracic radiofrequency neurotomy with 836%, followed by an increase of 662% for lumbar/sacral radiofrequency neurotomy, a 359% increase in cervical/thoracic facet joint injections, and 228% increase in lumbosacral facet joint injections. In reference to the number of procedures performed, however, the highest numbers were in the lumbosacral region with 990,449 total procedures of lumbar facet joint blocks and 406,378 lumbosacral radiofreqency neurotomies in 2011. Cervical and thoracic facet joint nerve blocks were 317,220, whereas cervical and thoracic radiofrequency neurotomies were 97,526 in 2011.

The data also showed that there were enormous increases in the proportion of procedures performed by the specialty of physical medicine and rehabilitation, with an increase of 781% and an annual increase of 21.9% excluding physicians of physical medicine and rehabilitation enrolled as interventional pain management or pain management. Even though the numbers were very low for nurse anesthetists, nurse practitioners, and physician assistants, the increases were from 143 in 2000 to 21,263 in 2011, providing an annual increase of 55.2%, an overall increase of 12,460%.

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. Furthermore, the data provided for state utilizations is based on claims data for that state which also may include patients from contiguous or other states receiving services in those states.

Conclusions: The explosive increase in the number of lumbar facet joint interventions performed began to wane in 2008. From 2008 to 2010, the utilization of facet joint interventions declined by 6%.

Key Words: Chronic spinal pain, interventional pain management, interventional techniques, facet joint injections, medial branch blocks, radiofrequency neurotomy

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The prevalence and resulting economic impact of chronic spinal pain across the globe is substantial. Even though due to numerous variations, the true burden of chronic pain has not been accurately estimated; prevalence estimates have ranged from 11% to 55% (1-5). One report of the economic costs of chronic pain (4) estimated the annual national economic cost to be between $560 billion and $635 billion in the United States. This particular report is confusing, however, as apart from moderate and severe pain, it included joint pain, arthritis, and functional disability, which were responsible for most of the costs. This data was erroneously accepted by an Institute of Medicine (IOM) report and publicized as such that the costs of chronic pain exceeded those of heart disease $309 billion, cancer $243 billion, and diabetes $188 billion (5). Isolating chronic pain, it appears that the costs are approximately $100 billion for moderate and severe pain. Martin et al (6) estimated that treatment for back and neck pain problems accounted for $86 billion in health care expenditures in the United States in 2005. They also showed that there was a 65% increase in expenditures and a 49% increase in the number of patients seeking spine-related care from 1997 through 2006 (7). Furthermore, despite all of these health care expenses, disability secondary to chronic pain continues to escalate (8). The increasing costs are shared by various modalities of diagnostic and therapeutic interventions including spinal interventional techniques which include facet joint interventions (9-39). Davis et al (12), in assessing expenditures on different ambulatory services for the management of back and neck conditions, showed that in 2008, 13.6 million, or 6%, sought ambulatory visits for a primary diagnosis of back or neck pain. Between 1999 and 2008, the mean inflation-adjusted annual expenditures on medical care for these patients increased by 95% from $487 to $950; most of the increase was accounted for by the increased cost for medical specialists, as opposed to primary care physicians. In addition, aging baby boomers may contribute to significant increases in costs of chronic back pain (18). Smith et al (18) showed that the prevalence of back pain has increased by 29%, whereas chronic back pain increased by 64% from 2000 to 2007. Further, the average age among all adults with back pain increased from 45.9 to 48.2 years; the average age among adults with chronic back pain increased from 48.5 to 52.2 years. They also showed that inflation-adjusted (to 2010 dollars) biennial expenditures on ambulatory services for chronic back pain increased by 129% over the same period, from $15.6 billion in 2000 to 2001 to $35.7 billion in 2006 to 2007.

Spinal interventional techniques, especially facet joint interventions, are considered one of the major components contributing to the explosive growth and increasing expenditures among patients with chronic spinal pain. Further, the literature addressing the effectiveness of spinal interventional techniques, specifically of those facet joint interventions, has been debated in reference to appropriate medical necessity and indications, even though it continues to emerge (34-41). Thus, facet joint interventions have been the focus of attention for payers, public policy health experts, and researchers (24-33). Not surprisingly, the Office of Inspector General (OIG) of the U.S. Department of Health and Human Services (HHS) has focused its attention on facet joint interventions (22). This evaluation in 2008 showed that Medicaid 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%. In addition, the payments for facet joint injections increased from $141 million in 2003 to $307 million in 2006, representing both physician and facility payments. However, the major concern was that 63% of facet joint injection services did not meet medical necessity criteria, resulting in improper payments of approximately $129 million. Further, evaluations by Noridian administrators, contractor for multiple western states in the United States, also showed a rather inordinately high proportion of denials ranging from 61% to 95% for facet joint interventions from June 1, 2012 to August 31, 2012 (32). Manchikanti et al (24) assessed the utilization patterns of interventional techniques in the Medicare population from 2000 to 2011 showing that the increases were highest for facet joint interventions and sacroiliac joint injections with an increase of 310% per 100,000 Medicare beneficiaries, followed by 127% for epidural and adhesiolysis procedures. They also showed that the geometric average of annual increases were 13.7% for facet joint interventions and sacroiliac joint blocks and 7.7% for epidural and adhesiolysis procedures. Manchikanti et al (25) showed that expenditures for Medicare patients from 2000 to 2008 increased from $362,347,025 to $1,231,180,420 for spinal interventional techniques inclusive of all epidural procedures including adhesiolysis and facet joint interventions and sacroiliac joint injections. In an analysis of the growth of facet joint interventions in the Medicare population in the United States comparing the data of 1997, 2002,

and 2006, Manchikanti et al (26) showed that from 1997 to 2006, the number of patients receiving facet joint interventions per 100,000 Medicare population increased 386%, facet joint visits increased 446%, and facet joint interventions increased 543%. Abbott et al (31), in an assessment of utilization characteristics of spinal interventions 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. Manchikanti et al (24), in another analysis of the 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%. However, they also showed that spinal interventional techniques increased 186.8%, with an annual average increase of 14.1% per 100,000 Medicare beneficiaries.

Thus, albeit some slowing in recent years, all the statistics show that there is explosive growth. Consequently, the modern health care reform regulations applied to control health care costs dictate that any interventions must be performed with appropriate medical necessity when indicated, and that overuse, abuse, and fraud must be avoided with increased emphasis on evidence-based medicine and comparative effectiveness research (33,34,42).

Consequently, we have undertaken this assessment with the primary purpose to evaluate the utilization of all types of facet joint interventions (i.e., intraarticular injections, facet joint nerve blocks, and facet joint neurotomy) in all the applicable regions – namely the lumbar, cervical, and thoracic spine – to identify the trends 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 (43). 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. 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 health care payers in the United States, with over 46.9 million beneficiaries in 2011 (43). Thus, the procedures performed on Medicare beneficiaries represent a large proportion of the recipients 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 this analysis, the Current Procedural Terminology (CPT) procedure codes for facet joint interventions were identified for years 2000 to 2011. The data was then tabulated based on the place of service – facility (ambulatory surgery center, hospital outpatient department) or non-facility (office). The calculated data included the number of facet joint interventions and rate of services per 100,000 Medicare beneficiaries. The CPT codes utilized were 64470 (64490 for 2010-2011) -C/T facet joint block, single; 64472 (64491 and 64492 for 2010-2011) -C/T facet joint block, additional; 64475 (64493 for 2010-2011) -L/S facet joint block, single; 64476 (64494 and 64495 for 2010-2011) -L/S facet joint block, additional; 64622-L/S facet neurolysis, single; 64623-L/S facet neurolysis, additional; 64626-C/T facet neurolysis, single; 64627-C/T facet neurolysis, additional

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; orthopedic surgery -20, neurosurgery -14, and general surgery -17, 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

Table 1 illustrates the characteristics of Medicare beneficiaries and facet joint interventions. During the same period, Medicare recipients receiving facet joint interventions increased 308%. Facet joint interventions increased from 947 per 100,000 in 2000 to 3,861 per 100,000 in 2011, a 308% increase. In 2000, 68% of procedures were performed in facility settings and 32% in office settings; whereas in 2011, 49% were performed in office settings.

Table 1. *Characteristics of Medicare beneficiaries and facet joint interventions.*

	U.S. Population (,000)			Medicare Beneficiaries (,000)						Facet Joint Injections Utilization		
Year	All Ages	≥ 65 Years	Percent	< 65 Years	Percent	≥ 65 Years	Percent	Total Medicare Beneficiaries	% to U.S.	Services	% of Change from Previous Year	Rate per 100,000 Medicare Beneficiaries
Y2000	282,172	35,077	12.4%	5,370	13.5%	34,262	86.5%	39,632	14.0%	375242 (68%)		947
Y2001	285,040	35,332	12.4%	5,567	13.9%	34,478	86.1%	40,045	14.0%	457845 (64%)	22.0%	1,143
Y2002	288,369	35,605	12.3%	5,805	14.3%	34,698	85.7%	40,503	14.0%	606437 (60%)	32.5%	1,497
Y2003	290,211	35,952	12.4%	6,078	14.8%	35,050	85.2%	41,126	14.2%	755171 (55%)	24.5%	1,836
Y2004	292,892	36,302	12.4%	6,402	15.3%	35,328	84.7%	41,729	14.2%	1181538 (47%)	56.5%	2,831
Y2005	295,561	36,752	12.4%	6,723	15.8%	35,777	84.2%	42,496	14.4%	1312616 (47%)	11.1%	3,089
Y2006	299,395	37,264	12.4%	7,022	16.2%	36,317	83.8%	43,339	14.5%	1684760 (40%)	28.4%	3,887
Y2007	301,290	37,942	12.6%	7,297	16.5%	36,966	83.5%	44,263	14.7%	1607206 (46%)	-4.6%	3,631
Y2008	304,056	38,870	12.8%	7,516	16.6%	37,896	83.4%	45,412	14.9%	1746312 (47%)	8.7%	3,845
Y2009	307,006	39,570	12.9%	7,624	16.6%	38,177	83.3%	45,801	14.9%	1882754 (46%)	7.8%	4,111
Y2010	308,746	40,268	13.0%	7,923	16.9%	38,991	83.1%	46,914	15.2%	1699677 (49%)	-9.7%	3,623
Y2011	313,848	41,122	13.1%	7,786	16.6%	39,132	83.4%	46,918	14.9%	1811573 (51%)	6.6%	3,861
Change	11%	17%		45%		14%		18%		383%		308%
(GM)	1.00%	1.5%		3.4%		1.2%		1.5%		15.4%		13.6%

( ) indicated Facility percentage
64470 or 64490-C/T facet joint block, single; 64472 or 64491 or 64492 -C/T facet joint block, additional; 64475 or 64493 -L/S facet joint block ,single; 64476 or 64494 or 64495-L/S facet joint block, additional; 64622-L/S facet neurolysis, single; 64623-L/S facet neurolysis, additional; 64626-C/T facet neurolysis, single; 64627-C/T facet neurolysis, additional

Utilization Characteristics

Table 2 illustrates the summary of the frequency of utilization of facet joint interventions from 2000 to 2011. The majority of procedures (70% in 2000 and 60% in 2011) were performed in the lumbar region, with cervical and thoracic procedures constituting 30% in 2000 and 40% in 2011. The most commonly performed procedures were subsequent lumbar facet joint /nerve blocks (CPT 64475-76), 68% in 2000 to 55% in 2011. Cervical/thoracic facet joint /nerve blocks increased 359% per 100,000 Medicare beneficiaries and lumbar facet joint injection/nerve blocks increased 228% from 2000 to 2011. Cervical/thoracic facet neurolysis increased 836% per 100,000 Medicare beneficiaries and lumbar facet neurolysis increased 544% from 2000 to 2011. Specialty Characteristics

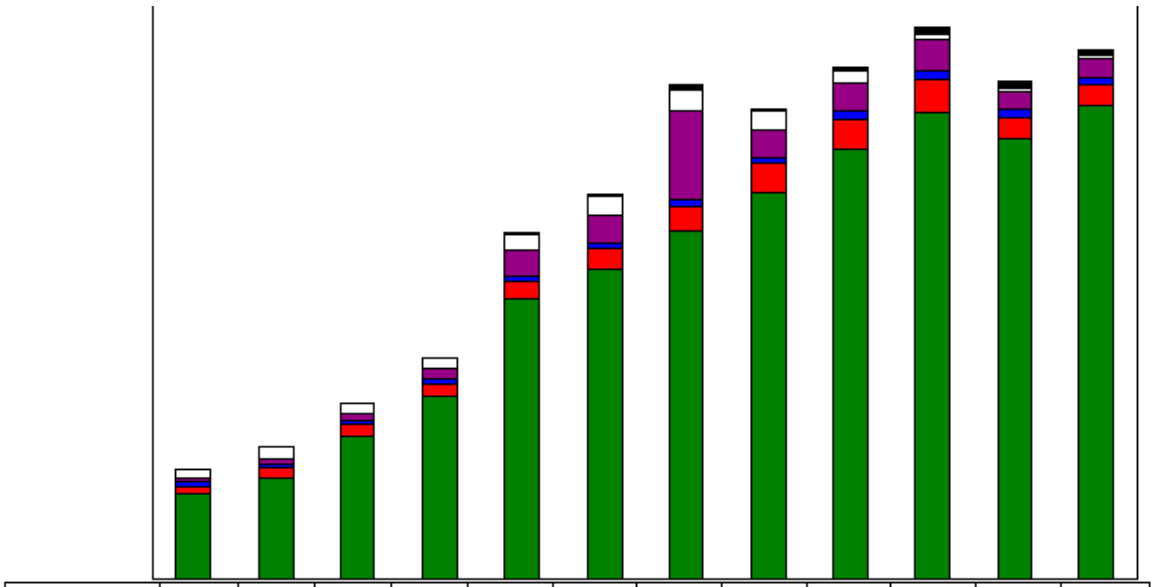
Figure 1 and Table 3 illustrate the increase in the utilization of facet joint interventions by various specialty groups assigned as IPM, Surgery, Radiology, General Practice, NPs/CRNAs, and others from 2000 to 2011. Across the country, the majority of procedures were performed by IPM physicians with 78.2% in 2000 and 89.2% in 2011. However, in 2006 general physicians performed 17.9% of these procedures, while all others performed 6.9% of the procedures (Table 3). This pattern changed with general physicians performing only 3.4% of facet joint interventions and other providers (nurse practitioners, nurse anesthetists, and physician assistants) performing 1.2% in 2011.

Procedural Characteristics by State

Table 4 shows the frequency of claims of utilization of facet joint interventions by state from 2008 to 2010 based on increases and decreases. Multiple states including Idaho, Wyoming, Arizona, Nevada, Alabama, New Hampshire, and West Virginia showed increases of 25% or more. On the other end of the spectrum there were multiple states which showed decreases of over 20%, including Texas, Florida, Montana, South Dakota, Delaware, and Rhode Island. Overall, over a period of 3 years, there was a 6% decrease from 2008 to 2010 per 100,000 Medicare beneficiaries; however, this decrease was not present in 2011 as the overall number of procedures increased in 2011 compared to 2010.

Table 2. *Utilization rates (per 100,000 Medicare recipients) of various facet joint interventions in the Medicare population from 2000 to 2011.*

Year	Facet Joint Blocks								Facet Neurolysis								All Facet Joint Interventions	
	Cervical/Thoracic				Lumbar/Sacral				Cervical/Thoracic				Lumbar/Sacral					
	64470	64472	Total	Rate	64475	64476	Total	Rate	64626	64627	Total	Rate	64622	64623	Total	Rate	Services	Rate
F2000	24751	33573	58324	147	101539	153252	254791	643	2750	6054	8804	22	15117	38206	53323	135	375242	947
F2001	34500	47684	82184	205	121234	175854	297088	742	3815	8334	12149	30	18792	47632	66424	166	457845	1143
F2002	41935	61981	103916	257	155620	240243	395863	977	5190	12202	17392	43	25744	63522	89266	220	606437	1497
F2003	49958	75489	125447	305	189263	299802	489065	1189	6877	15301	22178	54	35315	83166	118481	288	755171	1836
F2004	77620	126145	203765	488	286394	467823	754217	1807	10691	23461	34152	82	57053	132351	189404	454	1181538	2831
F2005	86541	141999	228540	538	316158	519689	835847	1967	12015	26298	38313	90	63228	146688	209916	494	1312616	3089
F2006	121312	204178	325490	751	370809	636673	1007482	2325	14207	31993	46200	107	79289	226299	305588	705	1684760	3887
F2007	108103	179279	287382	649	365372	599568	964940	2180	17689	39710	57399	130	88069	209416	297485	672	1607206	3631
F2008	114497	201857	316354	697	385491	634775	1020266	2247	20729	48089	68818	152	100606	240268	340874	751	1746312	3845
F2009	126730	214802	341532	746	418036	663690	1081726	2362	25510	57973	83483	182	112627	263386	376013	821	1882754	4111
F2010	114753	175887	290640	620	386897	557572	944469	2013	26588	59219	85807	183	116959	261802	378761	807	1699677	3623
F2011	124431	192789	317220	676	402507	587942	990449	2111	29904	67622	97526	208	125630	280748	406378	866	1811573	3861
Change from 2000 to 2011																		
	403%	474%	444%	359%	296%	284%	289%	228%	987%	1017%	1008%	836%	731%	635%	662%	544%	383%	308%
Geometric average annual change																		
	15.8%	17.2%	16.6%	14.9%	13.3%	13.0%	13.1%	11.4%	24.2%	24.5%	24.4%	22.5%	21.2%	19.9%	20.3%	18.4%	15.4%	13.6%



Specialty	F2000	F2001	F2002	F2003	F2004	F2005	F2006	F2007	F2008	F2009	F2010	F2011
IPM	293373	348361	487624	623975	958026	1062122	1189969	1321299	1471781	1590968	1506222	1615790
Surgery	29492	34792	40473	42933	61550	67862	85456	97668	100938	113131	75263	69107
Radiology	10141	11609	14144	16782	17395	19703	24081	23373	25037	27869	25690	28190
General Physicians	17243	19921	24540	37566	85077	94106	302208	96760	96749	109488	60048	61390
Other Specialties	24850	42494	38045	31380	54702	63327	74936	57525	37430	25203	13974	15833
CRNA, NP & PA	143	668	1611	2535	4788	5496	8110	10581	14377	16095	18480	21263
Total	375242	457845	606437	755171	1181538	1312616	1684760	1607206	1746312	1882754	1699677	1811573

Fig. 1. *Utilization of interventional pain management techniques by speciality from 2000 to 2011, in Medicare recipients.*

Table 3. *Frequency of utilization of facet joint interventions by specialty from 2000 to 2011, in Medicare recipients.*

Specialty	F2000	F2001	F2002	F2003	F2004	F2005	F2006	F2007	F2008	F2009	F2010	F2011	Change	GM
Anesthesiology -05	247,282	294,402	337,191	369,024	430,372	480,429	513,444	539,743	559,342	600,380	512,925	507,531	105%	6.8%
Interventional Pain Management -09	**0**	**0**	**0**	**37,882**	**155,989**	**172,078**	**218,021**	**325,813**	**459,996**	**535,496**	**532,584**	**578,317**	-	-
Pain Management -72	0	2,383	77,284	114,290	204,118	225,969	246,039	213,972	173,536	146,861	170,084	224,075	-	-
PM&R -25	29,984	33,772	49,416	71,278	126,738	138,649	162,075	186,232	220,863	248,619	241,261	264,274	781%	21.9%
Neurology -13	15,560	17,260	22,660	30,687	40,182	44,228	48,532	53,192	55,599	57,422	47,281	39,693	155%	8.9%
Psychiatry -26	547	544	1,073	814	627	769	1,858	2,347	2,445	2,190	2,087	1,900	247%	12.0%
Interventional Pain Management	**293,373**	**348,361**	**487,624**	**623,975**	**958,026**	**1,062,122**	**1,189,969**	**1,321,299**	**1,471,781**	**1,590,968**	**1,506,222**	**1,615,790**	**451%**	**16.8%**
Percent	78.2%	76.1%	80.4%	82.6%	81.1%	80.9%	70.6%	82.2%	84.3%	84.5%	88.6%	89.2%	-	-
Rate	740	870	1,204	1,517	2,296	2,499	2,746	2,985	3,241	3,474	3,211	3,444	365%	15.0%
Neurosurgery -14	7,983	9,281	12,577	12,129	17,632	19,938	22,886	26,636	36,428	48,305	21,905	18,388	130%	7.9%
Orthopedic Surgery -20	18,549	23,107	26,144	29,177	41,367	45,169	51,827	53,211	57,856	60,293	50,284	48,023	159%	9.0%
General Surgery -02	2,960	2,404	1,752	1,627	2,551	2,755	10,743	17,821	6,654	4,533	3,074	2,696	-9%	-0.8%
Surgery	**29,492**	**34,792**	**40,473**	**42,933**	**61,550**	**67,862**	**85,456**	**97,668**	**100,938**	**113,131**	**75,263**	**69,107**	**134%**	**8.0%**
Percent	7.9%	7.6%	6.7%	5.7%	5.2%	5.2%	5.1%	6.1%	5.8%	6.0%	4.4%	3.8%	-	-
Rate	74	87	100	104	147	160	197	221	222	247	160	147	98%	6.4%
Interventional Radiology -94	694	496	821	1,082	942	1,199	1,885	2,484	3,265	4,911	3,891	2,932	322%	14.0%
Diagnostic Radiology -30	9,447	11,113	13,323	15,700	16,453	18,504	22,196	20,889	21,772	22,958	21,799	25,258	167%	9.4%
Radiology	**10,141**	**11,609**	**14,144**	**16,782**	**17,395**	**19,703**	**24,081**	**23,373**	**25,037**	**27,869**	**25,690**	**28,190**	**178%**	**9.7%**
Percent	2.7%	2.5%	2.3%	2.2%	1.5%	1.5%	1.4%	1.5%	1.4%	1.5%	1.5%	1.6%	-	-
Rate	26	29	35	41	42	46	56	53	55	61	55	60	135%	8.1%
Family Practice -08	4,382	6,572	7,928	11,237	22,011	25,463	73,265	30,776	26,914	35,041	20,328	22,897	423%	16.2%
General Practice -01	6,108	6,846	7,738	11,547	20,532	23,331	126,883	22,850	12,436	11,608	6,060	5,721	-6%	-0.6%
Internal Medicine -11	6,753	6,503	8,874	14,782	42,534	45,312	102,060	43,134	57,399	62,839	33,660	32,772	385%	15.4%
General Physicians	**17,243**	**19,921**	**24,540**	**37,566**	**85,077**	**94,106**	**302,208**	**96,760**	**96,749**	**109,488**	**60,048**	**61,390**	**256%**	**12.2%**
Percent	4.6%	4.4%	4.0%	5.0%	7.2%	7.2%	17.9%	6.0%	5.5%	5.8%	3.5%	3.4%	-	-
Rate	44	50	61	91	204	221	697	219	213	239	128	131	201%	10.5%
Rheumatology -66	13,724	18,862	20,794	20,666	23,289	27,086	25,814	24,433	17,683	11,755	3,453	4,367	-68%	-9.9%
Osteopathic Manipulative Therapy -12	563	2,505	3,810	4,433	5,284	6,410	8,145	8,402	4,486	2,730	1,308	973	73%	5.1%
Emergency Medicine -93	982	691	1,315	2,829	2,290	2,539	14,325	6,731	1,312	2,081	2,365	2,467	151%	8.7%
Others	9,581	20,436	12,126	3,452	23,839	27,292	26,652	17,959	13,949	8,637	6,848	8,026	-16%	-1.6%

Table 3 (cont.). *Frequency of utilization of facet joint interventions by specialty from 2000 to 2011, in Medicare recipients.*

Specialty	F2000	F2001	F2002	F2003	F2004	F2005	F2006	F2007	F2008	F2009	F2010	F2011	Change	GM
Other Specialties	24,850	42,494	38,045	31,380	54,702	63,327	74,936	57,525	37,430	25,203	13,974	15,833	-36%	-4.0%
Percent	6.6%	9.3%	6.3%	4.2%	4.6%	4.8%	4.4%	3.6%	2.1%	1.3%	0.8%	0.9%	-	-
Rate	63	106	94	76	131	149	173	130	82	55	30	34	-46%	-5.5%
CRNA -43	101	189	358	529	442	618	696	821	1,921	3,039	2,112	2,124	2003%	31.9%
NP -50	0	111	276	1,068	1,957	2,191	3,713	4,103	8,168	9,276	11,997	14,346	-	-
PA -97	42	368	977	938	2,389	2,687	3,701	5,657	4,288	3,780	4,371	4,793	11,312%	53.8%
CRNA, NP & PA	**143**	**668**	**1,611**	**2,535**	**4,788**	**5,496**	**8,110**	**10,581**	**14,377**	**16,095**	**18,480**	**21,263**	**14,769%**	**57.6%**
Percent	0.04%	0.1%	0.3%	0.3%	0.4%	0.4%	0.5%	0.7%	0.8%	0.9%	1.1%	1.2%	-	-
Rate	0.4	2	4	6	11	13	19	24	32	35	39	45	12,460%	55.2%
Total	**375,242**	**457,845**	**606,437**	**755,171**	**1,181,538**	**1,312,616**	**1,684,760**	**1,607,206**	**1,746,312**	**1,882,754**	**1,699,677**	**1,811,573**	**383%**	**15.4%**
Rate	947	1,143	1,497	1,836	2,831	3,089	3,887	3,631	3,845	4,111	3,623	3,861	308%	13.6%

Rate - Per 100,000 Medicare Beneficiaries; Change - Change from 2000 to 2011; GM- Geometric average annual change

Table 5 shows increases based on a listing of states in alphabetical order.

Discussion

This assessment of facet joint interventions in the Medicare population from 2000 to 2011 showed explosive growth. In contrast to the Medicare population growth of 18%, facet joint interventions increased 308% over the same period per 100,000 Medicare beneficiaries. More importantly, lumbosacral facet joint neurolysis procedures increased 544% per 100,000 Medicare beneficiaries, from an increase rate of 135 to 866 or 53,323 to 406,378 in 2011. There were also significant increases noted with lumbosacral facet joint injections with 228% from 2000 to 2011 with an annual increase of 11.4%, increasing from 643 per 100,000 Medicare beneficiaries to 20,111 in 2011 or from 254,791 to 990,449. Proportionately, cervical and thoracic facet joint injections and neurolysis increased 359% and 836%. The baseline numbers were lower for cervical facet joint injections of 147 per 100,000 population, increasing to 676, increasing from 58,324 to 317,220; whereas, for cervical and thoracic facet neurolysis, the increases were 836% from 22 to 208, increasing from 8,804 to 97,526 from 2000 to 2011. Thus, increases were present in all settings for all types of facet joint interventions.

The results of this evaluation of the explosive growth patterns are similar to previous evaluations (24-26). Some of the changes noted include significant decreases for general physicians amounting to 17.9% in 2006 and further decreasing to 3.4% in 2011. Non-physician providers including certified registered nurse anesthetists, nurse practitioners, and physician assistants, also increased percentage-wise substantially by 12,460%; however, the baseline rates were extremely low with 0.4 per 100,000 population increasing to 45 per 100,000 population in 2011, or 143 procedures to 21,263 procedures in 2011 with an annual increase of 55.2%. Despite many physical medicine and rehabilitation specialists designating themselves in IPM or pain management specialties, the proportion of procedures for the specialty of physical medicine and rehabilitation increased by 781% from 2000 to 2011, increasing from 29,984 in 2000 to 264,274 in 2011.

The states' claims data showed over 20% increase in 9 states consisting of Idaho, Wyoming, Arizona, Nevada, Alabama, New Hampshire, West Virginia, Massachusetts, and Oklahoma. Further, in 6 states there were decrease of greater than 20% including Texas,

Table 4. *Frequency of claims of utilization of facet joint interventions performed (claims data) in each state with claims data from 2008 to 2010 in Medicare recipients.*

State	F2008	F2009	F2010	Overall Change	Annual Change (GM)	R2008	R2009	R2010	Overall Change	Annual Change (GM)
Idaho	3,448	4,933	5,145	49%	14%	1,609	2,222	2,239	39%	12%
Wyoming	1,561	2,036	2,288	47%	14%	2,051	2,603	2,857	39%	12%
Arizona	36,124	48,359	51,232	42%	12%	4,154	5,376	5,508	33%	10%
Nevada	12,229	14,438	17,294	41%	12%	3,706	4,209	4,849	31%	9%
Alabama	27,412	34,681	37,764	38%	11%	3,388	4,191	4,468	32%	10%
New Hampshire	7,382	8,175	9,612	30%	9%	3,488	3,761	4,305	23%	7%
West Virginia	10,492	12,397	13,422	28%	9%	2,813	3,286	3,516	25%	8%
Massachusetts	28,026	32,249	35,597	27%	8%	2,751	3,103	3,355	22%	7%
Oklahoma	14,567	18,698	18,187	25%	8%	2,518	3,160	3,014	20%	6%
Oregon	8,656	10,055	10,631	23%	7%	1,482	1,670	1,712	16%	5%
Utah	10,546	12,136	12,755	21%	7%	3,993	4,431	4,507	13%	4%
Colorado	10,733	12,258	12,839	20%	6%	1,853	2,036	2,055	11%	4%
Ohio	57,542	65,808	67,447	17%	5%	3,126	3,519	3,549	14%	4%
Vermont	2,259	2,615	2,653	17%	6%	2,153	2,422	2,379	10%	3%
North Dakota	1,560	2,044	1,803	16%	5%	1,463	1,893	1,649	13%	4%
Maine	4,708	5,256	5,385	14%	5%	1,859	2,029	2,033	9%	3%
Mississippi	19,786	26,739	22,420	13%	4%	4,129	5,480	4,510	9%	3%
Washington	17,750	22,060	19,815	12%	4%	1,965	2,351	2,038	4%	1%
Hawaii	841	815	930	11%	3%	433	407	450	4%	1%
Indiana	38,750	39,868	41,891	8%	3%	4,019	4,047	4,165	4%	1%
Kansas	10,242	11,933	11,112	8%	3%	2,450	2,805	2,568	5%	2%
Nebraska	4,322	5,421	4,685	8%	3%	1,593	1,967	1,679	5%	2%
Georgia	60,718	76,481	65,230	7%	2%	5,268	6,406	5,279	0%	0%
New Mexico	7,705	7,964	8,248	7%	2%	2,618	2,621	2,632	1%	0%
South Carolina	44,696	50,727	47,945	7%	2%	6,176	6,776	6,197	0%	0%
Tennessee	53527	55,494	57,376	7%	2%	5,330	5,381	5,424	2%	1%
Missouri	35,584	38,174	37,224	5%	2%	3,683	3,874	3,706	1%	0%
Wisconsin	24,306	24,961	25,427	5%	2%	2,782	2,799	2,791	0%	0%
DC	11,540	12,641	12,004	4%	1%	15,361	16,482	15,363	0%	0%
Minnesota	13,394	14,896	13,869	4%	1%	1,788	1,943	1,765	-1%	0%
New Jersey	29,557	29,375	30,735	4%	1%	2,304	2,252	2,316	1%	0%
Connecticut	11,810	11,554	12,167	3%	1%	2,152	2,070	2,144	0%	0%
Virginia	24,677	27,730	24,753	0%	0%	2,288	2,498	2,170	-5%	-2%
Iowa	9,123	8,850	9,007	-1%	0%	1,802	1,730	1,741	-3%	-1%
California	137,088	154,921	133,684	-2%	-1%	3,052	3,354	2,810	-8%	-3%
Kentucky	31,612	33,580	31,077	-2%	-1%	4,341	4,517	4,089	-6%	-2%
Louisiana	26,301	24,152	24,953	-5%	-2%	4,007	3,598	3,634	-9%	-3%
North Carolina	51,826	55,887	49,289	-5%	-2%	3,689	3,860	3,308	-10%	-4%
Alaska	1,528	1,279	1,432	-6%	-2%	2,556	2,040	2,180	-15%	-5%
Arkansas	38,483	36,987	35,111	-9%	-3%	7,564	7,108	6,607	-13%	-4%
New York	62,844	55,294	57,025	-9%	-3%	2,174	1,883	1,908	-12%	-4%
Maryland	30,821	30,310	27,498	-11%	-4%	4,139	3,967	3,504	-15%	-5%

Table 4 (cont.). *Frequency of claims of utilization of facet joint interventions performed (claims data) in each state with claims data from 2008 to 2010 in Medicare recipients.*

State	F2008	F2009	F2010	Overall Change	Annual Change (GM)	R2008	R2009	R2010	Overall Change	Annual Change (GM)
Pennsylvania	61,486	56,582	54,218	-12%	-4%	2,768	2,513	2,375	-14%	-5%
Illinois	57,328	67,939	49,567	-14%	-5%	3,231	3,761	2,695	-17%	-6%
Michigan	109,510	118,627	92,593	-15%	-5%	6,933	7,348	5,608	-19%	-7%
Texas	189,830	210,162	161,265	-15%	-5%	6,775	7,247	5,374	-21%	-7%
Florida	264,406	259,799	212,902	-19%	-7%	8,232	7,899	6,309	-23%	-8%
Montana	4,515	4,663	3,587	-21%	-7%	2,814	2,832	2,116	-25%	-9%
South Dakota	6,666	7,264	5,295	-21%	-7%	5,048	5,402	3,877	-23%	-8%
Delaware	5,616	4,536	4,022	-28%	-11%	3,981	3,127	2,694	-32%	-12%
Rhode Island	10,879	8,945	7,259	-33%	-13%	6,116	4,963	3,967	-35%	-13%
Total	1,746,312	1,882,754	1,699,677	-3%	-1%	3,845	4,111	3,623	-6%	-2%

Annual change = geometric

Florida, Montana, South Dakota, Delaware, and Rhode Island. Overall from 2008 to 2010 there was a decrease of 6% for facet joint interventions. Unfortunately this decrease did not sustain and in 2011 the total number of procedures increased from 1,699,677 to 1,811,573; however, this was still lower than 2009, even though it was higher than 2007. An OIG report was published in 2008 (33) which provided a scathing criticism of facet joint injections. In this evaluation, radiofrequency neurolysis was not included; however, this seems to have not made any significant difference in the utilization of either cervical and thoracic or lumbar and sacral facet joint injections, except for the decreases seen in 2010 which may have been unrelated to this report. Consequently, the findings of this assessment illustrate that facet joint interventions are not only out of control, but also add fuel to the claims that facet joint interventions are overused, abused, and used without appropriate medical necessity and indications.

Some researchers claim that there has not been an increase of low back pain. However, data show otherwise with overall evidence that spinal pain is increasing along with continuing disability (1-8,12,18,34,44). Thus, the significance of spinal pain, disability, and escalating economic costs continue to be a concern to the public at large, policy makers, and providers (1-8,12,24-26,34,44). Studies of spinal pain (45,46) have shown 25% of patients reporting Grade II to IV low back pain with high pain intensity and disability compared to 14% with neck pain and Grade III and IV levels of pain in 15% with low back and 5% with neck. The care seeking including age related, prevalence is also increasing with many baby boomers entering the elderly population (12,18). Proponents argue that advances in the understanding of the structural basis of chronic spinal pain and evidence-based medicine with comparative effectiveness research have increased utilization (34-39). Consequently, IPM performed in contemporary IPM settings with appropriate indications and medical necessity may be considered appropriate utilization; however, when they do not meet these criteria, they are considered as overuse and abuse. In fact, systematic reviews and guidelines addressing the diagnostic and therapeutic utility of facet joint interventions have shown good evidence for diagnostic interventions (35-39) and variable evidence for therapeutic interventions ranging from limited to fair and good (35-39,47-49). The majority of the evidence is based on active control trials which have been common in IPM (34). Even then, criticism continues on not only facet joint interventions, but all interventional techniques. The explosive growth of facet joint interventions, rather justifiably, contributes to the criticism of all other interventions.

These patterns of utilization lead to various types of policies including national coverage determinations, local coverage determinations, and noncoverage by private insurers and other payers (42). In fact, the OIG has recommended strengthening program safeguards to prevent improper payments for facet joint injections and also enforce proper documentation, however, either the OIG report or establishment of local coverage determinations (LCDs) has not deterred the explosive growth in the utilization patterns of facet joint interventions. Contrary to all the measures undertaken,

Table 5. *Frequency of the utilization of facet joint interventions based on listing of states (claims data) in alphabetical order from 2000 to 2011 in the Medicare population*

State	F2008	F2009	F2010	Overall Change	Annual Change	R2008	R2009	R2010	Overall Change	Annual Change
Alabama	27,412	34,681	37,764	38%	11%	3,388	4,191	4,468	32%	10%
Alaska	1,528	1,279	1,432	-6%	-2%	2,556	2,040	2,180	-15%	-5%
Arizona	36,124	48,359	51,232	42%	12%	4,154	5,376	5,508	33%	10%
Arkansas	38,483	36,987	35,111	-9%	-3%	7,564	7,108	6,607	-13%	-4%
California	137,088	154,921	133,684	-2%	-1%	3,052	3,354	2,810	-8%	-3%
Colorado	10,733	12,258	12,839	20%	6%	1,853	2,036	2,055	11%	4%
Connecticut	11,810	11,554	12,167	3%	1%	2,152	2,070	2,144	0%	0%
DC	11,540	12,641	12,004	4%	1%	15,361	16,482	15,363	0%	0%
Delaware	5,616	4,536	4,022	-28%	-11%	3,981	3,127	2,694	-32%	-12%
Florida	264,406	259,799	212,902	-19%	-7%	8,232	7,899	6,309	-23%	-8%
Georgia	60,718	76,481	65,230	7%	2%	5,268	6,406	5,279	0%	0%
Hawaii	841	815	930	11%	3%	433	407	450	4%	1%
Idaho	3,448	4,933	5,145	49%	14%	1,609	2,222	2,239	39%	12%
Illinois	57,328	67,939	49,567	-14%	-5%	3,231	3,761	2,695	-17%	-6%
Indiana	38,750	39,868	41,891	8%	3%	4,019	4,047	4,165	4%	1%
Iowa	9,123	8,850	9,007	-1%	0%	1,802	1,730	1,741	-3%	-1%
Kansas	10,242	11,933	11,112	8%	3%	2,450	2,805	2,568	5%	2%
Kentucky	31,612	33,580	31,077	-2%	-1%	4,341	4,517	4,089	-6%	-2%
Louisiana	26,301	24,152	24,953	-5%	-2%	4,007	3,598	3,634	-9%	-3%
Maine	4,708	5,256	5,385	14%	5%	1,859	2,029	2,033	9%	3%
Maryland	30,821	30,310	27,498	-11%	-4%	4,139	3,967	3,504	-15%	-5%
Massachusetts	28,026	32,249	35,597	27%	8%	2,751	3,103	3,355	22%	7%
Michigan	109,510	118,627	92,593	-15%	-5%	6,933	7,348	5,608	-19%	-7%
Minnesota	13,394	14,896	13,869	4%	1%	1,788	1,943	1,765	-1%	0%
Mississippi	19,786	26,739	22,420	13%	4%	4,129	5,480	4,510	9%	3%
Missouri	35,584	38,174	37,224	5%	2%	3,683	3,874	3,706	1%	0%
Montana	4,515	4,663	3,587	-21%	-7%	2,814	2,832	2,116	-25%	-9%
Nebraska	4,322	5,421	4,685	8%	3%	1,593	1,967	1,679	5%	2%
Nevada	12,229	14,438	17,294	41%	12%	3,706	4,209	4,849	31%	9%
New Hampshire	7,382	8,175	9,612	30%	9%	3,488	3,761	4,305	23%	7%
New Jersey	29,557	29,375	30,735	4%	1%	2,304	2,252	2,316	1%	0%
New Mexico	7,705	7,964	8,248	7%	2%	2,618	2,621	2,632	1%	0%
New York	62,844	55,294	57,025	-9%	-3%	2,174	1,883	1,908	-12%	-4%
North Carolina	51,826	55,887	49,289	-5%	-2%	3,689	3,860	3,308	-10%	-4%
North Dakota	1,560	2,044	1,803	16%	5%	1,463	1,893	1,649	13%	4%
Ohio	57,542	65,808	67,447	17%	5%	3,126	3,519	3,549	14%	4%
Oklahoma	14,567	18,698	18,187	25%	8%	2,518	3,160	3,014	20%	6%
Oregon	8,656	10,055	10,631	23%	7%	1,482	1,670	1,712	16%	5%
Pennsylvania	61,486	56,582	54,218	-12%	-4%	2,768	2,513	2,375	-14%	-5%
Rhode Island	10,879	8,945	7,259	-33%	-13%	6,116	4,963	3,967	-35%	-13%
South Carolina	44,696	50,727	47,945	7%	2%	6,176	6,776	6,197	0%	0%
South Dakota	6,666	7,264	5,295	-21%	-7%	5,048	5,402	3,877	-23%	-8%
Tennessee	53,527	55,494	57,376	7%	2%	5,330	5,381	5,424	2%	1%

Table 5 (cont.). *Frequency of the utilization of facet joint interventions based on listing of states (claims data) in alphabetical order from 2000 to 2011 in the Medicare population*

State	F2008	F2009	F2010	Overall Change	Annual Change	R2008	R2009	R2010	Overall Change	Annual Change
Texas	189,830	210,162	161,265	-15%	-5%	6,775	7,247	5,374	-21%	-7%
Utah	10,546	12,136	12,755	21%	7%	3,993	4,431	4,507	13%	4%
Vermont	2,259	2,615	2,653	17%	6%	2,153	2,422	2,379	10%	3%
Virginia	24,677	27,730	24,753	0%	0%	2,288	2,498	2,170	-5%	-2%
Washington	17,750	22,060	19,815	12%	4%	1,965	2,351	2,038	4%	1%
West Virginia	10,492	12,397	13,422	28%	9%	2,813	3,286	3,516	25%	8%
Wisconsin	24,306	24,961	25,427	5%	2%	2,782	2,799	2,791	0%	0%
Wyoming	1,561	2,036	2,288	47%	14%	2,051	2,603	2,857	39%	12%

Annual change = geometric

lumbosacral neurolysis, which was not the subject of the OIG investigation increased with explosive growth similar to lumbosacral transforaminal epidural injections (50). However, we continue to believe that if LCDs are prepared to provide value based IPM, they will stop the excessive utilization, whereas, if they are inappropriately prepared, they could function as a hindrance.

The cost effectiveness of cost utility evidence is not utilized based on the Patient-Centered Outcomes Research Institute (PCORI) (51,52), but the CMS may use this threshold implicitly or explicitly (51). Multiple cost effectiveness analysis studies have been performed over the years about managing spinal pain, along with multiple systematic reviews (53-63). Due to escalating health care costs and the questionable effectiveness of multiple interventions, cost effectiveness or cost utility analysis continues to be a crucial part of evidence-based medicine, clinical practice, and health care policy (34,51,53-63). The purpose of a cost utility analysis is to estimate the ratio between the cost of a health-related intervention and the benefit it produces in terms of the number of years lived in full health by the patient receiving intervention in health economics. It is also considered a type of cost effectiveness analysis, with both the terms being used interchangeably, measuring the cost in monetary units. Cost effectiveness and cost utility analysis in the past have shown highly variable results. However, there are no significant assessments of cost utility analysis for any of the interventional techniques except for spinal cord stimulation and a recent publication for epidural injections (51,53,57,64-67). Recently in a cost utility analysis of 480 patients with 2-year follow-up, the cost was demonstrated at less than $2,200 per year with improvement in QALY (53). For facet joint interventions, such evaluations are under way for therapeutic facet joint nerve blocks; however, there are no published reports from well conducted randomized trials. In the past, in a prospective low quality randomized, trial of 73 patients, the cost utility analysis was assessed for therapeutic lumbar facet joint nerve blocks with cost for one-year QALY of $3,461 (68).

Recently, it has been stated that truly informed consent will transform spine care. The ethics and legality of spine care providers has been questioned and claims have been made that decisions are neither informed nor consensual (69). It has been stated that informed consent in spine care often ignores the key details in reference to the patient's diagnosis and the risks and benefits of proposed treatments and procedures; the risks and benefits of alternative approaches (regardless of their costs or availability under insurance policies); and the risks and benefits of not having the proposed procedure(s).It is claimed that informed consent in spine care does not live up to the above standards. Patients with back and neck problems often don't receive accurate information about their condition per the authors. As an example they illustrate facet syndrome, however, many physicians do not use facet syndrome as a diagnosis. They claim that they are often assigned invalidated diagnosis – and the prescribed treatments targeting these hypothetical disease entities. They question the scientific evidence supporting the diagnosis of facet syndrome and the interventions that are often prescribed for it, including diagnostic facet blocks, therapeutic facet injections, and facet rhizotomy. These critics claim that patients do not typically hear about the full range of diagnostic and treatment options and they are often shunted toward the favored treatment approaches of the providers they visit – whether these align with the patient's best interest or not. Further, they also criticized that many spine care providers play up the potential benefits of suggested

treatments while playing down their risks. This criticism may be accurate in some settings, but the majority of it may not be applicable in contemporary IPM settings. The authors of this manuscript are quite certain that the majority provide proper information as the authors of this manuscript do. What critics are missing is that these patients have undergone many years of alternative modalities of treatments including surgical interventions in some cases and are left without any major alternative, even when the alternatives are explained. Consequently, it would be best if authors used a professional demeanor in criticizing when they do not agree, and use appropriate knowledge and synthesis of evidence-based medicine (28,40,41,70).

There are several limitations to our study including the lack of inclusion of participants from Medicare Advantage plans; however, this study included all fee-for-service Medicare patients, rather than only the ones above the age of 65. An additional disadvantage is that detailed state data were not available from 2000 to 2007, nor was facility and cost data, which have been published elsewhere (25). Further, the data provided for state utilizations is based on claims data for that state which also may include patients from contiguous or other states receiving services in those states.

Overall, the growth of facet joint interventions is explosive and appropriate measures must be enforced to control this growth. Appropriate evidence development utilizing proper methodologic criteria with a description of the limitations of the indications and medical necessity and frequency, while limiting these procedures to be performed by only well-trained and qualified physicians will not only curb the explosive increases with reduced utilization, but also allow continued access when indicated.

Conclusion

There have been explosive increases in the performance of lumbar facet joint interventions. However, from 2008 to 2010, there has been a dampening of the growth in general with a 6% decline in the utilization of facet joint interventions.

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