Public Health Policy Perspective

An Updated Assessment of Utilization of Interventional Pain Management Techniques in the Medicare Population: 2000 – 2013

Laxmaiah Manchikanti, MD[1,2], Vidyasagar Pampati, MSc[1], Frank J.E. Falco, MD[3], and Joshua A. Hirsch, MD[4]

From: [1]Pain Management Center of Paducah, Paducah, KY; and [2]University of Louisville, Louisville, KY; [3]Mid Atlantic Spine & Pain Physicians, Newark, DE, and Temple University Hospital, Philadelphia, PA; and [4]Massachusetts General Hospital and Harvard Medical School, Boston, MA.

Additional Author Affiliation information on P. E124.

Address Correspondence:
Laxmaiah Manchikanti, MD
2831 Lone Oak Road
Paducah, KY 42003
E-mail:
drlm@thepainmd.com

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Background: The rapid increase in the prevalence of chronic pain and disability, and the explosion of interventional pain management associated health care costs are a major concern for our community. Further, the increasing utilization of numerous modalities of treatments in managing chronic pain, continue to escalate at a pace which may not be sustainable. There are multiple regulations in place to control the growth of health care expenditures which seem to have been largely ineffective. Among the various modalities utilized in managing chronic pain, interventional techniques have shown a significant increase in their utilization in the face of continued debate with respect to the accuracy of diagnostic interventions and the efficacy of therapeutic interventions.

Objective: To update and assess the utilization of interventional techniques in chronic pain management in fee-for-service Medicare population.

Study Design: An updated analysis of the growth of interventional techniques in managing chronic pain in fee-for-service Medicare beneficiaries from 2000 through 2013.

Methods: The data were derived and analyzed utilizing the Centers for Medicare and Medicaid Services (CMS) Physician Supplier Procedure Summary Master Data from 2000 through 2013.

Results: From 2000 through 2013, in fee-for-service Medicare beneficiaries, the overall utilization of interventional techniques services increased 236% at an annual average growth of 9.8%, whereas the per 100,000 Medicare population utilization increased 156% with an annual average growth of 7.5%. During this period, the US population increased 12% with an annual average increase of 0.9%, whereas those above 65 years of age increased 27% with an annual average increase of 1.9%. Total Medicare beneficiaries increased 31% with an annual average increase of 2.1%, with an overall increase of 64% for those above 65 years of age, an increase of 26%, constituting 17% of the US population in 2013.

The overall increases in epidural and adhesiolysis procedures were 165% compared to 102% per 100,000 fee-for-service population with annual average increases of 7.8% and 5.6%. Facet joint and sacroiliac joint injections increased 417% for services with an annual average increase of 13.5%, whereas the rate per 100,000 fee-for-service Medicare beneficiaries increased 295% with an annual average increase of 11.1%.

Limitations: Limitations of this assessment include the lack of inclusion of participants from Medicare Advantage plans, lack of appropriate available data for state-wide utilization, and potential errors in documentation, coding, and billing.

Conclusion: This update once again shows a significant increase in interventional techniques in fee-for-service Medicare beneficiaries from 2000 through 2013 with an increase of 156% per 100,000 Medicare population with an annual average increase of 7.5%. During this period the Medicare population increased 31% with an annual average increase of 2.1%.

Key words: Chronic pain, chronic spinal pain, interventional pain management, interventional techniques, epidural injections, facet joint interventions, sacroiliac joint injections

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The increasing prevalence in chronic pain and disability, and the economic impact with increases in health care costs continue to be subjects of concern in the United States and across the globe (1-4). Specifically, spinal pain is highly pervasive and has been shown to contribute to disability, with 3 of 5 disorders constituting the cause of most years lived with disability in 2010 in the United States as well as worldwide which includes low back pain, other musculoskeletal disorders, and neck pain (1-10). Thus, not only costs, utilization, and appropriateness, but also complications related to various interventions in managing chronic pain, specifically spinal pain, have been debated extensively (1-4,11-34). Consequently, based on available reports, deaths due to acetaminophen were approximately 1,000 per year; nonsteroidal anti-inflammatory drug deaths, based on 1990 data, were 17,000; opioid deaths in 2012 were 16,235, with deaths secondary to methadone alone of 4,400 in 2011. Deaths have escalated due to heroin and extensive liberalization of marijuana use. Surgical interventions, which have increased 137%for low back pain from 1998 to 2008, resulted in 1,012 deaths in 2008 (15,20,22,27-32). Most of the focus has been on complications of interventional techniques and opioid use with increasing utilization (16-19,23-26,34). The Food and Drug Administration (FDA) has reported 131 deaths, of which 41 were secondary to arachnoiditis (23-26). In addition, there was an unprecedented outbreak of fungal infection due to preservative-free, injectable methylprednisolone acetate in 2012 (33), affecting 76 facilities in 23 states and a total of 751 patients.

Published reports show that utilization of interventional techniques in managing chronic pain has been increasing substantially over the years. Manchikanti et al (16,19), in an assessment of the population in the fee-for-service sector of Medicare, showed an overall increase of 228% and 177% per 100,000 Medicare beneficiaries from 2000 to 2011. In addition, they (17) also reported utilization and costs from 2000 to 2008. They found a 240% increase in costs and a 229% increase in procedures. They estimated the costs of spinal interventional techniques to be over $362 million in 2000, increasing to over $1.2 billion in 2008. Overall, per patient expenditures increased 19% and per visit expenditures increased 6% (17). Manchikanti et al (16), in describing accountable interventional pain management, a collaboration among practitioners, patients, payers, and government, discussed various issues related to escalating utilization, costs, and measures to reduce utilization and costs without affecting access to care. There have been multiple investigations from the Office of Inspector General in reference to the utilization of facet joint injections and transforaminal epidural injections (35,36).

An emerging specialty, interventional pain management (IPM) and its techniques have their own definitions (37,38). IPM is represented on Carrier Advisory Committees (39) in the United States. The specialty has a specific responsibility to provide medically necessary services while at the same time improving quality and curbing costs (12,16,40); however, it is extremely difficult because of counter-acting forces with ever-changing coverage policies, regulations, an increasing population that has pain and disability, and finally health care reform and excessive utilization (16-19,40-43). In addition, there also has been extensive debate on IPM's efficacy and effectiveness, including medical necessity, indications, and appropriateness of interventional techniques for managing chronic pain (44-53) with a case being made for and against these techniques by appropriately performed systematic reviews (12,44-48), and others with inappropriate evidence synthesis and lack of appropriate methodology (39,50-52).

With the institution of national health care systems across the globe and affordable health care in the United States and an increasing aged population and Medicaid expansion in the United States secondary to the Affordable Care Act, interventional techniques have become the focus of attention in the United States. Further, Medicare has become a standard due to the organization being larger than any other insurance provider. Medicare continues to expand rapidly and all other payers, specifically Medicaid with its explosive expansion, seem to base their decisions on the policies of Medicare. As expected, multiple measures are applied by insurers and various governmental agencies across the globe to get a handle on exploding health care costs, specifically costs of chronic pain management with a focus on interventional techniques. However, the basic understanding of chronic pain itself and the proper and safe application of interventional techniques compared to various other clinical modalities available for managing chronic pain seems to be misunderstood. Further, utilization patterns, costs, and policies continue to emerge.

This study was undertaken to update previous assessments (19) about the utilization of interventional techniques in chronic pain from 2000 through 2013.

Methods

The study was performed utilizing the Centers for Medicare and Medicaid Services (CMS) Physician Supplier Procedure Summary Master Data from 2000 through 2013 (54). The data were purchased from CMS by the American Society of Interventional Pain Physicians. This study was conducted with the internal resources of the primary author's practice without any external funding, either from industry or elsewhere. CMS's 100% data set is therefore expected to be unbiased and unpredictable in terms of any patient characteristics. Even though previous studies (55,56) used only patients aged 65 or older, in this study we have used all patients enrolled in fee-for-service Medicare. A significant proportion of patients below the age of 65 receive interventional pain management services (17). Medicare represents the single largest health care payer in the United States, with over 51.9 million beneficiaries in 2013 (57). Thus, the procedures performed on 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 procedure codes for interventional techniques [Epidural and Adhesiolysis procedures (62310, 62311, 64479, 64480, 64483, 64484, 62280, 62281, 62282, 62263, 62264); Facet Joint interventions and SI joint blocks (64470, 64472, 64475, 64476, 64490, 64491-new, 64492-new, 64493-new, 64494-new, 64495-new, 64622, 64623, 64626, 64627, 64633-new, 64634-new, 64635-new, 64636-new, 27096); Discography and Disc decompression (62290, 62291, 62287) other type of nerve blocks (64400, 64402, 64405, 64408, 64410, 64412, 64413, 64417, 64420, 64421, 64425, 64430, 64445, 64505, 64510, 64520, 64530, 64600, 64605, 64610, 64613, 64620, 64630, 64640, 64680)] were identified for 2000 through 2013. The data were then tabulated based on the place of service – facility (ambulatory surgery center, hospital outpatient department) or nonfacility (office). The calculated data included the number of interventional pain management services and the rate of services per 100,000 Medicare beneficiaries.

Various specialties were described as providers: interventional pain management -09, pain medicine -72, anesthesiology -05, physical medicine and rehabilitation -25, neurology -13, psychiatry -26, all constituting interventional pain management; orthopedic surgery -20, general surgery-17 and neurosurgery -14 as a surgical group; radiology specialties as a separate group (-30 diagnostic radiology, -94 interventional radiology); 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 (SPSS, Inc., Chicago, IL) Microsoft Access 2003, and Microsoft Excel 2003 (Microsoft, Redmond, WA). 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 51.900 million in 2013, an increase of 31% compared to an increase of 12% in the US population.

Utilization Characteristics

Table 2 illustrates a summary of the frequency of utilization in various categories of interventional techniques in Medicare beneficiaries from 2000 to 2013.

Overall, the increase in interventional pain management procedures from 2000 to 2013 was 236%, with a 156% increase per 100,000 Medicare beneficiaries. The increases were highest for facet joint interventions and sacroiliac joint blocks, with 417% total and 295% per 100,000 Medicare beneficiaries, followed by 165% and 102% for epidural and adhesiolysis procedures, 161% and 99% for other types of nerve blocks and finally, a 3% increase and 22% decrease for disc procedures. The geometric average of annual increases was 9.8% overall with 13.5% for facet joint interventions and sacroiliac joint blocks and 7.8% for epidural and adhesiolysis procedures.

Fig. 1 illustrates the distribution of procedural characteristics from 2000 to 2013.

Specialty Characteristics

Tables 3 and 4 illustrate procedural characteristics based on specialty. Overall increases were 236% with a 156% increase per 100,000 Medicare beneficiaries. For interventional pain management, these increases were 268% and 181%; for surgical specialties, including neurosurgery, orthopedic surgery and general surgery, increases were 101% and 54%; for radiology, they were 194% and 125%; for other physicians, they were 60% and 22%; and for other providers, they were 323% and

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

Year	U.S. Population			Medicare Beneficiaries				IPM Services		
	Population (,000)	≥ 65 Years (,000)	Percent	Medicare	% to U.S.	≥ 65 years (,000) (Percent)	< 65 years (,000) Percent	Services	% of Change from Previous Year	Rate Per 100,000
Y2000	282,172	35,077	12.40%	39,632	14.0%	34,262 (86.5%)	5,370 (13.5%)	1,469,495	-	3,708
Y2001	285,040	35,332	12.40%	40,045	14.0%	34,478 (86.1%)	5,567 (13.9%)	1,760,456	19.8%	4,396
Y2002	288,369	35,605	12.30%	40,503	14.0%	34,698 (85.7%)	5,805 (14.3%)	2,183,052	24.0%	5,390
Y2003	290,211	35,952	12.40%	41,126	14.2%	35,050 (85.2%)	6,078 (14.8%)	2,559,323	17.2%	6,223
Y2004	292,892	36,302	12.40%	41,729	14.2%	35,328 (84.7%)	6,402 (15.3%)	3,335,047	30.3%	7,992
Y2005	295,561	36,752	12.40%	42,496	14.4%	35,777 (84.2%)	6,723 (15.8%)	3,660,699	9.8%	8,614
Y2006	299,395	37,264	12.40%	43,339	14.5%	36,317 (83.8%)	7,022 (16.2%)	4,146,124	13.3%	9,567
Y2007	301,290	37,942	12.60%	44,263	14.7%	36,966 (83.5%)	7,297 (16.5%)	4,111,127	-0.8%	9,288
Y2008	304,056	38,870	12.80%	45,412	14.9%	37,896 (83.4%)	7,516 (16.6%)	4,433,411	7.8%	9,763
Y2009	307,006	39,570	12.90%	45,801	14.9%	38,177 (83.4%)	7,624 (16.6%)	4,645,679	4.8%	10,143
Y2010	308,746	40,268	13.00%	46,914	15.2%	38,991 (83.1%)	7,923 (16.9%)	4,578,977	-1.4%	9,760
Y2011	311,583	41,370	13.28%	48,300	15.5%	40,000 (82.8%)	8,300 (17.2%)	4,815,673	5.2%	9,970
Y2012	313,874	43,144	13.75%	50,300	16.0%	41,900 (83.3%)	8,500 (16.9%)	4,947,974	2.7%	9,837
Y2013	316,129	44,704	14.14%	51,900	16.4%	43,100 (83.0%)	8,800 (17.0%)	4,932,950	-0.3%	9,505
Change	12.0%	27.4%	-	31.0%	-	25.8%	63.9%	236%	-	156%
GM	0.9%	1.9%	-	2.1%	-	1.8%	3.9%	9.8%	-	7.5%

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

223% increase overall and per 100,000 Medicare beneficiaries. Fig. 2 illustrates the distribution of specialty characteristics.

Discussion

Interventional techniques for chronic pain have increased dramatically from 2000 to 2013. The increases were present in all settings and by all types of specialists. Over this period from 2000 to 2013, beneficiaries increased 31%, whereas overall interventional pain management services increased 236%, whereas rate per 100,000 Medicare beneficiaries increased 156%. The study also showed an exponential increase in facet joint interventions with a rate of 295% increase per 100,000 beneficiaries and annual average growth of 11.1%, more than any other modality. Overall, average annual increases were 7.5 % per 100,000 Medicare beneficiaries.

The results of this evaluation of growth patterns are similar to previous evaluations (17,19,55,56,58-60) although they differ in select aspects. Friedly et

Table 2. *Updated utilization of frequency of interventional techniques in the Medicare population from 2000 to 2013.*

Year	Epidural and adhesiolysis procedures		Facet joint interventions and SI joint blocks		Disc Procedures (discography & disc decompression)		Other types of nerve blocks		Total*		
	Services (Facility %)	*Rate*	Services (Facility %)	*Rate*	Services (Facility %)	*Rate*	Services (Facility%)	*Rate*	Services (Facility%)	*Change from previous year*	*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%)	*19.8%*	*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%)	*24.0%*	*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%)	*17.2%)*	*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%)	*30.3%*	*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%)	*9.8%*	*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%)	*13.3%*	*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%)	*-0.8%*	*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%)	*7.8%*	*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%)	*4.8%*	*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%)	*-1.4%*	*9,760*
2011	2,309,906 (58%)	*4,782*	2,064,227 (50%)	*4,274*	19,104 (61%)	*40*	422,436 (66%)	*875*	4,815,673 (48%)	*5.2%*	*9,970*
2012	2,324,563 (58%)	*4,621*	2,159,057 (50%)	*4,292*	18,017 (57%)	*36*	446,337 (36%)	*887*	4,947,974 (53%)	*2.7%*	*9,837*
2013	2,278,790 (58%)	*4,391*	2,197,766 (51%)	*4,235*	15,394 (51%)	*30*	441,000 (37%)	*850*	4,932,950 (53%)	*-0.3%*	*9,505*
Change	165%	*102%*	417%	*295%*	3%	*-22%*	161%	*99%*	236%	-	*156%*
Average	7.80%	*5.6%*	13.50%	*11.1%*	0.20%	*-1.8%*	7.70%	*5.4%*	9.80%	-	7.5%

Rate per 100,000 Medicare Beneficiaries; IPM - Interventional Pain Management
Change: Change from 2000 to 2013; Average - Geometric average annual change
Epidural and Adhesiolysis procedures: 62310, 62311, 64479, 64480, 64483, 64484, 62280, 62281, 62282, 62263, 62264
Facet Joint interventions and SI joint blocks: 64470, 64472, 64475, 64476, 64490, 64491 (new), 64492 (new), 64493 (new), 64494 (new), 64495 (new), 64622, 64623, 64626, 64627, 64633 (new), 64634 (new), 64635 (new), 64636 (new), 27096
Discography and Disc decompression: 62290, 62291, 62287
Other type of nerve blocks: 64400, 64402, 64405, 64408, 64410, 64412, 64413, 64417, 64420, 64421, 64425, 64430, 64445, 64505, 64510, 64520, 64530, 64600, 64605, 64610, 64613, 64620, 64630, 64640, 64680

al (55,56) focused on the escalating use of injection therapies coupled with a lack of evidence for managing chronic low back pain and geographic variation in epidural steroid injections, reaching inaccurate conclusions (61). These results no longer represent the present day atmosphere. Abbott et al (18) basically utilized an inappropriate concept and hypothesis.

Some critics of increasing utilization continue to claim interventional techniques lack evidence, and question if back pain is increasing (15,62-64). How-

Table 3. *Frequency of utilization of interventional pain management techniques from 2000 to 2013, in Medicare recipients.*

Specialty	Interventional Pain Management #		Surgical (neuro, general & 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	92,126 (6.3%)	232	40,491 (2.8%)	102	145,100 (9.9%)	366	15,237 (1.0%)	38	1,469,495 (72%)	3,708
2001	1,389,569 (78.9%)	3,470	105,075 (6.0%)	262	48,978 (2.8%)	122	196,311 (11.2%)	490	20,524 (1.2%)	51	1,760,456 (69%)	4,396
2002	1,755,521 (80.4%)	4,334	123,403 (5.7%)	305	62,295 (2.9%)	154	218,870 (10.0%)	540	22,963 (1.1%)	57	2,183,052 (64%)	5,390
2003	2,098,053 (82.0%)	5,102	133,165 (5.2%)	324	77,160 (3.0%)	188	229,010 (8.9%)	557	21,935 (0.9%)	53	2,559,323 (60%)	6,223
2004	2,718,622 (81.5%)	6,515	168,669 (5.1%)	404	91,892 (2.8%)	220	329,705 (9.9%)	790	26,519 (0.8%)	64	3,335,047 (54%)	7,992
2005	2,976,908 (81.3%)	7,005	183,972 (5.0%)	433	101,586 (2.8%)	239	367,303 (10.0%)	864	30,930 (0.8%)	73	3,660,699 (54%)	8,614
2006	3,196,190 (77.1%)	7,375	211,580 (5.1%)	488	110,472 (2.7%)	255	589,835 (14.2%)	1361	38,047 (0.9%)	88	4,146,124 (49%)	9,567
2007	3,405,892 (82.8%)	7,695	231,170 (5.6%)	522	111,423 (2.7%)	252	323,021 (7.9%)	730	39,621 (1.0%)	90	4,111,127 (52%)	9,288
2008	3,670,828 (82.8%)	8,083	247,125 (5.6%)	544	117,388 (2.6%)	258	354,877 (8.0%)	781	43,193 (1.0%)	95	4,433,411 (51%)	9,763
2009	3,879,520 (83.5%)	8,470	273,436 (5.9%)	597	123,228 (2.7%)	269	324,729 (7.0%)	709	44,766 (1.0%)	98	4,645,679 (49%)	10,143
2010	3,917,426 (85.6%)	8,350	222,784 (4.9%)	475	121,127 (2.6%)	258	265,771 (5.8%)	567	51,869 (1.1%)	111	4,578,977 (52%)	9,760
2011	4,159,585 (86.4%)	8,612	206,805 (4.3%)	428	127,614 (2.6%)	264	259,177 (5.4%)	537	62,492 (1.3%)	129	4,815,673 (48%)	9,970
2012	4,302,121 (86.9%)	8,553	197,982 (4.0%)	394	129,823 (2.6%)	258	244,626 (4.9%)	486	73,422 (1.5%)	146	4,947,974 (53%)	9,837
2013	4,331,789 (87.8%)	8,346	185,630 (3.8%)	358	119,172 (2.4%)	230	231,899 (4.7%)	447	64,460 (1.3%)	124	4,932,950 (53%)	9,505
Change	268%	181%	101%	54%	194%	125%	60%	22%	323%	223%	236%	156%
GM	10.5%	8.3%	5.5%	3.4%	8.7%	6.4%	3.7%	1.5%	11.7%	9.4%	9.8%	7.5%

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

ever, disability secondary to spinal pain, health, and economic impact are increasing at an explosive rate, along with evidence of the increase in the prevalence of spinal pain (1-10,13,65-73). In fact, Freburger et al (5) showed an increase in low back pain in North Carolina of 162%, from 3.9% to 10.2% over a period of 14 years from 1992 to 2006. Our understanding of the impact of chronic pain has changed over the years, specifically with its comorbid disorders and functional limitations. The impact of chronic pain has been described by various organizations as it fits their needs. The Institute of Medicine (1), based on data from Gaskin and Richard (2), estimated chronic pain in 100 million patients to have a cost of $650 billion; however, these estimations are inaccurate in that moderate and severe persistent pain contributed to 44.9 million persons, costing approximately $100 billion a year in the United States (74). Further, the FDA commissioner also used these numbers to justify the approval of Zohydro ER (Zogenix Inc., San Diego, CA) which faced stiff opposition from multiple organizations, Congress, and governors (74).

There are several limitations to our study; for example the lack of inclusion of participants in Medicare Advantage plans and potential coding errors. In

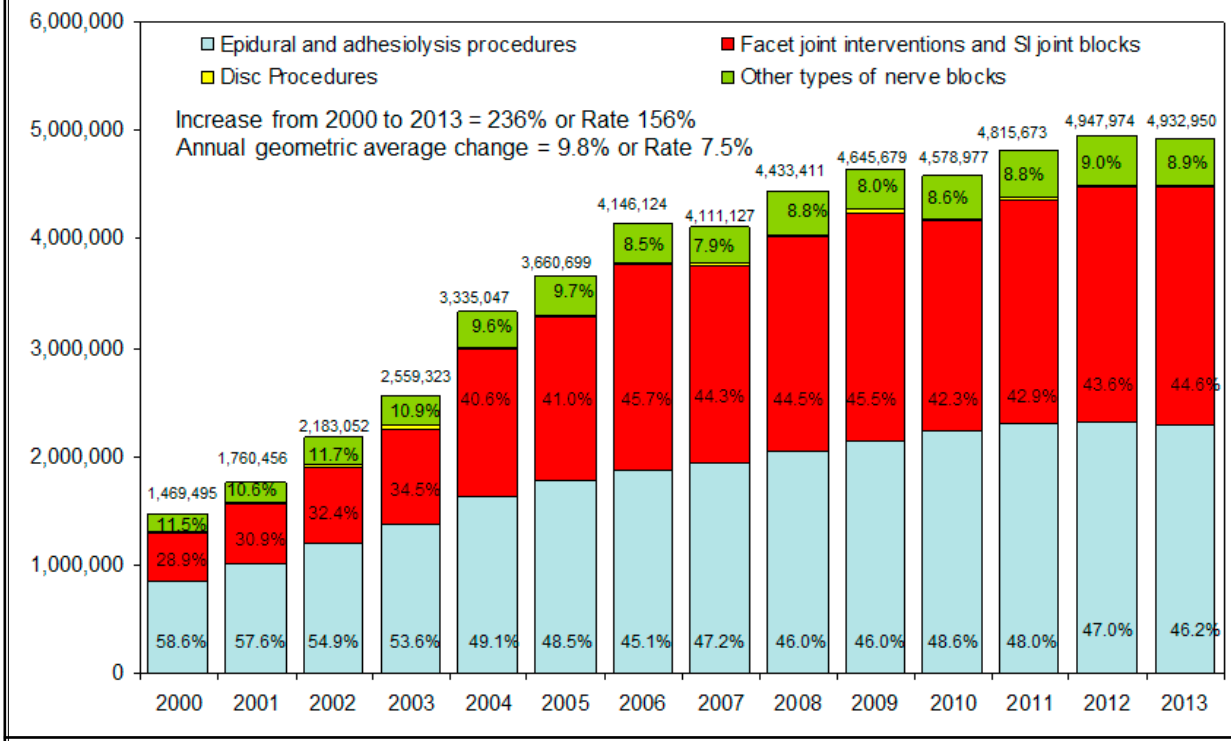

Fig. 1. *Distribution of procedural characteristics by type of procedures from 2000 to 2013.*

contrast to previous studies (55,56), 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 (60). Further, by limiting to the Medicare database, this study has not evaluated other insurance providers including Medicaid, workmen's compensation and other carriers. However, the data from the FDA (26), shows utilization of epidural injections in Medicare and non-Medicare population. This data showed that over a period of approximately 5 years, 6.6 million epidural injections were administered to 1.4 million patients over the age of 65 years. Thus, even this data has missed those of less than 65 years of age and Medicare Advantage plans. The FDA data also showed among other payers, in those who were aged 0 to 59 years, with 150,572 patients receiving 262,301 epidural injections in 2012. Thus, the present data correlates with the data provided by the FDA.

Overall interventional techniques are escalating and are associated with complications; and complications should never be minimized. Consequently, application of principles of accountable and value-based interventional pain management are crucial. Other developments include reducing over-regulation and applying appropriate regulations without shifting services from one sector to the other with evidence-based approaches.

Conclusion

Interventional techniques increased significantly in Medicare beneficiaries from 2000 to 2013. There was an increase of 156% in utilizing interventional pain management services per 100,000 fee-for-service Medicare beneficiaries, with an annual average increase of 7.5%. The study also showed an exponential increase in facet joint interventions and sacroiliac joint blocks.

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Table 4. *Frequency of utilization of interventional pain management techniques from 2000 to 2013, in fee-for-service 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	FY2012	FY2013	Change	GM change
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	1,407,719	1,385,402	37%	2.4%
IPM	-	-	-	89,631	360,217	394,987	500,776	732,563	998,062	1,148,080	1,214,619	1,311,404	1,335,469	1,329,056	-	-
Pain Management	-	4,890	197,670	310,634	489,038	534,963	561,862	472,778	388,065	335,436	413,976	533,757	592,723	675,032	-	-
PM&R	104,894	123,087	183,630	245,944	374,572	404,111	465,509	523,334	600,757	665,273	690,303	740,661	790,004	785,712	649%	16.8%
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	171,074	152,186	165%	7.8%
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	5,132	4,401	84%	4.8%
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	4,302,121	4,331,789	268%	10.5%
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%	86.9%	87.8%	10%	0.7%
Rate	2,969	3,470	4,334	5,102	6,515	7,005	7,375	7,695	8,083	8,470	8,350	8,612	8,553	8,346	181%	8.3%
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	47,669	42,390	97%	5.3%
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	142,425	136,038	116%	6.1%
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	7,888	7,202	-7%	-0.5%
Surgery	92,126	105,075	123,403	133,165	168,669	183,972	211,580	231,170	247,125	273,436	222,784	206,805	197,982	185,630	101%	5.5%
Percent	6.3%	6.0%	5.7%	5.2%	5.1%	5.0%	5.1%	5.6%	5.6%	5.9%	4.9%	4.3%	4.0%	3.8%	-40%	-3.9%
Rate	232	262	305	324	404	433	488	522	544	597	475	428	394	358	54%	3.4%
Extended IPM	1,268,667	1,494,644	1,878,924	2,231,218	2,887,291	3,160,880	3,407,770	3,637,062	3,917,953	4,152,956	4,140,210	4,366,390	4,500,103	4,517,419	256%	10.3%
Percent	86.3%	84.9%	86.1%	87.2%	86.6%	86.3%	82.2%	88.5%	88.4%	89.4%	90.4%	90.7%	90.9%	91.6%	6%	0.5%
Rate	3,201	3,732	4,639	5,425	6,919	7,438	7,863	8,217	8,628	9,067	8,825	9,040	8,947	8,704	172%	8.0%
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	12,769	15,010	318%	11.6%
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	117,054	104,162	182%	8.3%
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	129,823	119,172	194%	8.7%
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%	2.6%	2.4%	-12%	-1.0%
Rate	102	122	154	188	220	239	255	252	258	269	258	264	258	230	125%	6.4%
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	65,712	55,992	237%	9.8%

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

Table 4. *Frequency of utilization of interventional pain management techniques from 2000 to 2013, in fee-for-service 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	FY2012	FY2013	Change	GM change
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	15,149	19,586	7%	0.6%
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	58,630	46,677	105%	5.7%
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	17,239	13,899	-53%	-5.7%
Osteopathic	1,865	4,196	5,392	6,271	7,089	8,428	10,612	12,098	9,782	8,024	6,716	5,721	5,987	7,909	324%	11.8%
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	11,770	22,513	701%	17.4%
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	70,139	65,323	23%	1.6%
Other Physicians	145,100	196,311	218,870	229,010	329,705	367,303	589,835	323,021	354,877	324,729	265,771	259,177	244,626	231,899	60%	3.7%
Percent	9.9%	11.2%	10.0%	8.9%	9.9%	10.0%	14.2%	7.9%	8.0%	7.0%	5.8%	5.4%	4.9%	4.7%	-52%	-5.5%
Rate	366	490	540	557	790	864	1,361	730	781	709	567	537	486	447	22%	1.5%
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	24,956	23,782	62%	3.8%
NP	362	907	1,765	2,529	5,508	6,257	10,240	10,452	14,585	15,205	18,957	28,117	30,901	23,212	6312%	37.7%
PA	219	950	1,926	2,716	5,058	5,926	7,862	9,821	8,896	9,243	10,976	13,675	17,565	17,466	7875%	40.1%
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	73,422	64,460	323%	11.7%
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%	1.5%	1.3%	26%	1.8%
Rate	38	51	57	53	64	73	88	90	95	98	111	129	146	124	223%	9.4%
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	4,947,974	4,932,950	236%	9.8%
Rate	3708	4396	5390	6223	7992	8614	9567	9288	9763	10143	9760	9970	9837	9505	156%	7.5%

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
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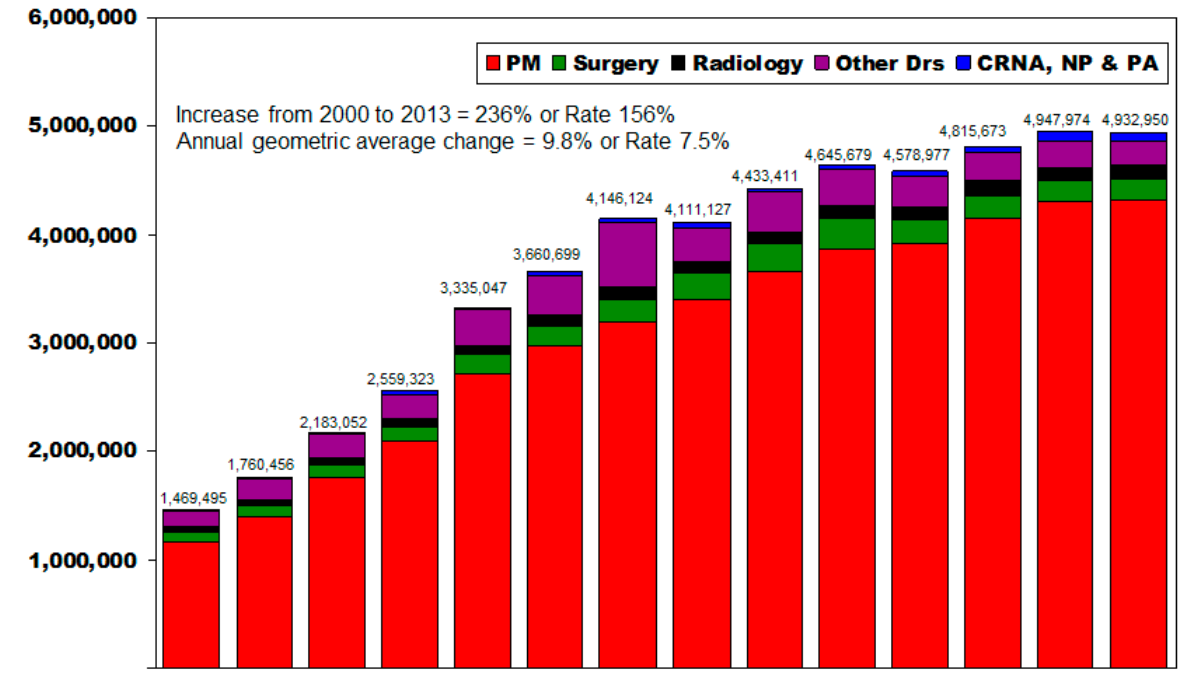

Specialty (%)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pain Management	80.1%	78.9%	80.4%	82.0%	81.5%	81.3%	77.1%	82.8%	82.8%	83.5%	85.6%	86.4%	86.9%	87.8%
Surgery	6.3%	6.0%	5.7%	5.2%	5.1%	5.0%	5.1%	5.6%	5.6%	5.9%	4.9%	4.3%	4.0%	3.8%
Radiology	2.8%	2.8%	2.9%	3.0%	2.8%	2.8%	2.7%	2.7%	2.6%	2.7%	2.6%	2.6%	2.6%	2.4%
Other Physicians	9.9%	11.2%	10.0%	8.9%	9.9%	10.0%	14.4%	7.9%	8.0%	7.0%	5.8%	5.4%	4.9%	4.7%
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%	1.5%	1.3%

Fig. 2. *Utilization of interventional pain management techniques by specialty from 2000 to 2013, in Medicare recipients.*

Author affiliations:

Dr. Manchikanti is Medical Director of the Pain Management Center of Paducah, Paducah, KY, and Clinical Professor, Anesthesiology and Perioperative Medicine, University of Louisville, Louisville, KY.

Vidyasagar Pampati is a Statistician at the Pain Management Center of Paducah, Paducah, KY.

Dr. Falco is Medical Director of Mid Atlantic Spine & Pain Physicians, Newark, DE; Director, Pain Medicine Fellowship Program, Temple University Hospital, Philadelphia, PA; and Adjunct Associate Professor, Department of PM&R, Temple University Medical School, Philadelphia, PA.

Dr. Hirsch is Vice Chief of Interventional Care, Chief of Minimally Invasive Spine Surgery, Service Line Chief of Interventional Radiology, Director of NeuroInterventional Services and Neuroendovascular Program, Massachusetts General Hospital; and Associate Professor, Harvard Medical School, Boston, MA.

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