

Health Services Research

Trends of Expenditures and Utilization of Facet Joint Interventions in Fee-For-Service (FFS) Medicare Population from 2009-2018

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Disclaimer: There was no external funding in the preparation of this manuscript. Conflict of interest: Dr. Kaye is a speaker for Merck. Dr. Hirsch is a consultant for Medtronic and Senior Affiliate Research Fellow at the Neiman Policy Institute.

Manuscript received: 04-28-2020
Revised manuscript received: 05-15-2020
Accepted for publication: 05-22-2020

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Background: The trends of the expenditures of facet joint interventions have not been specifically assessed in the fee-for-service (FFS) Medicare population since 2009

Objectives: The objective of this investigation is to assess trends of expenditures and utilization of facet joint interventions in FFS Medicare population from 2009 to 2018.

Study Design: The study was designed to analyze trends of expenditures and utilization of facet joint interventions in FFS Medicare population from 2009-2018 in the United States. In this manuscript:

- A patient was considered as undergoing facet joint interventions throughout the year.
- A visit included all regions treated during the visit.
- An episode was considered as one per region utilizing primary codes only.
- Services or procedures were considered all procedures (multiple levels).

Data for the analysis was obtained from the standard 5% national sample of the Centers for Medicare & Medicaid Services (CMS) physician outpatient billing claims for those enrolled in the FFS Medicare program from 2009 to 2018. All the expenditures were presented with allowed costs and also were inflation adjusted to 2018 US dollars.

Results: This analysis showed expenditures increased by 79% from 2009 to 2018 in the form of total cost for facet joint interventions, at an annual rate of 6.7%. Cervical and lumbar radiofrequency neurotomy procedures increased 185% and 169%. However, inflation-adjusted expenditures with 2018 US dollars showed an overall increase of 53% with an annual increase of 4.9%. In addition, using inflation-adjusted expenditures per procedures increased, the overall 6% with an annual increase of 0.7%. Overall, per patient costs, with inflation adjustment, decreased from \$1,925 to \$1,785 with a decline of 7% and an annual decline of 0.8%. Allowed charges per visit also declined after inflation adjustment from \$951.76 to \$849.86 with an overall decline of 11% and an annual decline of 1.3%. Staged episodes of radiofrequency neurotomy were performed in 23.9% of patients and more than 2 episodes for radiofrequency neurotomy in 6.9%, in lumbar spine and 19.6% staged and 5.1% more than 2 episodes in cervical spine of patients in 2018.

Limitations: This analysis is limited by inclusion of only the FFS Medicare population, without adding utilization patterns of Medicare Advantage plans, which constitutes almost 30% of the Medicare population.

Conclusions: Even after adjusting for inflation, there was a significant increase for the expenditures of facet joint interventions with an overall 53% increase. Costs per patient and cost per visit declined. Inflation-adjusted cost per year declined 7% overall and 0.8% annually from \$1,925 to \$1,785, and inflation-adjusted cost per visit also declined 11% annually and 1.3% per year from \$952 in 2009 to \$850 in 2018.

Key words: Facet joint interventions, facet joint nerve blocks, facet joint neurolysis, facet joint injections, Medicare expenditures

Pain Physician 2020; 23:S129-S147

Once escalating and now flattening, utilization of facet joint interventions continues to be debated and is associated with multiple policy changes and regulations. The recent analyses of utilization patterns of interventional techniques in general (1,2) and facet joint interventions in particular (3-5) have shown significant alterations in utilization patterns. While there was a decline in utilization of various interventional techniques, facet joint interventions stayed flat with a decline for some procedures, but with an increase in others. Overall, the proportion of facet joint interventions to all interventional techniques was 25.5% in 2000, increasing to 39.5% in 2009 and 46.8% in 2018 (1,3). During the same period, epidurals declined from 59% in 2000 to 46% in 2009 and 39% in 2018. Facet joint interventions include facet joint nerve blocks or intraarticular injections and radiofrequency neurotomy procedures. Facet joint interventions in the Medicare population, has increased by 18.8% from 2009 to 2018 per 100,000 fee-for-service (FFS) with an annual increase of 1.9%, and a significant decline compared to an overall increase of 309.9% from 2000 to 2009 during which there was an annual increase of 17% (3). The importance of this is that lumbosacral facet joint nerve block visits or sessions decreased at an annual rate of 0.2% from 2009 to 2018, with an increase of 15.2% from 2000 to 2009. In contrast, lumbosacral facet joint neurolysis sessions increased at an annual rate of 7.4% from 2009 to 2018, compared to an annual increase rate of 23% from 2000 to 2009, with reduction in growth patterns. Further, compared to lumbosacral facet joint nerve block episodes, which showed a decline at an annual rate of 0.2% from 2009 to 2018, this is a disproportionate increase. The ratio of lumbar facet joint nerve block sessions to lumbosacral facet joint neurolysis episodes decreased from 6.7 in 2000 to 1.9 in 2018. Cervical and thoracic facet joint injection episodes increased at an annual rate of 0.5% compared with cervicothoracic facet neurolysis episodes of 8.7% from 2009 to 2018. Cervical and thoracic facet joint injection episodes increased at an annual rate of 0.5% compared with cervicothoracic facet neurolysis episodes of 8.7% from 2009 to 2018. Cervical facet joint injections increased 4.9% from 2009 to 2018 compared with neurolysis procedures increase of 112%. The ratio of cervical facet joint injection sessions to neurolysis episodes changed from 8.9 in 2000 to 2.4 in 2018. This pattern of utilization significantly changed since the

enactment of new local coverage determinations (LCDs) which tended to shift procedures towards neurolysis and away from facet joint nerve blocks (6-8).

Similar observations were also made by Starr et al (5) in patients with commercial insurance with utilization and cost of lumbar radiofrequency ablation and lumbar facet joint injections. The results of this analysis showed that from 2007 to 2016, lumbar radiofrequency sessions performed per 100,000 enrollees per year increased from 49 to 113, a 130.6% overall increase and 9.7% annual increase. During the same period, lumbar facet joint injection use increased at a slower pace from 201 to 251 sessions per 100,000 enrollees, a 24.9% overall increase versus 130.6% overall increase and an annual increase of 2.5% compared to 9.7% for radiofrequency ablation. Surprisingly, they also showed that in the year after lumbar facet joint injections, less than 27% of patients received lumbar radiofrequency ablation, almost 29% received another injection, but not radiofrequency ablation, almost 45% of the patients received neither. The cost for lumbar facet joint nerve blocks per 100,000 enrollees went from \$257,280 in 2007 to \$396,580 in 2016, a 4.9% annual increase, whereas for facet joint radiofrequency ablation, costs increased from \$94,570 in 2007 to \$206,680 in 2016, an annual increase of 12.2%. Thus, reducing lumbar facet joint injections does not seem to reduce the overall utilization patterns or even the costs.

Manchikanti et al (2) assessed the growth of spinal interventional pain management techniques, along with Medicare expenditures from 2000 to 2008. In previous analysis, the authors did not look at facet joint interventions and their costs individually. However, they calculated the total costs of interventional procedures, including epidural injections, adhesiolysis procedures, facet joint interventions, and sacroiliac joint interventions. The overall costs for interventional techniques increased from \$362,347,025 in 2000 to \$1,231,180,420 in 2008, a 240% increase, with an increase of 43% per patient, 28% per visit, and 3% per procedure code.

Health care costs are a concern for all of the US population. In fact, in 2016, low back and neck pain expenditures increased an estimated \$134.5 billion, and \$129.8 billion for musculoskeletal conditions, with total spending of \$264.3 billion, an increase of 44.4%, from \$183 billion in 2013 (9,10). At the same time, overall US healthcare spending has reached \$3.65 trillion in 2018, with per person costs for health care increasing to \$11,012 in 2018 (11,12). More importantly, in 2018,

Medicare benefit payments totaled \$731 billion, up from \$462 billion in 2008. Part B spending consisting of physician services and hospital outpatient services increased from 39% to 46%, whereas Part A benefits consisting of mainly hospital inpatient services decreased from 50% to 41%, with Part D prescription drug benefits increasing from 11% to 13% (13). Further, costs of Medicare are expected to increase rapidly in upcoming years (14). Unfortunately, all these estimations look very optimistic considering the economic and health impact of COVID-19 (15-17). Thus, utilization patterns and costs continue to be a major issue for facet joint interventions. Other issues also include claims of lack of medical necessity, indications and lack of cost utility. Further, over the past 2 decades, multiple modalities in pain management have shown a significant escalation in utilization, including opioids, leading to an opioid epidemic and escalating deaths (18-39). However, appropriate systematic reviews and randomized controlled trials (RCTs) have shown significant evidence of efficacy for interventional techniques in general and facet joint interventions in particular, along with cost utility (40-54). Consequently, multiple attempts have been made to control the utilization patterns of facet joint interventions, along with other interventional techniques by affecting coverage policies based on LCDs in Medicare populations, increased oversight from Medicare, coding changes, and reimbursement reductions (5-8,55-61). Cost utility analysis of facet joint nerve blocks has shown similar cost effectiveness as epidurals and other interventional techniques (42,43,50-52). These cost utilities were derived from surgical interventions from Spine Patient Outcomes Research Trial (SPORT) studies (62,63). Even though opponents and proponents continue to come to discordant conclusions with negative and positive recommendations, the literature of the effectiveness and appropriateness of facet joint interventions continues to accumulate (40,41,47,64-69).

This manuscript was undertaken to assess utilization patterns and expenditures of facet joint interventions from 2009 to 2018.

METHODS

This retrospective cohort analysis of Medicare expenditures and utilization trends was performed as per the methodology as described by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (70).

The data for this study were obtained from the standard 5% national sample of the Centers for Medi-

care & Medicaid Services (CMS) physician outpatient billing claims for those enrolled in the FFS Medicare program for 2009 through 2018 (71). The CMS 5% sample data set is considered to be unbiased and unpredictable in terms of any patient characteristics, but does allow appropriate tracking of patients over time and across databases. Thus, institutional review board (IRB) approval was not required.

Study Design

This analysis of utilization patterns of facet interventions was designed as a retrospective cohort study in FFS Medicare population in the United States calculating trends of utilization and costs from 2009 to 2018 (71) in the United States. In this analysis:

- A patient was considered as undergoing facet joint interventions throughout the year, irrespective of visits, irrespective of number of visits, episodes or services.
- A visit included all regions treated during the visit.
- An episode was considered as one per region utilizing primary codes only.
- Services or procedures were considered all procedures (multiple levels) including add-on codes.
- Staged episodes were assessed based on if radiofrequency neurotomy was performed within 3 months. A staged episode is defined as an episode repeated in the same region; however, on a different side or involving different joints before 6 months elapsed.
- Number of episodes beyond allowed number based on LCDs was considered as more than approved episodes.

Setting

The setting of this analysis involved review of the standard 5% national sample of CMS services physician outpatient billing claims for those enrolled in FFS Medicare program from 2009 to 2018. Participants included Medicare FFS recipients receiving facet joint interventions. The Current Procedural Terminology (CPT) codes included in this analysis are listed in Table 1.

Data Sources

Data were obtained from CMS physician outpatient billing claims for those enrolled in the FFS Medicare program from 2009 to 2018.

Data Compilation

Data were compiled utilizing Microsoft 365 Access and Microsoft 365 Excel (Microsoft, Redmond, WA).

Table 1. CPT codes utilized for facet joint interventions from 2009 to 2018.

CPT CODE	DESCRIPTION
CPT CODES UNTIL 2009	
64470	Injection, anesthetic agent and/or steroid, paravertebral facet joint or facet joint nerve; cervical or thoracic, single level
64472	Injection, anesthetic agent and/or steroid, paravertebral facet joint or facet joint nerve; cervical or thoracic, each additional level
64475	Injection, anesthetic agent and/or steroid, paravertebral facet joint or facet joint nerve; lumbar or sacral, single level
64476	Injection, anesthetic agent and/or steroid, paravertebral facet joint or facet joint nerve; lumbar or sacral, each additional level
CPT CODES FROM 2010 TO 2018	
64490	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), cervical or thoracic; single level
64491	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), cervical or thoracic; second level (List separately in addition to code for primary procedure)
64492	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), cervical or thoracic; third and any additional level(s) (List separately in addition to code for primary procedure)
64493	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), lumbar or sacral; single level
64494	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), lumbar or sacral; second level (List separately in addition to code for primary procedure)
64495	Injection(s), diagnostic or therapeutic agent, paravertebral facet (zygapophyseal) joint (or nerves innervating that joint) with image guidance (fluoroscopy or CT), lumbar or sacral; third and any additional level(s) (List separately in addition to code for primary procedure)
CPT CODES FROM 2012 TO 2018	
64633	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT); cervical or thoracic, single facet joint
64634	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT); cervical or thoracic, each additional facet joint (List separately in addition to code for primary procedure)
64635	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT); lumbar or sacral, single facet joint
64636	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT); lumbar or sacral, each additional facet joint
CPT CODES FROM 2009 TO 2012	
64622	Destruction by neurolytic agent, paravertebral facet joint nerve; lumbar or sacral, single level
64623	Destruction by neurolytic agent, paravertebral facet joint nerve; lumbar or sacral, each additional level
64626	Destruction by neurolytic agent, paravertebral facet joint nerve; cervical or thoracic, single level
64627	Destruction by neurolytic agent, paravertebral facet joint nerve; cervical or thoracic, each additional level

We removed all facet joint interventions services with zero allowed payments. One hundred percent data was obtained by multiplication with 20 to scale up from our 5% sample to the full M-FFS population. The data were calculated for overall services for each procedure, and the rate of services, based on utilization per 100,000 FFS Medicare beneficiaries. Expenditures were also calculated for physician and facility, which included allowable charges for physician, and facility (ASC, HOPD, office setting). All the expenditures were presented

with allowed costs and also were adjusted with inflation to 2018 US dollars. HOPD facility allowed charges were estimated based on National Average rates.

Variables

The analysis of trends of utilization and costs patterns of facet joint interventions incorporated multiple variables with analysis and costs for all procedures, utilization based on statewide and Medicare Administrative Contractors (MACs) and location of the service

provided, either office-based, ambulatory surgery center (ASC)-based, or hospital outpatient department (HOPD)-based.

Measures

Allowed services were assessed for each procedure, and rates were calculated based on Medicare beneficiaries for the corresponding year and are reported as procedures per 100,000 Medicare beneficiaries. Data were assessed for total number of procedures performed, as well as number of visits or sessions for lumbar facet joint interventions. A session or episode is considered as one per region, irrespective of number of procedures performed. More than 2 radiofrequency neurotomy episodes and staged episodes were assessed for 2018.

Bias

Data were purchased from the CMS by American Society of Interventional Pain Physicians (ASIPP). The study was conducted with the internal resources of the primary author's practice without external funding. The costs were determined without eliciting any bias. Thus, based on the large size of the dataset derived from a government source, there was no information related to patient individual identification.

Sample Size

The size of this retrospective cohort study is considered to be large, providing real-world claims data on Medicare patients with inclusion of all Medicare FFS patients undergoing facet joint interventions for spinal pain from 2009 to 2018.

RESULTS

Participants and Characteristics

Participants in this assessment of trends in expenditures and utilization of facet joint interventions from 2009 to 2018 included all Medicare FFS recipients. Table 2 shows descriptive data of facet joint interventions and population characteristics.

The number of patients receiving facet joint interventions showed a dramatic increase from 463,500 to 797,460 from 2009 to 2018, an overall increase of 65.1% or an annual increase of 5.7%. The number of patients per 100,000 population annual increase of rate of visits, rate of episodes of treatment, and rate of procedures increased 2.7%, 3.1%, 2.2%, and 1.1% respectively.

Table 3 shows utilization patterns and ratios of lumbar facet joint nerve blocks compared to facet joint

neurolysis and cervical/thoracic facet joint nerve blocks compared to facet neurolysis in Medicare population from 2009 to 2018. These ratios changed from 3.8 in 2009 to 1.9 in 2018 for lumbar facet joint interventions, whereas, for cervical/thoracic facet joint interventions, the ratio changed from 4.9 to 2.4.

Figure 1 shows facet joint interventions data by services, visits and patients per 100,000 FFS Medicare population.

Figure 2 shows utilization patterns for nerve blocks and radiofrequency neurolysis procedures.

Expenditure Characteristics

Table 4 shows total allowed charges by place of services by type of procedures showing significant growth of facet joint radiofrequency in all settings; however, the increases for cervical facet joint and lumbar facet joint injections were 35% and 37% compared to increases of cervical radiofrequency neurotomy of 185% and lumbar radiofrequency neurotomy of 169%, with a total increase of costs of 79% from 2009 to 2018. The inflation-adjusted costs to 2018 showed an overall increase of 53% compared to 79% without adjustment and at an annual increase of 4.9% compared to 6.7% without an adjustment. This table also shows costs for 100,000 Medicare beneficiaries with costs per beneficiary which increased over a period of time by 18% without adjusting for inflation. It also shows per beneficiary costs of \$13 in 2009, increasing to \$15, an 18% increase per beneficiary, with an 1.8% annual increase.

Table 5 shows average allowed charges per patient; the highest amount was in HOPD settings at \$2,746.64 in 2009, changing slightly to \$2,798.50 in 2018, a 2% increase or an 0.2% annual increase. In ASC settings, the fees were much lower. Overall allowed charges were lower than ASCs with a total of \$1,775.54 in 2009, increasing to \$1,855.61, with an annual increase of 0.5% and a total increase of 5%. In contrast, for office procedures, the increases were slightly higher at 8% total and 0.8% annually from \$1,026.86 in 2009 to \$1,107.36 in 2018, significantly lower than hospitals outpatient departments and ASCs. Overall, on average, total payments per patient were \$1,645.29 in 2009 increasing to \$1,785.31, a 9% increase overall with 0.9% increase per year. Inflation-adjusted costs demonstrated increases from \$1,645.29 to \$1,924.99 in 2009, resulting in an overall decline of 0.7% of the allowed charges with an annual decline of 7% compared to overall increase of 9% and annual increase of 0.9% prior to adjustment of inflation.

Table 2. Characteristics of Medicare beneficiaries and utilization pattern of facet joint interventions.

Year	Y2009	Y2010	Y2011	Y2012	Y2013	Y2014	Y2015	Y2016	Y2017	Y2018	change	GM
U.S. Population	307,006	308,746	311,583	313,874	316,129	318,892	320,897	323,127	326,625	327,167	6.6%	0.7%
≥ 65 years	39,570	40,268	41,370	43,144	44,704	46,179	47,734	49,244	51,055	52,347	32.3%	3.2%
Medicare Beneficiaries	45,801	46,914	48,300	50,300	51,900	53,500	54,900	56,500	58,000	59,600	30.1%	3.0%
≥ 65 years	38,177	38,991	40,000	41,900	43,100	44,600	46,000	47,500	49,200	50,800	33.1%	3.2%
(% ≥ 65 years)	83.4%	83.1%	82.8%	83.3%	83.0%	83.4%	83.8%	84.1%	84.8%	85.2%		
< 65 years	7,624	7,923	8,300	8,500	8,800	8,900	9,000	9,000	8,900	8,800	15.4%	1.6%
Facet joint Interventions												
Allowed Services (Procedures)	1,860,600	1,716,860	1,800,300	1,911,020	1,946,180	2,074,980	2,283,980	2,441,560	2,565,900	2,677,540	43.9%	4.1%
Rate	4,062	3,660	3,727	3,799	3,750	3,878	4,160	4,321	4,424	4,493	10.6%	1.1%
Visits	625,860	635,440	661,440	723,420	758,640	821,020	906,720	973,700	1,027,720	1,073,500	71.5%	6.2%
Rate	1,366	1,354	1,369	1,438	1,462	1,535	1,652	1,723	1,772	1,801	31.8%	3.1%
Patients												
≥ 65 years	223,700	223,220	231,160	245,640	253,600	276,960	308,020	336,000	360,780	387,040	73.0%	6.3%
(% ≥ 65 years)	72.3%	71.3%	69.9%	69.0%	69.1%	69.9%	71.1%	72.4%	73.7%	75.7%		
Rate	488	476	479	488	489	518	561	595	622	649	33.0%	3.2%
< 65 years	85,740	89,720	99,500	110,580	113,260	119,080	125,500	127,900	128,540	123,980	44.6%	4.2%
Rate	187	191	206	220	218	223	229	226	222	208	11.1%	1.2%
Total Patients	309,440	312,940	330,660	356,220	366,860	396,040	433,520	463,900	489,320	511,020	65.1%	5.7%
Rate	676	667	685	708	707	740	790	821	844	857	26.8%	2.7%
Episodes (primary codes only)												
Facet Joints Interventions	675,860	651,720	679,380	742,540	762,420	821,720	905,400	968,660	1,022,900	1,069,800	58.3%	5.2%
Rate	1,476	1,389	1,407	1,476	1,469	1,536	1,649	1,714	1,764	1,795	21.6%	2.2%
Episodes based Age groups												
≥ 65	463,500	443,700	453,280	488,860	502,200	548,920	620,400	679,400	735,340	797,460	72.1%	6.2%
Rate	1,214	1,138	1,133	1,167	1,165	1,231	1,349	1,430	1,495	1,570	29.3%	2.9%
<65	212,360	208,020	226,100	253,680	260,220	272,800	285,000	289,260	287,560	272,340	28.2%	2.8%
Rate	2,785	2,626	2,724	2,984	2,957	3,065	3,167	3,214	3,231	3,095	11.1%	1.2%
Episodes based on Place of Service												
ASC	160,560	166,400	180,020	208,340	205,000	225,340	257,180	283,980	305,060	326,120	103.1%	8.2%
Rate	351	355	373	414	395	421	468	503	526	547	56.1%	5.1%
HOPD	144,320	153,660	164,460	179,220	188,220	197,340	220,500	238,860	248,920	261,980	81.5%	6.8%
Rate	315	328	340	356	363	369	402	423	429	440	39.5%	3.8%
Office	370,980	331,660	334,900	354,980	369,200	399,040	427,720	445,820	468,920	481,700	29.8%	2.9%
Rate	810	707	693	706	711	746	779	789	808	808	-0.2%	0.0%

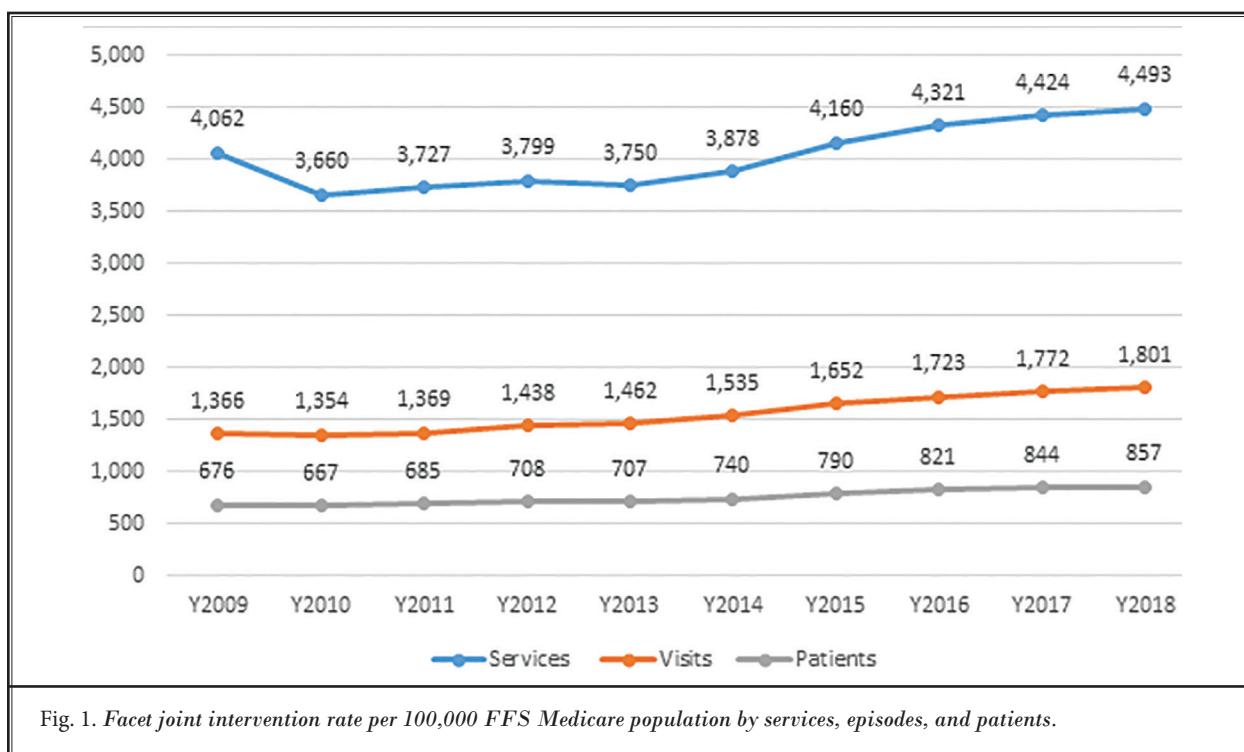
Table 6 shows average allowed charges per visit in all 3 settings. The data showed a 4% overall decline, or 0.4% annually for ASCs, -7% or -0.8% for HOPD, whereas for offices, it showed an increase of 7% with 0.8% annual rate. The reimbursements in 2019 ranged from

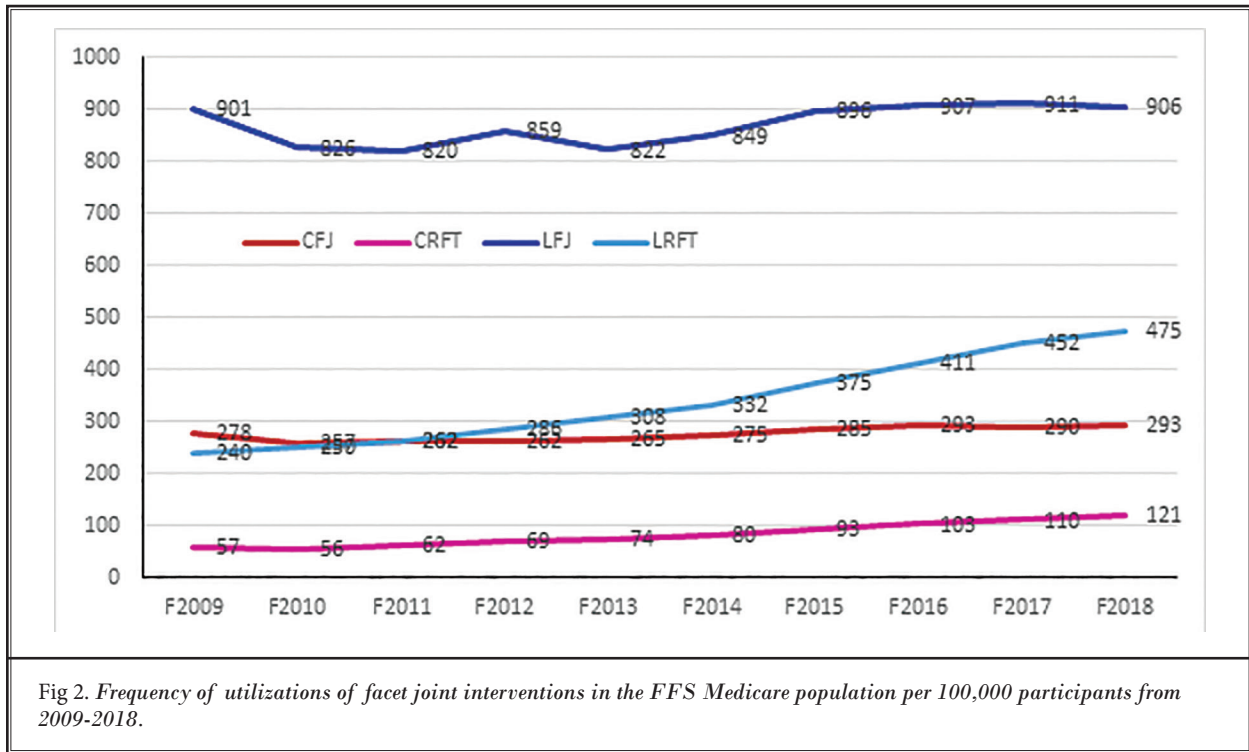
\$468.71 in office settings, \$912.50 in ASC settings, and \$1,557.84 in HOPD settings for total professional and facility fee in 2009 to \$532 in office settings, \$877.86 in ASC settings, and \$1,452.30 in HOPD settings in 2018. Average total cost prior to inflation adjustment per

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Table 3. Frequency of rate utilizations of facet joint interventions (facet nerve blocks vs facet neurolysis) in the Medicare population from 2009-2018.

Year	C/T Facet Joint Block (Only Primary 64470/ 64490)	C/T Facet Neurolysis (Only Primary 64626/ 64633)	Ratio of C/T Facet Joint NBs over RFT	L/S Facet Joint Blocks (Only Primary 64475/ 64493)	L/S Facet Neurolysis (Only Primary 64622/ 64635)	Ratio of L/S Facet Joint NBs over RFT
F2009	278	57	4.9	901	240	3.8
F2010	257	56	4.6	826	250	3.3
F2011	262	62	4.2	820	262	3.1
F2012	262	69	3.8	859	286	3.0
F2013	265	74	3.6	822	308	2.7
F2014	275	80	3.4	849	332	2.6
F2015	285	93	3.1	896	375	2.4
F2016	293	103	2.8	907	411	2.2
F2017	290	110	2.6	911	452	2.0
F2018	293	121	2.4	906	475	1.9
Change	5.6%	111.9%		0.6%	97.7%	
GM	0.6%	8.7%		0.1%	7.9%	





visit in 2009 was \$813.47 which increased to \$849.86 in 2018. However, inflation-adjusted allowed charges per visit increased the charges to \$957.16 in 2009 to \$849.86 in 2018, an 11% overall decrease or annual decrease of 1.3%.

Table 7 shows total allowed charges by place of service and type of the procedure. There was a significant increase in radiofrequency neurotomy procedures in all settings than for facet joint injections. As shown in other tables, inflation-adjusted allowed charges per service increased 6% with an annual increase of 0.7% compared to overall increase of 25% with an annual increase of 2.5%.

Specialty Characteristics

Appendix Table 1 shows utilization of facet joint interventions by episodes by specialty. The majority of the procedures were performed by physicians who considered themselves interventional pain management, including anesthesiology with CMS designations of -05, -09, and -72. In 2009, this group constituted 63% of the procedures, whereas in 2018, it increased to 73%. Physical medicine and rehabilitation, with a designation of -25, revealed significant increased utilization from 15% in 2009 to 20% in 2018; however, neurology, with the

designation of -13, showed a significant decline from 4% in 2009 to 1% in 2018. Interventional radiologists showed increased utilization, whereas diagnostic radiologists demonstrated a decline with an overall significant net decrease in utilization. All other specialties, including family practitioners and other providers, declined significantly.

State Wise Distribution Characteristics

Appendix Table 2 shows the utilization of facet joint interventions based by Medicare carrier and state from 2016. Noridian, the largest and most aggressive carrier regarding the development of specific interventional policies to be utilized across the nation to reduce utilization patterns, showed an overall increase of 1.7% per year and 16.1% from 2009 to 2018. Palmetto GBA with liberal policies in reference to the cutoff of threshold for positive blocks reducing it from 80% to 50% has shown significant increases compared to other states with a total of 43.9% from 2009 to 2018 with an annual increase of 4.1%. CGS utilizing prior policies, which were in contrast to policies by Novitas, showed an overall increase of 37.7%, with an annual increase of 3.6%. Overall, utilization was high with similar

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Table 4. Total allowed charges by place of services by type of procedures.

	C2009	C2010	C2011	C2012	C2013	C2014	C2015	C2016	C2017	C2018	
ASC											
C/T FJI	\$22,998,791	\$20,773,344	\$23,566,721	\$26,261,420	\$28,348,782	\$29,308,237	\$32,632,603	\$38,190,753	\$33,852,201	\$37,011,807	61%
Lumbar FJI	\$64,160,702	\$60,413,908	\$66,422,103	\$75,816,702	\$75,807,891	\$77,518,683	\$87,883,520	\$112,720,789	\$95,543,589	\$99,966,428	56%
C/T RFT	\$10,017,505	\$7,397,242	\$8,924,939	\$10,086,489	\$10,720,882	\$17,892,636	\$22,575,434	\$25,315,697	\$29,495,162	\$33,769,836	237%
Lumbar RFT	\$37,799,916	\$42,583,202	\$48,833,132	\$58,263,491	\$58,897,088	\$71,416,123	\$82,415,229	\$92,118,900	\$106,732,990	\$116,611,123	208%
Total	\$134,976,915	\$131,167,696	\$147,746,893	\$170,428,105	\$173,774,644	\$196,135,680	\$225,506,787	\$268,346,140	\$265,623,944	\$287,359,193	113%
HOPD#											
C/T FJI	\$25,180,587	\$27,014,693	\$31,226,498	\$32,436,750	\$34,913,506	\$33,000,124	\$35,392,637	\$45,944,385	\$36,323,427	\$40,019,565	59%
Lumbar FJI	\$109,824,874	\$101,553,402	\$113,528,571	\$126,717,158	\$137,512,785	\$120,814,392	\$135,542,826	\$170,109,914	\$141,899,934	\$155,188,112	41%
C/T RFT	\$12,096,573	\$7,085,999	\$9,283,200	\$9,614,496	\$11,354,256	\$18,801,147	\$20,280,748	\$23,283,989	\$25,714,447	\$30,072,145	149%
Lumbar RFT	\$67,630,660	\$75,670,782	\$86,301,934	\$90,434,833	\$97,300,171	\$95,227,471	\$102,696,261	\$114,936,883	\$142,426,053	\$156,268,100	131%
Total	\$214,732,696	\$211,324,876	\$240,340,203	\$259,203,237	\$281,080,717	\$267,843,134	\$293,912,472	\$354,275,170	\$346,363,861	\$381,547,951	78%
Office											
C/T FJI	\$33,409,240	\$25,400,734	\$27,878,073	\$27,781,385	\$29,746,173	\$30,312,188	\$31,243,095	\$33,681,683	\$33,851,875	\$34,389,133	3%
Lumbar FJI	\$89,430,630	\$68,539,687	\$75,198,875	\$81,996,787	\$85,270,591	\$90,303,943	\$94,176,709	\$95,343,496	\$97,567,951	\$99,199,589	11%
C/T RFT	\$8,324,485	\$9,365,481	\$10,453,584	\$12,092,419	\$12,441,252	\$15,917,976	\$17,088,471	\$18,952,545	\$19,910,271	\$22,764,163	173%
Lumbar RFT	\$28,244,631	\$30,882,586	\$34,449,126	\$50,011,455	\$52,275,997	\$61,493,405	\$66,204,998	\$73,535,652	\$80,515,919	\$87,067,022	208%
Total	\$159,408,986	\$134,188,488	\$147,979,659	\$171,882,048	\$179,734,013	\$198,027,513	\$208,713,274	\$221,513,376	\$231,846,015	\$243,419,907	53%
Total											
C/T FJI	\$81,588,618	\$73,188,771	\$82,671,292	\$86,479,555	\$93,008,461	\$92,620,549	\$99,268,335	\$117,816,821	\$104,027,503	\$111,420,505	37%
Lumbar FJI	\$263,416,206	\$230,506,997	\$255,149,549	\$284,530,647	\$298,591,267	\$288,637,018	\$317,603,055	\$378,174,199	\$335,011,474	\$354,354,129	35%
C/T RFT	\$30,438,563	\$23,848,722	\$28,661,723	\$31,793,404	\$34,516,390	\$52,611,759	\$59,944,653	\$67,552,231	\$75,119,880	\$86,606,144	185%
Lumbar RFT	\$133,675,207	\$149,136,570	\$169,584,192	\$198,709,779	\$208,473,256	\$228,136,999	\$251,316,488	\$280,591,435	\$329,674,962	\$359,946,245	169%
Total	\$509,118,597	\$476,681,060	\$536,066,755	\$601,513,390	\$634,589,374	\$662,006,327	\$728,132,533	\$844,134,686	\$843,833,820	\$912,327,051	79%
Total * (inflation-adjusted)	\$595,668,758	\$548,183,219	\$600,394,766	\$655,649,595	\$685,356,524	\$701,726,707	\$771,820,485	\$886,341,420	\$860,710,496	\$912,327,051	53%
Per 100,000 Medicare beneficiaries*	\$1,300,558	\$1,168,485	\$1,243,053	\$1,303,478	\$1,320,533	\$1,311,639	\$1,405,866	\$1,568,746	\$1,483,984	\$1,530,750	18%
Per Medicare beneficiaries*	\$13	\$12	\$12	\$13	\$13	\$13	\$14	\$16	\$15	\$15	18%
Per Facet joint patient*	\$1,925	\$1,752	\$1,816	\$1,841	\$1,868	\$1,772	\$1,780	\$1,911	\$1,759	\$1,785	-7%

* Inflation-adjusted and converted to year 2018 values

Note: In 2010 there was about a 17% reduction in payment rates for Facet joint blocks in office settings. In 2010 CRFT price decreased to 50% from 2009, In 2014 CRFT price increased same as LRFT (80%). In 2014 Payments for ASC & HOPD primary codes increased and also removed payments for add-on codes. In 2016 CFJ & LFJ HOPD rates increased 22% & 5% decreased for RFTs. C/T - Cervical/Thoracic, FJI - Facet joint injections, RFT - Radiofrequency Neurotomy, Actual patient - The Patients had at least one facet joint intervention. # HOPD facility allowed charges are estimated based on National Average rates.

Table 5. Average allowed charges per visit.

Number Visits	C2009	C2010	C2011	C2012	C2013	C2014	C2015	C2016	C2017	C2018	Change	GM
ASC	147,920	160,760	175,840	203,060	204,120	226,320	257,960	284,800	306,140.00	327,340	121%	9.2%
HOPD	137,840	151,760	161,700	176,240	188,760	198,520	221,220	239,780	250,500.00	262,720	91%	7.4%
Office	340,100	322,920	323,900	344,120	365,760	396,180	427,540	449,120	471,080.00	483,440	42%	4.0%
Total	625,860	635,440	661,440	723,420	758,640	821,020	906,720	973,700	1,027,720	1,073,500	72%	6.2%
Average Allowed payment per Visit												
Professional fee												
ASC	\$ 229.45	\$ 245.06	\$ 254.98	\$ 264.12	\$ 262.15	\$ 268.40	\$ 270.31	\$ 272.42	\$ 273.38	\$ 276.31	20%	2.1%
HOPD	\$ 218.06	\$ 236.63	\$ 245.29	\$ 252.34	\$ 248.17	\$ 258.44	\$ 258.79	\$ 262.68	\$ 261.83	\$ 265.72	22%	2.2%
Office	\$ 212.82	\$ 259.51	\$ 252.25	\$ 255.71	\$ 263.81	\$ 266.77	\$ 260.33	\$ 262.04	\$ 260.79	\$ 264.15	24%	2.4%
Average (Prof.)	\$ 217.90	\$ 250.39	\$ 251.27	\$ 257.25	\$ 259.47	\$ 265.21	\$ 262.79	\$ 265.24	\$ 264.79	\$ 268.24	23%	2.3%
Facility fee												
ASC	\$ 683.05	\$ 570.86	\$ 585.25	\$ 575.18	\$ 589.19	\$ 598.23	\$ 603.88	\$ 669.81	\$ 594.28	\$ 601.55	-12%	-1.4%
HOPD#	\$ 1,339.78	\$ 1,155.86	\$ 1,486.33	\$ 1,218.40	\$ 1,240.92	\$ 1,090.76	\$ 1,069.81	\$ 1,170.97	\$ 1,120.86	\$ 1,186.57	-11%	-1.3%
Office	\$ 255.90	\$ 156.04	\$ 204.62	\$ 243.78	\$ 227.59	\$ 233.07	\$ 227.84	\$ 231.17	\$ 231.37	\$ 239.37	-6%	-0.7%
Average (facility)	\$ 595.57	\$ 499.77	\$ 508.17	\$ 574.24	\$ 577.01	\$ 541.11	\$ 540.25	\$ 590.90	\$ 556.28	\$ 581.62	-2%	-0.3%
Total (Professional + Facility)												
ASC	\$ 912.50	\$ 815.92	\$ 840.23	\$ 839.30	\$ 851.34	\$ 866.63	\$ 874.19	\$ 942.23	\$ 867.66	\$ 877.86	-4%	-0.4%
PCPY		-10.6%	3.0%	-0.1%	1.4%	1.8%	0.9%	7.8%	-7.9%	1.2%		
HOPD	\$ 1,557.84	\$ 1,392.49	\$ 1,731.62	\$ 1,470.74	\$ 1,489.09	\$ 1,349.20	\$ 1,328.60	\$ 1,433.65	\$ 1,382.69	\$ 1,452.30	-7%	-0.8%
PCPY		-10.6%	24.4%	-15.1%	1.2%	-9.4%	-1.5%	7.9%	-3.6%	5.0%		
Office	\$ 468.71	\$ 415.55	\$ 456.87	\$ 499.48	\$ 491.40	\$ 499.84	\$ 488.17	\$ 493.22	\$ 492.16	\$ 503.52	7%	0.8%
PCPY		-11.3%	9.9%	9.3%	-1.6%	1.7%	-2.3%	1.0%	-0.2%	2.3%		
Average (Total)	\$ 813.47	\$ 750.16	\$ 759.44	\$ 831.49	\$ 836.48	\$ 806.32	\$ 803.04	\$ 856.14	\$ 821.07	\$ 849.86	4%	0.5%
		-7.8%	1.2%	9.5%	0.6%	-3.6%	-0.4%	6.6%	-4.1%	3.5%		
Total* (inflation-adjusted)	\$ 951.76	\$ 862.68	\$ 974.87	\$ 906.32	\$ 903.40	\$ 854.70	\$ 851.22	\$ 898.94	\$ 837.50	\$ 849.86	-11%	-1.3%
		-9.4%	13.0%	-7.0%	-0.3%	-5.4%	-0.4%	5.6%	-6.8%	1.5%		

* Inflation-adjusted and converted to year 2018 values. Note: in 2010 there was about a 17% reduction in payment rates for Facet joint blocks in office settings. In 2010 CRFT price decreased to 50% from 2009. In 2014 CRFT price increased same as LRFT (80%). In 2014 Payments for ASC & HOPD primary codes increased and also removed payments for add-on codes. In 2016 CFJ & LFHOPD rates increased 22% & 5% decreased for RFTs.# HOPD facility allowed charges are estimated based on National Average rates.

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Table 6. Average allowed charges per patient.

Patients	C2009	C2010	C2011	C2012	C2013	C2014	C2015	C2016	C2017	C2018	Change	GM
ASC	76,020	82,200	89,520	100,740	101,940	112,320	126,920	137,720	145,180	154,860	104%	8.2%
HOPD	78,180	83,640	88,840	94,980	99,260	104,720	115,780	124,040	130,200	136,340	74%	6.4%
Office	155,240	147,100	152,300	160,500	165,660	179,000	190,820	202,140	213,940	219,820	42%	3.9%
Total	309,440	312,940	330,660	356,220	366,860	396,040	433,520	463,900	489,320	511,020	65%	5.7%
Average Allowed payment per patient												
Professional fee												
ASC	\$ 446.47	\$ 479.27	\$ 500.85	\$ 532.38	\$ 524.91	\$ 540.81	\$ 549.40	\$ 563.35	\$ 576.47	\$ 584.05	31%	3.0%
HOPD#	\$ 384.46	\$ 429.36	\$ 446.46	\$ 468.22	\$ 471.94	\$ 489.94	\$ 494.47	\$ 507.78	\$ 503.75	\$ 512.04	33%	3.2%
Office	\$ 466.24	\$ 569.68	\$ 536.46	\$ 548.25	\$ 582.46	\$ 590.45	\$ 583.28	\$ 582.22	\$ 574.24	\$ 580.93	25%	2.5%
Average (prof)	\$ 440.72	\$ 508.43	\$ 502.64	\$ 522.42	\$ 536.56	\$ 549.80	\$ 549.64	\$ 556.71	\$ 556.14	\$ 563.49	28%	2.8%
Facility fee												
ASC	\$ 1,329.08	\$ 1,116.45	\$ 1,149.59	\$ 1,159.38	\$ 1,179.77	\$ 1,205.41	\$ 1,227.36	\$ 1,385.14	\$ 1,253.15	\$ 1,271.55	-4%	-0.5%
HOPD	\$ 2,362.19	\$ 2,097.24	\$ 2,705.32	\$ 2,260.81	\$ 2,359.82	\$ 2,067.77	\$ 2,044.08	\$ 2,263.59	\$ 2,156.49	\$ 2,286.47	-3%	-0.4%
Office	\$ 560.62	\$ 342.55	\$ 435.17	\$ 522.67	\$ 502.50	\$ 515.85	\$ 510.49	\$ 513.62	\$ 509.46	\$ 526.43	-6%	-0.7%
Average (facility)	\$ 1,204.57	\$ 1,014.81	\$ 1,016.52	\$ 1,166.18	\$ 1,193.22	\$ 1,121.77	\$ 1,129.94	\$ 1,240.27	\$ 1,168.36	\$ 1,221.81	1%	0.2%
Total (Professional + Facility fee)												
ASC	\$ 1,775.54	\$ 1,595.71	\$ 1,650.43	\$ 1,691.76	\$ 1,704.68	\$ 1,746.22	\$ 1,776.76	\$ 1,948.49	\$ 1,829.62	\$ 1,855.61	5%	0.5%
PCPY		-10.1%	3.4%	2.5%	0.8%	2.4%	1.7%	9.7%	-6.1%	1.4%		
HOPD	\$ 2,746.64	\$ 2,526.60	\$ 2,526.60	\$ 2,729.03	\$ 2,831.76	\$ 2,557.71	\$ 2,538.54	\$ 2,771.37	\$ 2,660.24	\$ 2,798.50	2%	0.2%
PCPY		-8.0%	24.7%	-13.4%	3.8%	-9.7%	-0.7%	9.2%	-4.0%	5.2%		
Office	\$ 1,026.86	\$ 912.23	\$ 971.63	\$ 1,070.92	\$ 1,084.96	\$ 1,106.30	\$ 1,093.77	\$ 1,095.84	\$ 1,083.70	\$ 1,107.36	8%	0.8%
PCPY		-11.2%	6.5%	10.2%	1.3%	2.0%	-1.1%	0.2%	-1.1%	2.2%		
Average (Total)	\$ 1,645.29	\$ 1,523.23	\$ 1,519.15	\$ 1,688.60	\$ 1,729.79	\$ 1,671.56	\$ 1,679.58	\$ 1,796.98	\$ 1,724.50	\$ 1,785.31	9%	0.9%
		-7.4%	-0.3%	11.2%	2.4%	-3.4%	0.5%	7.0%	-4.0%	3.5%		
Total* (inflation-adjusted)	\$ 1,924.99	\$ 1,751.72	\$ 1,950.09	\$ 1,840.57	\$ 1,868.17	\$ 1,771.86	\$ 1,780.36	\$ 1,886.83	\$ 1,758.99	\$ 1,785.31	-7%	-0.8%
		-9.0%	11.3%	-5.6%	1.5%	-5.2%	0.5%	6.0%	-6.8%	1.5%		

* Inflation-adjusted and converted to year 2018 values. Note: in 2010 there was about a 17% reduction in payment rates for Facet joint blocks in office settings. In 2010 CRFT price decreased to 50% from 2009. In 2014 CRFT price increased same as LRFT (80%). In 2014 Payments for ASC & HOPD primary codes increased and also removed payments for add-on codes. In 2016 CFJ & LFJ HOPD rates increased 22% & 5% decreased for RFTs.# HOPD facility allowed charges are estimated based on National Average rates.

Table 7. Average allowed charges per service or procedure.

Prof. fee	C2009	C2010	C2011	C2012	C2013	C2014	C2015	C2016	C2017	C2018	Change	GM
Allowed Services												
ASC	445,840	436,140	478,840	535,320	519,880	556,520	634,480	703,220	755,800	808,420	81%	6.8%
HOPD	403,020	401,480	422,940	444,520	462,040	482,160	537,460	580,860	603,520	633,300	57%	5.1%
Office	1,011,740	879,240	898,520	931,180	964,260	1,036,300	1,112,040	1,157,480	1,206,580	1,235,820	22%	2.2%
Total	1,860,600	1,716,860	1,800,300	1,911,020	1,946,180	2,074,980	2,283,980	2,441,560	2,565,900	2,677,540	44%	4.1%
Per Service												
Professional fee												
ASC	\$ 76.13	\$ 90.33	\$ 93.63	\$ 100.19	\$ 102.93	\$ 109.15	\$ 109.90	\$ 110.33	\$ 110.73	\$ 111.88	47%	4.4%
HOPD	\$ 74.58	\$ 89.45	\$ 93.78	\$ 100.04	\$ 101.39	\$ 106.41	\$ 106.52	\$ 108.43	\$ 108.68	\$ 110.23	48%	4.4%
Office	\$ 71.54	\$ 95.31	\$ 90.93	\$ 94.50	\$ 100.07	\$ 101.99	\$ 100.09	\$ 101.68	\$ 101.82	\$ 103.33	44%	4.2%
Total	\$ 73.30	\$ 92.67	\$ 92.32	\$ 97.38	\$ 101.14	\$ 104.94	\$ 104.33	\$ 105.78	\$ 106.06	\$ 107.55	47%	4.4%
Facility fee												
ASC	\$ 226.62	\$ 210.42	\$ 214.92	\$ 218.18	\$ 231.33	\$ 243.28	\$ 245.52	\$ 271.27	\$ 240.72	\$ 243.58	7%	0.8%
HOPD	\$ 458.23	\$ 436.92	\$ 568.26	\$ 483.06	\$ 506.96	\$ 449.10	\$ 440.34	\$ 483.38	\$ 465.23	\$ 492.24	7%	0.8%
Office	\$ 86.02	\$ 57.31	\$ 73.76	\$ 90.09	\$ 86.33	\$ 89.10	\$ 87.60	\$ 89.70	\$ 90.33	\$ 93.64	9%	0.9%
Fac. Total	\$ 200.33	\$ 184.97	\$ 186.70	\$ 217.38	\$ 224.93	\$ 214.11	\$ 214.47	\$ 235.65	\$ 222.81	\$ 233.19	16%	1.7%
Total (prof. + facility)												
ASC	\$ 302.75	\$ 300.75	\$ 308.55	\$ 318.37	\$ 334.26	\$ 352.43	\$ 355.42	\$ 381.60	\$ 351.45	\$ 355.46	17%	1.8%
PCPY		-0.7%	2.6%	3.2%	5.0%	5.4%	0.8%	7.4%	-7.9%	1.1%		
HOPD	\$ 532.81	\$ 526.36	\$ 662.04	\$ 583.11	\$ 608.35	\$ 555.51	\$ 546.85	\$ 591.81	\$ 573.91	\$ 602.48	13%	1.4%
PCPY		-1.2%	25.8%	-11.9	4.3%	-8.7%	-1.6%	8.2%	-3.0%	5.0%		
Office	\$ 157.56	\$ 152.62	\$ 164.69	\$ 184.59	\$ 186.40	\$ 191.09	\$ 187.69	\$ 191.38	\$ 192.15	\$ 196.97	25%	2.5%
PCPY		-3.1%	7.9%	12.1%	1.0%	2.5%	-1.8%	2.0%	0.4%	2.5%		
Total	\$ 273.63	\$ 277.65	\$ 319.80	\$ 314.76	\$ 326.07	\$ 319.04	\$ 318.80	\$ 341.43	\$ 328.86	\$ 340.73	25%	2.5%
PCPY		1.5%	15.2%	12.8%	3.6%	-2.2%	-0.1%	7.1%	-3.7%	3.6%		
Total* (inflation-adjusted)	\$ 320.15	\$ 319.30	\$ 358.18	\$ 343.09	\$ 352.16	\$ 338.18	\$ 337.93	\$ 358.50	\$ 335.44	\$ 340.73	6%	0.7%
PCPY		-0.3%	12.2%	-4.2%	2.6%	-4.0%	-0.1%	6.1%	-6.4%	1.6%		

* Inflation-adjusted and converted to year 2018 values. Note: in 2010 there was about a 17% reduction in payment rates for Facet joint blocks in office settings. In 2010 CRFT price decreased to 50% from 2009. In 2014 CRFT price increased same as LRFT (80%). In 2014 Payments for ASC & HOPD primary codes increased and also re-moved payments for add-on codes. In 2016 CFJ & LFI HOPD rates increased 22% & 5% decreased for RFTs.# HOPD facility allowed charges are estimated based on National Average rates.

numbers in states covered in the past by First Coast Services state, Florida, followed by Novitas with the least in NGS Medicare Administrative Contractor (MAC). [Appendix Tables 3](#) and [4](#) show the utilization patterns of lumbar/sacral facet joint nerve blocks compared to lumbar/sacral facet neurolysis with the reversal of usage patterns and significant growth patterns for facet neurolysis compared to facet joint injections. [Appendix Tables 5](#) and [6](#) show the utilization patterns separately for cervical/thoracic facet joint nerve blocks compared to cervical/thoracic facet neurolysis. As shown earlier, the differences are significant with the growth of 8.7% for facet neurolysis and a 5.6% annual increase for facet joint nerve blocks. For cervical/thoracic, it is a significant growth of 112%. Lumbar facet joint nerve blocks increased only 0.1% annually with a total increase of 0.6% from 2009 to 2018. However, there was a significant increase in some states and consequently MACs. The largest declines were seen in Florida for First Coast Services with an annual decline of 2% and an overall decline of 16.4%. However, their baseline utilization was the highest of all states with 1,453 per 100,000 population in 2009. This was followed by Noridian with an overall decline of 8.5% and WPS with a decline of 5.9% and with the states covered by Cahaba in 2016 with 6.2%. Increases were observed at a high rate of 23.5% with an annual increase of 2.4% in Palmetto MAC. In reference to lumbar facet neurolysis rates of utilization, all MACs showed increases with an overall increase of 97.7% across the United States and a 7.9% increase per year. Among the MACs, Novitas showed the highest increases with 123.2% or 9.3% annually per 100,000 FFS Medicare population. All MACs showed significant increases in utilization of radiofrequency neurotomy procedures. Perhaps, surprisingly, Palmetto MAC showed similar increases as other states.

The same pattern was observed with lumbar facet joint nerve blocks.

DISCUSSION

The present analysis of facet joint intervention expenditure trends in the FFS Medicare population from 2009 to 2018 shows an overall inflation-adjusted to 2018 expenditures of 53% with a 4.9% annual rate, in contrast to unadjusted increases of 79% or 6.2% annually. The growth of the US Medicare population was 30.1% or 3% annually, with an increase of total patients undergoing facet joint interventions of 65.1%

or 5.7% annually, visits increasing by 71.5% or 6.2% annually, and, finally, services increased by 43.9% or 4.1% annually. In contrast, the population-adjusted increase in rate of patients per 100,000 Medicare beneficiaries was 26.8% or 2.7% annually. Visits were 31.8% or 3.1% annually. Number of episodes were 21.6% or 2.2% annually, and, finally, services (procedures) were 10.6% or 1.1% annually. Further analysis also shows that the increase of unadjusted expenditures for cervical facet joint nerve blocks was 37%, and for lumbar facet joint nerve blocks 35%, whereas for cervical radiofrequency, increases were 185%, and for lumbar radiofrequency neurolysis, increases were 169% with significant discrepancy of utilization and patterns and trends in the expenditures. This analysis also demonstrated unadjusted costs of \$1.3 million in 2009 and \$1.53 million in 2018, with an 18% increase per 100,000 FFS Medicare beneficiaries. Similarly, inflation-adjusted per patient expenditures also showed a decline from \$1,925 in 2009 to \$1,785, with a net decline of 7% from 2009 to 2018 and 0.8% per year. The present analysis also showed in 2018, in 23.9% of the patients, episodes were staged, whereas, episodes beyond approval were performed in 6.9% of the patients with 68.9% of the patients receiving appropriate number of visits in lumbar spine. In contrast, in the cervical spine, these episodes were less with 19.6% of the patients undergoing staging, whereas, 5.1% of the patients receiving more than 2 episodes of radiofrequency neurotomy in 2018.

Overall, the present analysis showed inflation-adjusted costs of 53% and 4.9% per year compared to 79% and 6.7% per procedure costs of 6% and 0.7% with 7% decline and 0.8% per year per patient, and 4% and 0.5%, and decline of 11% and 1.3% per year per visit.

Overall increases in utilization of facet joint interventions is higher than the increase in population and expenditures adjusted for inflation. Increases in various categories include radiofrequency neurolysis, the unadjusted costs of which increased 185% for cervical neurolysis procedures and 169% for lumbar neurolysis procedures. In contrast, increases were 37% for cervical facet joint injections and 35% for lumbar facet joint injections even after inflation-adjusted overall increases were 53% with an annual increase of 4.9%. Medicare beneficiary growth may attribute to an unknown percentage in the range of less than 10% in utilization patterns and expenditures. However, the overall costs per patient and visits have declined even though proce-

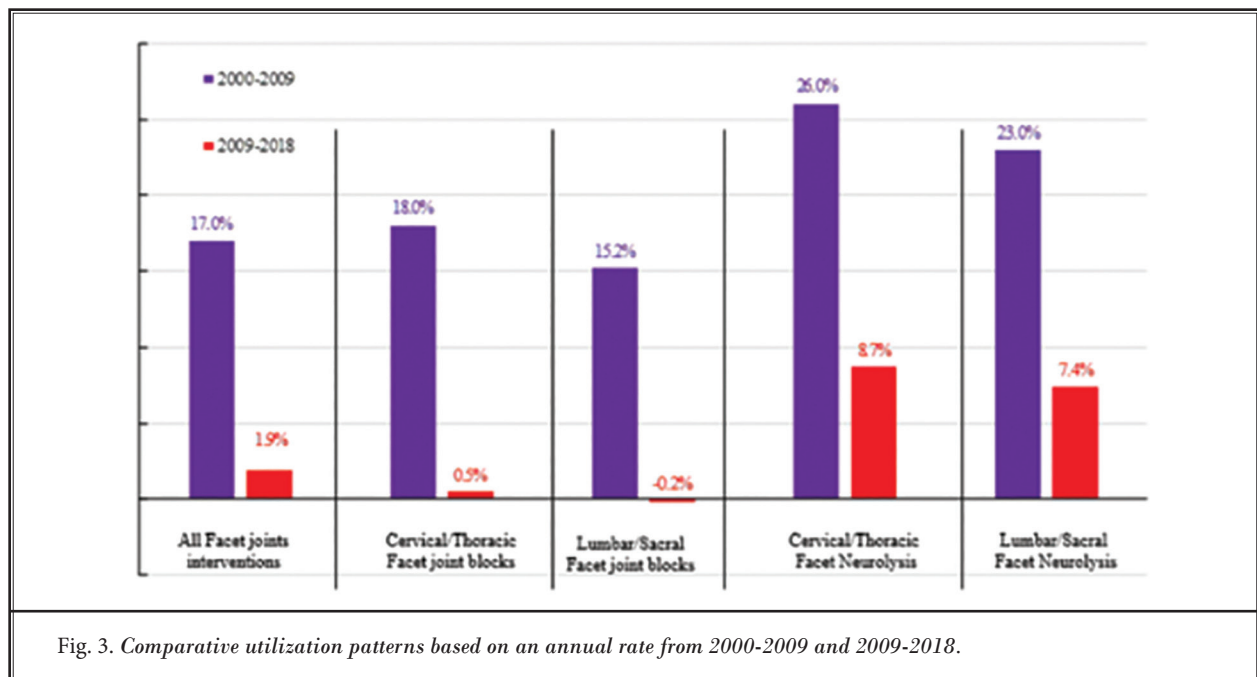
dural costs have increased slightly above inflation. The inference is that the costs are due to increasing number of patients' visits, episodes of treatment, most importantly, enormous increases reflected in increase of the radiofrequency neurolysis procedures. This is illustrated by the data which showed diminution of ratio of facet joint nerve blocks to radiofrequency thermoneurolysis from 4.9 for cervical facet joint interventions and 3.8 for lumbar facet joint interventions to 2.4 for cervical and 1.9 for lumbar facet interventions.

Our data is in agreement with the data published in the Medicare population by Manchikanti et al from 2000 to 2008 (2). However, since 2009, trends in utilization analyzed expenditures have declined. These results reinforce our previous assessments of growth of facet joint interventions (3) which showed substantial increases from 2000 to 2009 and flattening of the growth and some declines from 2009 to 2018 as shown in Fig. 3. The trends in the utilization patterns, as well as the costs also follow similar patterns.

Our investigation is also in agreement with the assessment by Starr et al (5). They assessed trends in utilization and cost patterns of lumbar facet joint injections with radiofrequency neurolysis procedures. From 2007 to 2016, lumbar radiofrequency ablation sessions performed per 100,000 enrollees per year increased from 49 to 113, a 130.6% overall increase,

9.7% annually in commercially insured patients. In contrast they showed that lumbar facet joint injections increased from 201 to 251 sessions per 100,000 enrollees at a 24.9% overall increase, with an annual increase of 2.5%. The costs also followed the same pattern. The unadjusted cost per 100,000 enrollees increased from \$94,570 in 2007 to \$206,680 in 2006, a 12.2% annual increase for lumbar radiofrequency ablation. Further, they also showed that unadjusted costs of lumbar facet joint injections were more with an annual increase of 4.9% and cost \$257,280 in 2007 increasing to \$396,580 in 2016 per 100,000 enrollees. However, if these costs are adjusted to inflation and 2016-dollar value, with inflation of 25%, changes will be lower.

Medicare is concerned with utilization patterns and increasing expenditures of facet joint interventions. Consequently, CMS continues to update LCDs, perform enhanced audits, and investigations (6-8,56-61). At present, there is a push to reduce utilization and expenditures by not only reducing fraud and abuse, but also by enforcing appropriate indications and medical necessity criteria. During the enactment of the Affordable Care Act (ACA) (72-76) they have enacted LCDs which were essentially accepted verbatim by all carriers except for CGS, which kept the frequency at the same levels as prior years (6-8,55-60). Since then,



Palmetto (59) also has reduced the criterion standard for positive blocks prior to therapeutic interventions from 80% to 50%. This change appears to have increased utilization patterns in Palmetto MAC for facet joint injections of 23.5% at annual increase of 2.4%, while the majority of the other MACs either slightly increased or reduced utilization. There was no significant change in utilization of radiofrequency neurolysis procedures. These factors may have increased the utilization of radiofrequency neurotomy, which in itself is a more expensive procedure, while we started observing continued flattening and decline in utilization patterns for facet joint injections. In fact, transforaminal epidural injections have shown a significant increase in utilization patterns compared to caudal and interlaminar epidural injections as shown in Fig. 4. As the causes described above, e.g., overutilization, abuse, and fraud may be contributing to some beyond expected increases related to a grown Medicare population. Further, the arguments continue in reference to indications and medical necessity (5-8,40-61). However, the disagreements and criticisms are not limited to only the positive evidence, but also to negative evidence. There was a barrage of criticism (65-68) for a study published by Juch et al (64) regarding inappropriate performance of multiple elements of the trial, including technical aspects, selection and reporting criteria (65-68). Meanwhile, the criticism also has been advanced against multiple descriptions in the past of the appropriateness of criteria of controlled comparative local anesthetic blocks, 50%, 80% or 100% relief criterion, the duration of relief with diagnostic blocks, appropriateness of therapeutic facet joint nerve blocks, and multiple procedural aspects for radiofrequency neurotomy (40-47,77-92).

CONCLUSION

This analysis of the FFS Medicare population from 2009 to 2018 demonstrated increasing costs for facet joint interventions, specifically radiofrequency neurolysis procedures, the ratios of which compared to facet joint injections, have changed significantly, or rather reversed. Even after adjusting for inflation, there is a significant increase in the expenditures of facet joint interventions with an overall 53% increase, and annual increase of 4.9%. This study also showed 23.9% of the patients received staged episodes, whereas, 6.9% of the patients received more than 2 episodes of treatments beyond the number allowed by LCDs. In lumbar spine in

2018 with 19.6% staged and 5.1% receiving more than allowed in cervical spine.

Acknowledgments

The authors also wish to thank Bert Fellows, MA, Director Emeritus of Psychological Services, Pain Management Centers of America, for manuscript review, and Tonie M. Hatton and Diane E. Neihoff, transcriptionists, for their assistance in preparation of this manuscript. We would like to thank the editorial board of Pain Physician for review and criticism in improving the manuscript.

Author Contributions

The study was designed by LM, AS, and JAH.

Data collection and analysis was performed by VP.

All authors contributed to preparation to the manuscript, reviewed, and approved the content with final version.

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[Appendices](#)

[Appendix Table 1.](#)

[Appendix Table 2](#)

[Appendix Table 3](#)

[Appendix Table 4](#)

[Appendix Table 5](#)

[Appendix Table 6](#)

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Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 1. Utilization of facet joint interventions (episodes) by specialty.

Specialty	F2009	F2010	F2011	F2012	F2013	F2014	F20015	F2016	F2017	F2018	Change	GM
Anesthesiology - 05	198,320	187,900	182,980	193,560	201,080	213,240	225,960	254,800	257,700	262,140	32.2%	3.1%
IPM - 09	181,220	199,360	209,400	227,120	230,000	235,740	232,280	226,800	234,200	248,580	37.2%	3.6%
Pain Management - 72	48,800	63,860	82,680	96,780	114,180	146,340	192,780	224,920	246,300	269,220	451.7%	20.9%
IPM (05, 09 & 72)	428,340	451,120	475,060	517,460	545,260	595,320	651,020	706,520	738,200	779,940	82.1%	6.9%
Percentage	63%	69%	70%	70%	72%	72%	72%	73%	72%	73%	15.0%	1.6%
Rate	935	962	984	1,029	1,051	1,113	1,186	1,250	1,273	1,309	39.9%	3.8%
PM&R - 25	98,920	98,080	106,140	123,940	127,260	139,600	167,100	177,460	201,400	212,940	115.3%	8.9%
Percentage	15%	15%	16%	17%	17%	17%	18%	18%	20%	20%	36.0%	3.5%
Rate	216	209	220	246	245	261	304	314	347	357	65.4%	5.8%
Neurology - 13	23,820	18,580	16,460	17,120	15,080	13,440	14,600	13,220	16,000	13,700	-42.5%	-6.0%
Percentage	4%	3%	2%	2%	2%	2%	2%	1%	2%	1%	-63.7%	-10.6%
Rate	52	40	34	34	29	25	27	23	28	23	-55.8%	-8.7%
Neurosurgery - 14	18,420	9,400	6,160	7,620	5,740	5,460	5,880	5,900	6,700	7,000	-62.0%	-10.2%
Orthopedic Surgery - 20	24,760	20,220	19,900	18,820	18,800	18,000	18,000	16,800	17,080	19,040	-23.1%	-2.9%
General Surgery- 02	1,500	1,040	860	940	960	660	980	920	780	940	-37.3%	-5.1%
Surgeons (02, 14 & 20)	44,680	30,660	26,920	27,380	25,500	24,120	24,860	23,620	24,560	26,980	-39.6%	-5.5%
Percentage	7%	5%	4%	4%	3%	3%	3%	2%	2%	3%	-61.9%	-10.2%
Rate	98	65	56	54	49	45	45	42	42	45	-53.6%	-8.2%
Interventional Radiology - 94	1,780	1,820	1,220	1,900	1,780	2,240	1,940	3,280	2,880	3,440	93.3%	7.6%
Diagnostic Radiology - 30	13,900	11,940	13,240	13,420	11,760	10,580	10,920	11,580	10,760	12,400	-10.8%	-1.3%
Radiologists (30, 94)	15,680	13,760	14,460	15,320	13,540	12,820	12,860	14,860	13,640	15,840	1.0%	0.1%
Percentage	2%	2%	2%	2%	2%	2%	1%	2%	1%	1%	-36.2%	-4.9%
Rate	34	29	30	30	26	24	23	26	24	27	-22.4%	-2.8%
Family Practice- 08	10,960	6,140	6,940	10,220	7,700	4,880	4,840	5,620	6,500	4,520	-58.8%	-9.4%
General Practice - 01	5,200	2,820	1,960	1,620	2,640	4,060	3,140	2,780	800	880	-83.1%	-17.9%
Internal Medicine - 11	27,580	15,980	15,960	13,940	10,900	10,220	8,220	8,120	7,400	4,440	-83.9%	-18.4%
Family, General & Internal	43,740	24,940	24,860	25,780	21,240	19,160	16,200	16,520	14,700	9,840	-77.5%	-15.3%
Percentage	6%	4%	4%	3%	3%	2%	2%	2%	1%	1%	-85.8%	-19.5%
Rate	96	53	51	51	41	36	30	29	25	17	-82.7%	-17.7%
Other Providers	13,300	7,620	8,060	6,580	9,440	13,900	15,840	13,320	10,520	6,680	-49.8%	-7.4%

Appendix Table 1 con't. Utilization of facet joint interventions (episodes) by specialty.

Specialty	F2009	F2010	F2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	Change	C-M
Percentage	2%	1%	1%	1%	1%	2%	2%	1%	1%	1%	-68.3%	-12.0%
Rate	29	16	17	13	18	26	29	24	18	11	-61.4%	-10.0%
CRNA	1,620	1,160	660	2,320	1,360	1,520	1,300	1,560	1,780	2,160	33.3%	3.2%
NP	3,840	4,020	4,860	4,560	2,200	680	840	920	680	960	-75.0%	-14.3%
PA	1,920	1,780	1,900	2,080	1,540	1,160	780	660	1,420	760	-60.4%	-9.8%
CRNA, NP & PA (18, 19, 20)	7,380	6,960	7,420	8,960	5,100	3,360	2,920	3,140	3,880	3,880	-47.4%	-6.9%
Percentage	1.1%	1.1%	1.1%	1.2%	0.7%	0.4%	0.3%	0.3%	0.4%	0.4%	-66.8%	-11.5%
Rate	16	15	15	18	10	6	5	6	7	7	-59.6%	-9.6%
US total	675,860	651,720	679,380	742,540	762,420	821,720	905,400	968,660	1,022,900	1,069,800	58.3%	5.2%
Rate	1,476	1,389	1,407	1,476	1,469	1,536	1,649	1,714	1,764	1,795	21.6%	2.2%

IPM (Anesthesiology, Pain Management, & Interventional Pain Management); Surgeons (Neurosurgery, Orthopedic Surgery, General Surgery); Radiologists (Interventional Radiology, Diagnostic Radiology)

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 2. Utilization of facet joint interventions rate (episodes) by Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Cahaba												
Alabama	1,438	1,824	1,766	1,989	1,774	1,808	1,752	2,025	1,755	1,794	24.8%	2.5%
Georgia	1,883	1,923	1,952	2,176	2,110	2,160	2,361	2,393	2,368	2,466	31.0%	3.0%
Tennessee	1,767	1,701	1,791	1,786	1,432	1,340	1,390	1,637	1,676	1,601	-9.4%	-1.1%
Cahaba Total	1,723	1,822	1,848	1,996	1,793	1,793	1,878	2,046	1,982	2,010	16.7%	1.7%
PCPY		5.7%	1.5%	8.0%	-10.2%	0.0%	4.7%	9.0%	-3.1%	1.4%		
CGS												
Kentucky	2,018	1,819	1,998	2,191	2,213	2,039	2,431	2,427	2,663	2,685	33.1%	3.2%
Ohio	1,237	1,310	1,487	1,605	1,682	1,626	1,767	1,852	1,720	1,741	40.7%	3.9%
CGS Total	1,459	1,455	1,634	1,773	1,835	1,745	1,958	2,016	1,989	2,009	37.7%	3.6%
PCPY		-0.3%	12.3%	8.5%	3.5%	-4.9%	12.2%	3.0%	-1.4%	1.0%		
First Coast												
Florida	2,347	2,084	2,123	2,309	2,066	2,360	2,399	2,542	2,466	2,485	5.9%	0.6%
PCPY		-11.2%	1.8%	8.7%	-10.5%	14.2%	1.7%	5.9%	-3.0%	0.8%		
NGS												
Connecticut	1,064	1,078	971	1,050	1,106	1,143	1,232	1,164	1,350	1,405	32.0%	3.1%
Illinois	1,396	1,018	1,207	1,390	1,311	1,346	1,417	1,411	1,548	1,528	9.4%	1.0%
Maine	1,088	929	1,056	1,129	1,252	1,506	1,718	1,469	1,366	1,238	13.7%	1.4%
Massachusetts	1,341	1,350	1,425	1,641	1,697	1,683	1,754	1,608	1,714	1,767	31.8%	3.1%
Minnesota	678	545	679	854	795	819	814	765	761	809	19.3%	2.0%
New Hampshire	1,233	1,693	1,957	1,962	1,368	1,615	1,606	1,923	1,808	1,806	46.5%	4.3%
New York	849	789	805	754	966	1,028	1,170	1,216	1,157	1,174	38.3%	3.7%
Rhode Island	1,387	1,202	1,293	955	1,188	1,043	1,042	1,122	832	1,146	-17.3%	-2.1%
Vermont	1,612	1,327	1,256	1,295	1,501	1,827	1,717	1,918	1,939	1,588	-1.5%	-0.2%
Wisconsin	1,121	1,091	1,192	1,360	1,333	1,294	1,363	1,470	1,410	1,416	26.3%	2.6%
NGS Total	1,084	972	1,053	1,132	1,185	1,227	1,314	1,319	1,333	1,347	24.3%	2.4%
PCPY		-10.3%	8.3%	7.6%	4.7%	3.5%	7.1%	0.3%	1.1%	1.0%		
Noridian												
Alaska	1,180	974	697	491	988	1,383	1,760	1,812	1,633	1,933	63.8%	5.6%
Arizona	1,723	2,103	1,924	2,153	2,247	2,157	2,427	2,429	2,840	3,056	77.4%	6.6%
California	1,272	1,131	1,137	1,087	1,062	1,033	1,053	1,057	1,084	1,148	-9.7%	-1.1%
Idaho	928	818	775	1,112	1,081	1,180	1,061	1,262	1,273	1,361	46.7%	4.3%
Montana	1,105	968	933	1,046	921	914	946	824	770	1,452	31.4%	3.1%
Nevada	1,609	1,739	2,114	2,511	2,153	1,884	2,301	2,468	2,186	2,493	54.9%	5.0%
North Dakota	704	403	672	577	1,312	1,255	642	740	935	1,002	42.5%	4.0%
Oregon	780	795	668	844	834	761	1,060	925	1,048	1,152	47.6%	4.4%
South Dakota	1,205	1,069	1,328	1,049	849	825	894	1,230	1,185	1,041	-13.6%	-1.6%
Utah	1,665	1,632	1,614	1,857	2,305	2,758	2,945	2,815	2,624	2,749	65.1%	5.7%
Washington	1,200	1,055	796	781	746	772	751	803	914	1,112	-7.4%	-0.8%
Wyoming	1,611	1,898	1,928	1,546	1,543	1,583	1,167	1,915	1,628	2,016	25.2%	2.5%
Noridian Total	1,286	1,228	1,193	1,226	1,227	1,208	1,284	1,300	1,364	1,492	16.1%	1.7%
PCPY		-4.5%	-2.8%	2.7%	0.1%	-1.5%	6.3%	1.3%	4.9%	9.4%		
Palmetto GBA												

Appendix Table 2 con't. *Utilization of facet joint interventions rate (episodes) by Medicare carrier and state.*

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
North Carolina	1,376	1,289	1,334	1,509	1,336	1,301	1,510	1,508	1,624	1,613	17.2%	1.8%
South Carolina	1,651	1,610	1,661	1,837	2,033	2,158	2,281	2,499	2,564	2,543	54.0%	4.9%
Virginia	1,296	1,073	1,110	1,374	1,648	1,799	1,865	1,989	2,028	2,152	66.1%	5.8%
West Virginia	1,230	1,231	1,378	1,367	1,480	1,944	1,911	2,121	2,393	1,959	59.2%	5.3%
Pllmetto Total	1,393	1,284	1,338	1,522	1,587	1,689	1,815	1,919	2,015	2,005	43.9%	4.1%
PCY		-8%	4%	14%	4%	6%	7%	6%	5%	0%		
Novitas												
Arkansas	2,517	2,315	1,934	2,230	2,542	2,580	3,094	3,676	3,629	3,613	43.5%	4.1%
Colorado	1,000	855	1,068	1,235	1,345	1,470	1,648	1,627	1,857	1,993	99.3%	8.0%
Delaware	1,599	790	1,353	1,119	1,795	1,820	2,153	2,105	2,046	2,397	49.9%	4.6%
District of Columbia	574	845	602	1,329	955	1,128	2,019	1,968	1,428	800	39.4%	3.8%
Louisiana	1,019	1,366	1,559	1,588	1,697	1,841	2,103	2,060	2,211	2,042	100.4%	8.0%
Maryland	1,712	1,493	1,678	1,815	1,888	2,220	2,465	2,254	2,063	2,416	41.1%	3.9%
Mississippi	1,775	1,718	2,073	2,252	2,081	1,840	2,143	2,238	2,190	2,504	41.1%	3.9%
New Jersey	964	1,094	1,128	1,187	1,289	1,562	1,767	1,722	1,715	1,864	93.2%	7.6%
New Mexico	1,422	1,372	1,457	1,545	1,291	1,481	1,557	1,846	2,091	1,786	25.6%	2.6%
Oklahoma	1,359	1,356	1,341	1,400	1,543	2,242	2,425	2,558	3,058	3,037	123.5%	9.3%
Pennsylvania	1,040	991	934	956	1,104	1,151	1,280	1,355	1,479	1,491	43.3%	4.1%
Texas	2,348	1,993	1,839	1,898	1,910	1,873	2,143	2,327	2,209	2,186	-6.9%	-0.8%
Novitas Total	1,572	1,457	1,452	1,533	1,617	1,724	1,959	2,050	2,073	2,114	34.5%	3.3%
PCPY		-7.3%	-0.4%	5.6%	5.5%	6.6%	13.6%	4.7%	1.1%	2.0%		
WPS												
Indiana	1,634	1,694	1,706	1,686	1,658	1,938	2,090	2,187	1,960	1,995	22.1%	2.2%
Iowa	797	897	945	911	1,064	1,114	1,267	1,308	1,458	1,427	78.9%	6.7%
Kansas	950	1,021	992	1,196	988	913	1,115	1,285	1,204	1,380	45.3%	4.2%
Michigan	2,681	2,390	2,358	2,577	2,734	2,975	2,813	2,599	2,354	1,929	-28.0%	-3.6%
Missouri	1,449	1,515	1,424	1,567	1,723	1,775	1,742	1,612	1,669	1,843	27.1%	2.7%
Nebraska	885	781	708	939	912	946	1,054	1,179	1,439	1,763	99.2%	8.0%
WPS Total	1,755	1,696	1,670	1,798	1,880	2,033	2,041	1,983	1,887	1,816	3.4%	0.4%
PCY		-3.4%	-1.6%	7.7%	4.6%	8.1%	0.4%	-2.8%	-4.8%	-3.8%		
USA Total	2,590	2,445	2,482	2,601	2,597	2,693	2,916	3,042	3,148	3,217	24.2%	2.4%
		-5.6%	1.5%	4.8%	-0.1%	3.7%	8.3%	4.3%	3.5%	2.2%		

Rate - per 100,000 Medicare Beneficiaries

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 3. Utilization of lumbar facet joint injections rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Cahaba												
Alabama	969	1,228	1,224	1,347	1,141	1,127	1,098	1,264	1,050	1,006	3.8%	0.4%
Georgia	1,099	1,107	1,087	1,175	1,131	1,154	1,246	1,235	1,116	1,210	10.1%	1.1%
Tennessee	1,187	1,138	1,195	1,157	865	847	808	902	873	809	-31.8%	-4.2%
Cabha Total	1,093	1,150	1,160	1,215	1,044	1,044	1,061	1,132	1,019	1,026	-6.2%	-0.7%
PCPY		5.2%	0.9%	4.7%	-14.1%	0.0%	1.7%	6.7%	-10.0%	0.7%		
CGS												
Kentucky	1,154	1,011	1,084	1,170	1,131	1,056	1,337	1,182	1,310	1,238	7.3%	0.8%
Ohio	814	802	911	971	923	879	966	965	896	910	11.8%	1.2%
CGS Total	911	861	961	1,028	983	930	1,073	1,027	1,014	1,003	10.2%	1.1%
PCPY		-5.4%	11.5%	7.0%	-4.4%	-5.4%	15.3%	-4.3%	-1.2%	-1.1%		
First Coast												
Florida	1,453	1,253	1,226	1,326	1,154	1,297	1,266	1,293	1,250	1,215	-16.4%	-2.0%
PCPY		-13.8%	-2.2%	8.2%	-13.0%	12.4%	-2.4%	2.2%	-3.4%	-2.8%		
NGS												
Connecticut	817	740	662	730	752	772	753	771	868	809	-1.0%	-0.1%
Illinois	914	639	729	783	765	761	750	762	810	829	-9.4%	-1.1%
Maine	648	680	650	673	743	722	973	751	720	719	10.8%	1.1%
Massachusetts	929	899	937	1,032	1,063	1,097	1,148	1,010	1,060	1,038	11.6%	1.2%
Minnesota	352	310	368	490	429	463	400	395	399	397	12.9%	1.4%
New Hampshire	727	1,003	1,048	985	718	898	783	947	932	958	31.8%	3.1%
New York	488	497	500	440	558	579	661	661	652	614	25.8%	2.6%
Rhode Island	877	907	894	796	1,045	904	926	846	586	795	-9.3%	-1.1%
Vermont	1,000	915	733	767	784	825	977	1,081	1,149	878	-12.3%	-1.4%
Wisconsin	682	674	713	778	765	724	771	794	724	684	0.4%	0.0%
NGS Total	682	623	649	670	705	716	752	740	746	727	6.7%	0.7%
PCPY		-8.7%	4.2%	3.3%	5.1%	1.7%	5.0%	-1.7%	0.8%	-2.5%	-100.0%	
Noridian												
Alaska	574	639	290	115	480	813	1,061	978	827	935	62.9%	5.6%
Arizona	1,047	1,107	998	1,095	1,042	1,061	1,151	1,149	1,236	1,258	20.2%	2.1%
California	836	682	687	664	611	552	574	581	588	630	-24.6%	-3.1%
Idaho	496	409	387	659	548	578	548	688	692	749	51.2%	4.7%
Montana	559	543	622	664	531	630	549	566	473	717	28.4%	2.8%
Nevada	1,026	965	1,076	1,279	1,008	786	1,081	1,020	971	1,106	7.8%	0.8%
North Dakota	389	238	254	361	773	460	260	421	484	642	65.1%	5.7%
Oregon	478	470	372	447	404	430	589	509	587	638	33.4%	3.3%
South Dakota	818	542	649	468	418	419	473	679	665	538	-34.2%	-4.5%
Utah	935	728	752	915	1,110	1,430	1,347	1,135	1,145	1,123	20.2%	2.1%
Washington	753	613	420	443	456	435	404	467	498	586	-22.1%	-2.7%
Wyoming	972	899	903	975	1,013	981	821	1,136	824	1,168	20.2%	2.1%
Noridian Total	814	702	670	695	656	630	666	673	689	744	-8.5%	-1.0%
PCPY		-13.7%	-4.5%	3.8%	-5.6%	-4.1%	5.8%	1.0%	2.5%	8.0%		

Appendix Table 3 con't. Utilization of lumbar facet joint injections rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Palmetto GBA												
North Carolina	803	730	747	889	742	784	865	897	877	832	3.7%	0.4%
South Carolina	1,085	998	1,026	1,101	1,260	1,330	1,340	1,456	1,449	1,382	27.4%	2.7%
Virginia	867	726	731	851	1,025	1,029	1,100	1,113	1,101	1,186	36.9%	3.5%
West Virginia	636	597	741	821	820	1,127	1,023	1,233	1,262	931	46.3%	4.3%
Palmetto Total	862	770	799	914	941	1,004	1,050	1,111	1,101	1,065	23.5%	2.4%
PCPY		-11%	4%	14%	3%	7%	5%	6%	-1%	-3%		
Novitas												
Arkansas	1,172	1,099	967	1,173	1,219	1,111	1,365	1,500	1,519	1,424	21.5%	2.2%
Colorado	538	522	560	671	686	694	808	784	743	810	50.6%	4.7%
Delaware	1,034	522	963	750	1,106	1,076	1,253	1,318	1,384	1,323	27.9%	2.8%
District of Columbia	391	538	451	886	533	633	835	746	791	432	10.5%	1.1%
Louisiana	512	786	802	749	797	890	957	973	975	853	66.4%	5.8%
Maryland	1,008	841	907	1,035	1,010	1,259	1,319	1,183	1,051	1,216	20.7%	2.1%
Mississippi	1,041	990	1,200	1,343	1,187	1,018	1,196	1,228	1,265	1,303	25.1%	2.5%
New Jersey	600	668	691	720	755	831	943	893	966	964	60.8%	5.4%
New Mexico	698	759	819	879	796	740	773	880	937	903	29.4%	2.9%
Oklahoma	858	756	667	751	775	1,072	1,300	1,318	1,407	1,481	72.5%	6.2%
Pennsylvania	684	644	607	613	689	721	769	783	863	863	26.2%	2.6%
Texas	1,324	1,036	964	993	922	902	1,044	1,074	960	933	-29.6%	-3.8%
Novitas Total	906	816	806	854	854	890	1,006	1,015	1,003	1,000	10.4%	1.1%
PCPY		-9.9%	-1.3%	6.0%	-0.1%	4.2%	13.1%	0.9%	-1.2%	-0.3%		
WPS												
Indiana	952	1,034	974	1,106	942	1,052	1,179	1,259	1,107	1,123	18.0%	1.9%
Iowa	551	595	558	527	635	611	657	773	792	794	44.0%	4.1%
Kansas	574	605	578	808	596	530	549	620	675	787	37.3%	3.6%
Michigan	1,639	1,497	1,459	1,563	1,624	1,857	1,706	1,443	1,256	969	-40.9%	-5.7%
Missouri	767	866	812	934	975	997	961	947	952	1,082	41.1%	3.9%
Nebraska	581	394	248	466	525	541	593	606	838	887	52.9%	4.8%
WPS Total	1,048	1,035	985	1,103	1,099	1,199	1,175	1,115	1,040	985	-5.9%	-0.7%
PCY		-1.2%	-4.8%	12.0%	-0.4%	9.1%	-2.0%	-5.1%	-6.7%	-5.3%		
USA Total	901	826	820	859	822	849	896	907	911	906	0.6%	0.1%
PCPY		-8.3%	-0.7%	4.8%	-4.4%	3.4%	5.5%	1.2%	0.5%	-0.6%		

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 4. Utilization of lumbar facet neurolysis rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Cahaba												
Alabama	111	144	160	231	221	254	257	362	341	381	243.2%	14.7%
Georgia	390	447	405	443	438	494	584	578	669	715	83.1%	7.0%
Tennessee	223	161	228	306	262	259	329	392	437	433	94.2%	7.7%
Cahaba Total	258	269	280	341	321	352	413	460	508	537	108.1%	8.5%
PCPY		4.2%	4.1%	21.8%	-5.7%	9.6%	17.4%	11.2%	10.5%	5.7%		
CGS												
Kentucky	336	374	402	509	501	517	649	640	799	853	153.5%	10.9%
Ohio	199	256	309	370	373	420	422	473	453	502	152.3%	10.8%
CGS Total	238	289	336	410	410	448	487	521	551	602	152.8%	10.9%
		21.6%	16.0%	22.2%	0.0%	9.2%	8.8%	6.9%	5.8%	9.1%		
First Coast												
Florida	392	334	329	387	378	470	488	580	617	627	60.1%	5.4%
PCPY		-14.6%	-1.6%	17.7%	-2.5%	24.5%	3.7%	18.9%	6.4%	1.6%		
NGS												
Connecticut	104	137	135	174	157	161	253	225	250	359	245.8%	14.8%
Illinois	220	194	231	286	310	326	366	382	425	415	88.3%	7.3%
Maine	239	159	214	152	241	241	302	222	279	205	-14.2%	-1.7%
Massachusetts	196	213	219	272	349	272	381	355	318	391	99.1%	8.0%
Minnesota	141	84	95	173	152	178	119	171	203	173	22.6%	2.3%
New Hampshire	340	394	629	458	257	363	400	466	498	558	64.0%	5.6%
New York	155	141	151	170	222	229	269	294	253	309	99.0%	7.9%
Rhode Island	166	131	86	53	110	22	74	118	104	157	-5.6%	-0.6%
Vermont	371	287	332	307	434	501	394	563	531	418	12.8%	1.3%
Wisconsin	229	222	204	306	301	313	353	394	387	417	82.1%	6.9%
NGS Total	186	172	190	226	255	257	298	317	313	344	84.6%	7.0%
PCPY		-7.9%	10.6%	19.2%	12.7%	0.7%	16.1%	6.1%	-1.1%	9.9%		
Noridain												
Alaska	128	61	174	260	226	325	440	477	479	520	307.3%	16.9%
Arizona	334	434	436	483	570	564	631	668	799	989	196.7%	12.8%
California	151	182	196	194	203	223	216	233	248	258	70.9%	6.1%
Idaho	189	218	194	222	211	323	339	326	333	300	58.4%	5.2%
Montana	316	236	150	124	173	126	224	149	158	314	-0.6%	-0.1%
Nevada	257	275	414	542	568	439	494	671	609	723	181.8%	12.2%
North Dakota	167	110	182	144	234	389	278	236	274	204	22.2%	2.3%
Oregon	139	187	153	174	180	178	215	204	233	251	79.9%	6.7%
South Dakota	193	161	260	255	111	176	145	282	230	269	39.2%	3.7%
Utah	453	452	465	594	720	915	1,139	921	941	968	113.8%	8.8%
Washington	200	185	129	130	123	157	138	151	194	267	33.0%	3.2%
Wyoming	486	475	464	262	230	89	216	358	451	490	0.8%	0.1%
Noridian Total	197	225	231	245	264	283	300	315	345	390	97.8%	7.9%
PCPY		14.1%	2.7%	5.9%	7.7%	7.4%	5.9%	5.1%	9.4%	13.1%		

Appendix Table 4 con't. Utilization of lumbar facet neurolysis rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Palmetto GBA												
North Carolina	331	314	350	318	305	276	349	356	430	415	25.2%	2.5%
South Carolina	251	313	333	336	431	420	513	582	624	625	148.8%	10.7%
Virginia	198	195	174	228	306	348	423	440	566	585	195.1%	12.8%
West Virginia	292	299	290	230	285	364	359	456	594	544	86.5%	7.2%
Palmetto Total	271	276	287	286	330	336	406	438	527	522	92.9%	7.6%
PCPY		2%	4%	-1%	16%	2%	21%	8%	20%	-1%		
Novitas												
Arkansas	688	696	557	623	791	809	1,034	1,271	1,331	1,354	96.8%	7.8%
Colorado	126	118	172	264	260	304	388	392	536	536	324.3%	17.4%
Delaware	207	80	182	114	209	165	330	410	393	577	178.9%	12.1%
District of Columbia	52	179	125	320	393	495	646	1,108	483	259	397.2%	19.5%
Louisiana	268	300	424	465	456	547	672	673	734	714	166.2%	11.5%
Maryland	377	319	421	459	542	478	668	621	606	704	86.7%	7.2%
Mississippi	238	298	391	395	451	367	396	400	445	660	177.6%	12.0%
New Jersey	163	181	181	212	249	344	422	428	394	461	183.4%	12.3%
New Mexico	197	274	360	315	289	373	372	553	519	493	149.6%	10.7%
Oklahoma	213	268	355	320	400	615	543	610	864	900	322.5%	17.4%
Pennsylvania	144	162	161	161	204	230	281	285	298	324	125.3%	9.4%
Texas	384	417	381	440	505	523	567	675	702	666	73.4%	6.3%
Novitas Total	272	293	307	339	393	430	500	554	586	607	123.2%	9.3%
PCPY		7.6%	4.9%	10.4%	15.9%	9.5%	16.3%	10.9%	5.6%	3.7%		
WPS												
Indiana	272	251	312	237	308	354	431	455	453	449	65.0%	5.7%
Iowa	121	201	203	207	244	228	305	276	435	359	196.4%	12.8%
Kansas	197	180	219	161	163	190	228	250	314	283	43.3%	4.1%
Michigan	269	327	275	353	379	388	406	406	428	407	51.4%	4.7%
Missouri	209	239	262	296	328	349	336	292	360	380	81.8%	6.9%
Nebraska	138	158	198	209	221	216	283	261	328	444	221.9%	13.9%
WPS Total	228	257	263	277	312	330	364	358	404	397	74.2%	6.4%
PCY		13.0%	2.2%	5.3%	12.8%	5.6%	10.5%	-1.8%	13.0%	-1.9%		
USA Total	240	250	262	286	308	332	375	411	452	475	97.7%	7.9%
		4.1%	4.5%	9.5%	7.4%	8.0%	12.8%	9.5%	10.2%	5.1%		

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 5. Utilization of cervical/thoracic facet joint injections rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Cahaba												
Alabama	333	402	336	392	371	363	337	318	286	315	-5.5%	-0.6%
Georgia	310	274	345	423	397	358	373	423	387	364	17.4%	1.8%
Tennessee	328	357	318	281	255	194	181	248	235	267	-18.5%	-2.2%
Cahaba Total	322	336	334	367	342	304	299	337	311	320	-0.8%	-0.1%
PCPY		4.4%	-0.8%	10.1%	-6.8%	-11.1%	-1.7%	12.8%	-7.9%	2.9%		
CGS												
Kentucky	441	366	409	401	440	365	341	440	353	373	-15.6%	-1.9%
Ohio	175	210	219	221	285	251	287	306	269	224	27.7%	2.8%
CGS Total	251	255	274	273	330	284	303	345	293	266	6.1%	0.7%
PCPY		1.5%	7.4%	-0.4%	20.9%	-13.9%	6.6%	13.9%	-14.9%	-9.2%		
First Coast												
Florida	404	410	472	468	434	471	499	493	448	457	13.3%	1.4%
PCPY		1.4%	15.3%	-1.0%	-7.2%	8.5%	6.1%	-1.3%	-9.1%	2.1%		
NGS												
Connecticut	115	197	146	113	178	182	179	124	168	186	61.9%	5.5%
Illinois	221	158	205	260	184	201	231	214	249	210	-5.3%	-0.6%
Maine	185	68	185	246	219	488	409	411	298	248	33.6%	3.3%
Massachusetts	177	217	238	288	224	254	182	205	281	268	51.5%	4.7%
Minnesota	125	112	162	132	162	130	211	138	101	157	25.1%	2.5%
New Hampshire	156	260	218	389	308	255	312	376	249	179	14.6%	1.5%
New York	170	127	128	115	156	168	190	199	192	194	13.9%	1.5%
Rhode Island	255	164	291	106	33	118	42	138	113	148	-42.0%	-5.9%
Vermont	204	108	140	187	234	437	284	167	201	195	-4.3%	-0.5%
Wisconsin	164	162	223	200	204	186	168	202	209	215	31.5%	3.1%
NGS Total	176	153	178	187	181	199	204	202	210	205	16.5%	1.7%
PCPY		-13.0%	16.5%	5.0%	-3.2%	9.9%	2.8%	-1.0%	3.7%	-2.4%	-99.9%	
Noridian												
Alaska	447	274	203	115	198	136	233	238	283	374	-16.2%	-1.9%
Arizona	265	411	345	409	441	371	425	400	536	497	87.9%	7.3%
California	241	232	203	174	189	202	206	185	181	189	-21.5%	-2.6%
Idaho	135	131	152	148	258	158	123	191	189	237	75.6%	6.5%
Montana	170	165	127	202	173	126	102	99	111	323	89.8%	7.4%
Nevada	262	365	430	516	399	454	484	464	301	414	57.9%	5.2%
North Dakota	56	18	164	-	234	212	69	17	64	125	125.6%	9.5%
Oregon	136	109	116	177	186	110	185	162	178	198	45.7%	4.3%
South Dakota	134	351	332	269	265	203	197	179	230	129	-3.9%	-0.4%
Utah	153	346	246	254	324	210	331	492	317	368	139.6%	10.2%
Washington	200	202	195	183	140	153	170	139	174	195	-2.5%	-0.3%
Wyoming	153	400	464	238	230	446	130	274	275	283	84.2%	7.0%
Noridian Total	222	245	223	216	228	218	234	221	229	245	10.6%	1.1%
PCPY		10.6%	-9.2%	-2.9%	5.2%	-4.1%	7.1%	-5.4%	3.5%	7.1%		

Appendix Table 5 con't. *Utilization of cervical/thoracic facet joint injections rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.*

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Palmetto GBA												
North Carolina	193	173	187	242	239	209	218	197	219	253	30.6%	3.0%
South Carolina	278	256	245	334	276	326	330	366	364	392	41.1%	3.9%
Virginia	196	130	167	248	265	326	279	334	258	290	47.5%	4.4%
West Virginia	254	272	264	235	265	335	407	317	397	350	37.6%	3.6%
Palmetto Total	218	187	200	262	257	280	277	285	278	302	38.8%	3.7%
PCPY		-14%	7%	31%	-2%	9%	-1%	3%	-2%	9%		
Novitas												
Arkansas	411	320	251	290	316	347	348	528	445	497	20.9%	2.1%
Colorado	256	163	246	243	292	329	310	278	394	418	63.3%	5.6%
Delaware	345	174	156	216	467	485	490	244	227	388	12.5%	1.3%
District of Columbia	130	128	-	123	28	-	242	90	110	65	-50.3%	-7.5%
Louisiana	164	195	248	276	322	276	309	280	331	302	84.0%	7.0%
Maryland	277	265	280	249	265	384	341	320	293	372	34.0%	3.3%
Mississippi	398	362	407	410	391	404	450	471	376	430	8.1%	0.9%
New Jersey	170	203	220	212	232	308	300	327	268	331	94.2%	7.7%
New Mexico	395	300	223	236	175	297	333	241	403	288	-27.1%	-3.5%
Oklahoma	247	275	257	252	252	423	415	440	552	448	81.8%	6.9%
Pennsylvania	186	157	144	140	173	160	184	223	270	239	28.9%	2.9%
Texas	541	434	390	340	330	323	379	376	351	364	-32.8%	-4.3%
Novitas Total	322	278	269	256	272	300	322	331	337	345	7.2%	0.8%
PCPY		-13.8%	-3.1%	-4.6%	6.2%	10.1%	7.5%	2.7%	1.7%	2.5%		
WPS												
Indiana	337	340	331	292	339	425	381	382	322	339	0.5%	0.1%
Iowa	102	70	122	128	137	206	220	199	167	193	89.6%	7.4%
Kansas	132	166	123	187	185	155	266	345	184	237	80.1%	6.8%
Michigan	725	483	558	569	630	645	593	651	581	433	-40.3%	-5.6%
Missouri	406	360	307	298	365	353	340	313	282	315	-22.3%	-2.8%
Nebraska	131	201	198	202	131	155	151	255	194	308	135.5%	10.0%
WPS Total	426	341	355	356	399	425	406	431	367	340	-20.2%	-2.5%
PCY		-20.1%	4.3%	0.2%	12.0%	6.7%	-4.4%	5.9%	-14.7%	-7.3%		
USA Total	278	257	262	262	265	275	285	293	290	293	5.6%	0.6%
PCPY		-7.5%	2.2%	-0.2%	1.4%	3.5%	3.8%	2.9%	-1.2%	1.2%		

Trends of Expenditures of Facet Joint Interventions in Medicare Population

Appendix Table 6. Utilization of cervical/thoracic facet neurolysis rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Cahaba												
Alabama	24	50	46	18	42	65	61	81	77	91	278.5%	15.9%
Georgia	84	95	116	135	143	154	157	158	197	178	112.2%	8.7%
Tennessee	29	45	50	41	50	40	72	96	131	92	216.5%	13.7%
Cabha Total	49	66	75	73	85	93	104	117	145	128	159.6%	11.2%
PCPY		34.9%	13.0%	-3.2%	17.5%	8.7%	12.1%	12.9%	23.5%	-11.8%		
CGS												
Kentucky	86	68	103	111	141	101	104	165	201	221	157.1%	11.1%
Ohio	49	42	48	43	100	75	92	108	101	105	114.3%	8.8%
CGS Total	60	50	63	62	112	83	95	124	130	138	131.9%	9.8%
		-16.9%	27.9%	-2.0%	79.7%	-25.9%	15.3%	29.9%	4.7%	6.7%		
FirstCoast												
Florida	98	88	96	128	101	122	146	175	152	186	90.3%	7.4%
PCPY		-10.4%	9.0%	33.4%	-20.9%	21.3%	19.6%	19.8%	-13.5%	22.7%		
NGS												
Connecticut	29	4	28	34	17	27	47	44	64	51	77.6%	6.6%
Illinois	40	27	43	61	52	58	70	53	63	75	87.6%	7.2%
Maine	15	23	7	58	50	55	34	85	68	66	330.2%	17.6%
Massachusetts	38	21	31	49	61	61	44	38	55	71	83.2%	7.0%
Minnesota	60	38	55	59	52	49	83	61	58	82	37.2%	3.6%
New Hampshire	9	36	61	130	86	99	112	135	128	110	1098.5%	31.8%
New York	36	24	26	29	30	52	51	62	60	58	60.3%	5.4%
Rhode Island	89	186	22	-	-	-	-	20	28	46	-47.9%	-7.0%
Vermont	37	233	52	34	50	65	63	107	57	98	163.2%	11.4%
Wisconsin	47	33	52	76	63	71	71	80	90	100	111.9%	8.7%
NGS Total	40	31	36	49	44	55	59	60	65	71	78.8%	6.7%
PCPY		-21.1%	14.2%	35.6%	-8.3%	23.8%	7.3%	2.3%	6.8%	10.0%	-98.9%	
Noridian												
Alaska	32	-	29	-	85	108	26	119	44	104	225.8%	14.0%
Arizona	78	151	145	166	195	160	220	211	269	311	300.2%	16.7%
California	45	34	51	54	59	56	58	57	66	71	58.9%	5.3%
Idaho	108	61	42	82	63	120	51	57	59	75	-30.7%	-4.0%
Montana	61	24	35	56	43	32	71	10	28	99	62.4%	5.5%
Nevada	64	135	194	174	179	205	242	313	305	250	290.0%	16.3%
North Dakota	93	37	73	72	72	194	35	67	113	31	-66.2%	-11.3%
Oregon	27	29	28	46	65	42	71	50	50	65	142.8%	10.4%
South Dakota	59	351	87	57	56	27	79	90	60	105	77.0%	6.5%
Utah	124	7	150	94	152	203	129	266	220	290	133.5%	9.9%
Washington	47	-	52	25	26	27	39	45	49	64	35.6%	3.4%
Wyoming	-	125	98	71	69	67	-	147	78	75	#DIV/0!	####
Noridian Total	53	52	69	69	79	77	84	91	100	113	113.2%	8.8%
PCPY		-2.2%	33.6%	0.2%	13.7%	-2.0%	9.1%	8.4%	10.2%	12.0%		

Appendix Table 6 con't. Utilization of cervical/thoracic facet neurolysis rate per 100,000 Medicare beneficiaries (episodes) by 2016 Medicare carrier and state.

State name	R2009	R2010	R2011	R2012	R2013	R2014	R2015	R2016	R2017	R2018	Change	GM
Palmetto GBA												
North Carolina	48	71	51	60	50	33	78	59	97	113	133.4%	9.9%
South Carolina	37	3	58	66	67	83	99	96	127	144	285.5%	16.2%
Virginia	34	47	38	48	51	95	64	102	104	91	166.2%	11.5%
West Virginia	48	63	83	82	110	118	121	115	140	134	180.1%	12.1%
Palmetto Total	42	49	51	60	60	70	82	85	109	115	174.7%	11.9%
PCPY		18%	5%	16%	0%	17%	18%	3%	29%	5%		
Novitas												
Arkansas	246	199	159	145	216	312	348	377	334	338	37.3%	3.6%
Colorado	80	51	89	57	108	142	142	173	184	229	187.5%	12.4%
Delaware	14	13	52	-	12	95	80	133	41	109	693.4%	25.9%
District of Columbia	-	-	25	74	-	-	296	23	44	43	#DIV/0!	#####
Louisiana	74	84	85	97	123	128	166	134	171	174	134.0%	9.9%
Maryland	50	69	69	73	72	98	138	129	114	125	150.5%	10.7%
Mississippi	98	68	75	104	53	51	101	139	103	112	13.5%	1.4%
New Jersey	32	42	36	44	54	79	102	75	88	109	237.0%	14.5%
New Mexico	132	38	56	115	30	70	79	172	232	102	-22.2%	-2.7%
Oklahoma	41	56	62	77	117	133	167	191	235	208	411.9%	19.9%
Pennsylvania	27	28	22	43	39	41	47	63	48	64	140.6%	10.2%
Texas	98	107	104	124	153	125	153	201	196	224	128.6%	9.6%
Novitas Total	72	71	70	83	98	105	130	149	148	162	125.2%	9.4%
PCPY		-1.4%	-0.9%	18.6%	17.2%	7.5%	23.8%	14.8%	-1.0%	9.6%		
WPS												
Indiana	73	70	90	52	69	107	99	90	78	84	15.3%	1.6%
Iowa	23	31	61	49	48	69	85	59	64	82	248.1%	14.9%
Kansas	47	69	73	40	44	39	72	70	31	73	54.5%	5.0%
Michigan	48	82	67	91	101	85	107	98	89	121	149.5%	10.7%
Missouri	67	50	43	38	55	75	104	60	74	65	-3.4%	-0.4%
Nebraska	36	29	64	63	35	34	26	57	79	124	242.5%	14.7%
WPS Total	54	63	67	62	71	79	95	80	75	94	74.1%	6.4%
PCPY		17.9%	5.1%	-7.3%	14.7%	11.4%	20.6%	-16.0%	-5.6%	24.2%		
USA Total	57	56	62	69	74	80	93	103	110	121	111.9%	8.7%
PCPY		-2.1%	11.7%	10.2%	8.4%	7.2%	16.7%	10.8%	6.6%	9.8%		