Health Policy Research

Escalating Growth to Rapid Decline of Utilization Patterns of Facet Joint Interventions in Managing Spinal Pain in the Medicare Population: Updated Analysis of the Effect of Multiple Factors from 2000 To 2022

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Background: The use of facet joint interventions for spinal pain management experienced rapid growth between 2000 and 2010, with an annual increase of 14.2%. However, this trend slowed significantly from 2010 to 2019, with a reduced growth rate of just 2.9% annually. A more recent analysis highlighted a steep decline in facet joint interventions and sacroiliac joint injections, with an overall decrease of 33.2% and an annual decline rate of 12% per 100,000 Medicare beneficiaries between 2019 and 2022.

Objective: This study aims to update and analyze utilization patterns of facet joint interventions for chronic pain management in the U.S. Medicare population over three periods: 2000–2010, 2010–2019, and 2019–2022.

Study Design: A retrospective cohort study analyzing utilization trends and influencing factors for facet joint interventions in the FFS Medicare population in the United States from 2000 to 2022.

Methods: Data were obtained from the Centers for Medicare & Medicaid Services (CMS) physician/supplier procedure summary database (2000–2022). Utilization rates were calculated based on Medicare beneficiaries for each year and expressed as procedures per 100,000 beneficiaries. Episodes or procedural visits included only primary codes, while services encompassed all procedure levels, including add-on codes.

Results: Utilization patterns showed substantial fluctuations. From 2000 to 2010, facet joint intervention rates grew at 14.4% annually, slowing to 2.2% from 2010 to 2019. The COVID-19 pandemic led to a 19.3% decline in episodes.

From 2019 to 2022, episodes of facet joint interventions decreased by 21.2% per 100,000 beneficiaries, while the rate of services dropped by 37%, with an annual decrease of 14.3%. Specific declines included lumbar and cervical facet joint injections (38.8% and 40.2%, respectively) and lumbosacral and cervicothoracic facet joint neurolysis (33.6% and 30.8%, respectively). The reduction in facet joint injections and nerve blocks was greater than that observed for neurolytic procedures.

Limitations: Data were limited to the FFS Medicare population and were available only through 2022, excluding patterns for Medicare Advantage Plans, which covered nearly half of Medicare enrollees in 2022. Additionally, this study shares the common limitations of retrospective claims-based reviews.

Conclusion: This retrospective analysis reveals a substantial decline in facet joint intervention episodes, with an overall decrease of 21.2% per 100,000 Medicare beneficiaries and an annual decline rate of 7.6% for episodes from 2019 to 2022.

Key words: Facet joint interventions, facet joint nerve blocks, facet joint neurolysis, interventional techniques, economic decline, Affordable Care Act (ACA)

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Facet joint interventions are widely used techniques for managing chronic spinal pain (1-6). Despite their popularity, these interventions have faced scrutiny over alleged overuse and questions regarding their clinical and cost-effectiveness evidence (7-26). Over the past two decades, the landscape of pain management has shifted significantly, marked by increased utilization of various modalities (1-7,27,28).

An analysis of the COVID-19 pandemic's impact on pain management revealed an 18.7% reduction in utilization of interventional techniques for chronic pain management in the Medicare population from 2019 to 2020 (2). Similarly, a focused examination of facet joint interventions documents a 19.3% decrease in the rate of facet joint episodes and an 18.5% decline in related services or procedures (3). Manchikanti et al (3) analyzed various aspects of facet joint interventions, detailing numerous changes and highlighting trends in utilization over the years, from rapid to moderate growth and ultimately declines (1-3).

An examination of utilization patterns from 2000 to 2022, focusing on the periods 2000–2010, 2010–2019, and 2019–2022, indicated a 28.9% overall decline in interventional techniques, or a 10.7% annual reduction (1). The study further demonstrated reductions of 18.8% from 2019 to 2020, 1.1% from 2020 to 2021, and 11.5% from 2021 to 2022. In contrast, previous utilization trends showed a 163.2% increase (10.2% annually) from 2000 to 2010 across all interventional techniques. From 2010 to 2019, there was a minor decline of 0.4% annually, amounting to 4% overall, before COVID-19 triggered a steep downward trend. The study also reported declines of 33.2% for facet joint interventions and sacroiliac joint blocks (12.6% annually), 24.7% for epidural and adhesiolysis procedures (9% annually), and 28.9% for disc procedures and other nerve blocks (10.7% annually) among Medicare recipients from 2019 to 2022.

In existing literature, the utilization patterns of facet joint interventions and related variables have been thoroughly documented. Overall, the increase in facet joint intervention services was 282.6%, or 14% annually, compared to a 278.1% rise in episodes or procedural visits, equating to a 14.2% annual growth rate. However, from 2010 to 2019, the growth was moderate, with a 21.9% total increase in services and a 29% increase in episodes, with annual rates of 2.2% for services and 2.9% for episodes. Significant changes began in 2019 with the onset of the COVID-19 pandemic, as previously noted.

Physicians and clinical services represent 20% of healthcare spending, which grew by 2.7% in 2022, totaling $884.9 billion — a slower rate than the 5.3% increase in 2021 (29). This deceleration was seen across major payers, including Medicare, Medicaid, private insurance, and out-of-pocket costs, due to reduced service utilization and moderated physician price increases.

In line with the trend of rising national healthcare expenditures (30,31), the United States spending on personal and public healthcare for back and neck pain peaked at $134.5 billion in 2016, a 53.5% increase from $87.6 billion in 2013 (32). Following the Affordable Care Act (ACA), utilization decreased (4-6,33-45) as some patients encountered higher deductibles, coinsurance, and copayments. Pain management practices faced rising costs due to several factors including inflation, increased supply costs, increased salaries, additionally related to explaining insurance plans to patients, handling complaints about rising costs, and managing increased scrutiny and audits (46-53). The COVID-19 pandemic intensified these declines in utilization (1-3,13,27,28,44-53) as quarantines, screening requirements, testing, vaccination mandates, and interruptions in elective procedures disrupted access to care and heightened uncertainty. Economic challenges—unemployment, inflation, workforce shifts, and supply chain disruptions—have further impacted the sector (46-53). Patients' health often deteriorated due to missed screenings and essential care, either because they chose to stay home or lacked access to preventive services.

Despite emerging literature supporting the clinical and cost-effectiveness of interventional techniques, including facet joint interventions, skepticism persists about their efficacy and cost utility. Evidence from guidelines, systematic reviews, randomized controlled trials (RCTs), observational studies, diagnostic accuracy studies, and cost-utility analyses remains divided, with disagreements primarily between proponents and critics regarding methodological evaluations (7-26,54).

To manage utilization patterns, numerous measures have been introduced, especially after the Office of Inspector General (OIG) highlighted the overuse and rising costs of facet joint interventions compared to epidural injections (55,56). Local Coverage Determinations (LCDs) and medical policies have tightened, now requiring stringent inclusion criteria and limiting therapeutic facet joint injections unless radiofrequency neurotomy is contraindicated (36-42,57).

This study undertakes a retrospective cohort analysis of facet joint intervention utilization patterns in the U.S. Medicare fee-for-service (FFS) population from 2019 to 2022. By evaluating these trends during a critical period of healthcare transformation, the study aims to provide valuable insights into the evolving landscape of pain management and inform future clinical and policy decisions (3).

Methods

This investigation followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure clarity and reliability in presenting the results (57). Publicly available, non-identifiable data from the Centers for Medicare & Medicaid Services (CMS) database was used for the study, ensuring that only non-attributable and non-confidential information was included (58).

Study Design

The study aimed to analyze utilization patterns and related variables of facet joint interventions for chronic pain management from 2000 to 2022.

Objectives

The primary objectives were to assess trends in facet joint intervention utilization over time and to provide an updated analysis of these patterns from 2000 to 2022 within the FFS Medicare population.

Setting

Data analysis was based on the CMS national database of specialty usage data files, with a focus on the U.S. FFS Medicare population (58).

Participants

The study included all individuals in the FFS Medicare population from 2000 to 2022, covering those receiving Medicare due to Social Security disability, Social Security insurance, or retirement.

Variables

Rate: The rate of services and episodes was calculated using the Medicare beneficiary population for each respective year and is reported as the number of procedures per 100,000 beneficiaries.

Episode: An episode or procedural visit was defined as comprising only primary codes.

Services: Services, or procedures, included all procedure levels, incorporating any applicable add-on codes.

A range of variables was evaluated to analyze the utilization patterns of facet joint interventions in the Medicare population from 2019 to 2022, with specific consideration of the potential impacts of the COVID-19 pandemic. This analysis also included usage patterns from 2000 to 2010 and 2010 to 2019. Additionally, various characteristics of the Medicare population, including population growth, were studied to provide context.

Historically, facet joint interventions have been performed by physicians across multiple specialties, including interventional pain management (specialty code -09), pain medicine (-72), anesthesiology (-05), physical medicine and rehabilitation (-25), neurology (-13), radiology (-30, -94), and psychiatry (-26). Other specialties also occasionally perform interventional procedures. For analysis, certain specialties were grouped based on Medicare designations: orthopedic surgery (-20), general surgery (-17), and neurosurgery (-14) were combined as a "surgical group"; diagnostic radiology (-30) and interventional radiology (-94) were classified as a "radiological group"; other physicians were categorized separately, while all remaining providers were grouped as "other providers."

The procedure codes for facet joint interventions, applicable from 2000 to 2022, included:

- Facet joint interventions: CPT 64451 (from 2020), 64470, 64472, 64475, 64476, 64490, 64491 (new), 64492 (new), 64493 (new), 64494 (new), 64495 (new), 64622, 64623, 64625 (from 2020), 64626, 64627, 64633 (new), 64634 (new), 64635 (new), and 64636 (new).
- Additional CPT codes related to interventional procedures used in comparative evaluations were detailed in a recent publication (2).

Data was analyzed based on the place of service, categorized into:

- Facility: Includes ambulatory surgery centers and hospital outpatient departments.
- Non-Facility: Primarily includes office settings.

Data were also compared by Medicare Administrative Contractor (MAC) jurisdictions. A MAC is a private health insurer granted a specific geographic area in the United States by CMS to process Medicare Part A and Part B medical claims, or durable medical equipment claims for Medicare FFS beneficiaries, as established under the Medicare Prescription Drug Improvement and Modernization Act (MMA) of 2003.

Data Sources

The analyzed data were derived from the CMS Physician/Supplier Procedure Summary Master Data for the years 2000 to 2022 (58). This dataset includes all Medicare FFS participants who received interventional techniques, regardless of disability type.

Measures

The CMS 100% dataset comprises primary procedure codes, add-on and bilateral procedure codes, specialty codes, place of service, total services, and denied services. Usage patterns were analyzed based on "allowed services," which were determined by subtracting denied services, services with zero payments, and services marked with a code of 8 or F from the total submitted services. Each procedure's allowed services were then evaluated, with rates calculated relative to the Medicare beneficiary population for each respective year and reported as procedures per 100,000 beneficiaries. Percentage changes and geometric average changes were calculated for the periods 2000-2022, 2000-2010, 2010-2019, and 2019-2022, along with annual percentage changes for 2019-2020, 2020-2021, and 2021-2022.

Bias

The data used were purchased from CMS by the American Society of Interventional Pain Physicians (ASIPP). This study was conducted using the primary author's practice resources, without any external funding or grants, whether from industry or other sources.

Study Size

The study encompasses a large sample, including all Medicare FFS patients undergoing facet joint interventions across all settings and regions in the United States for chronic spinal pain from 2000 to 2022.

Data Compilation

Data were compiled using Microsoft Access 2020 and Microsoft Excel 2020 (Microsoft Corporation, Redmond, WA).

Funding

The study received no external funding.

Results

Participants

The assessment included all Medicare FFS recipients from 2000 to 2022.

Descriptive Data of Population Characteristics

Table 1, Appendix Table 1, and Figs. 1 and 2 illustrate various characteristics of Medicare beneficiaries and the utilization patterns of facet joint interventions from 2000 to 2022. During this period, the U.S. population grew at an annual rate of 0.8%, while the population aged 65 and older, including Medicare beneficiaries, grew by 2.3%. From 2000 to 2010, the overall population increased at 0.9% per year, the over-65 population at 1.4%, and Medicare beneficiaries at 1.7%. From 2010 to 2019, growth rates slowed to 0.7% for the general population, but those aged 65+ grew by 3.3% and Medicare beneficiaries by 3.0%. Between 2019 and 2022, annual U.S. population growth decreased further to 0.5%, while the population aged 65+ grew by 2.1% and Medicare beneficiaries by 1.9%.

Utilization patterns for facet joint interventions also experienced marked changes. From 2000 to 2010, there was a significant rise in these interventions, with an annual growth rate of 14.4%. This rate slowed to 2.2% per year between 2010 and 2019. Episodes of facet joint interventions, representing all procedures performed in one setting, displayed similar trends, with a 278.1% total increase (14.2% annually) from 2000 to 2010, and a 29% total increase (2.9% annually) from 2010 to 2019.

From 2019 to 2022, episodes and procedures showed distinct declines. Overall episodes decreased by 21.2%, compared to a 37% decline in procedures. Annually, this translated to a 7.6% reduction in episodes and a 14.3% reduction in procedures. Year-by-year, procedure volumes fell consistently: by 18.5% from 2019 to 2020, 8.8% from 2020 to 2021, and 15.3% from 2021 to 2022, culminating in a 37% decrease over the three years. Episodes, however, showed more variation: following a 19.3% decrease from 2019 to 2020, there was a 4% increase from 2020 to 2021, followed by a 6.1% decrease from 2021 to 2022.

This divergence may indicate differences in the number of procedures per patient, as "procedures" or "services" capture the number of levels treated, including bilateral procedures when performed on both sides, while "episodes" capture all procedures conducted in a single setting on one day of service.

Utilization Characteristics

Table 2, Appendix Table 2, and Figs. 3 and 4 show the utilization trends of lumbar facet joint interventions from 2000 to 2022. Between 2000 and 2010, lumbar facet joint blocks experienced an annual

increase of 12.1% in total blocks and 12.4% in episodes (primary code only). From 2010 to 2019, this growth significantly slowed, with only a 0.8% annual increase for primary codes. A sharp decline began in 2019, with a 20.6% decrease in the overall rate and a 20.7% decrease in episodes (primary codes only) from 2019 to 2020. The downward trend persisted in 2021, with episodes dropping by 12.1%, though there was a minor 3.3% increase in overall services. From 2019 to 2022, lumbar facet joint interventions saw an annual decrease of 15.1%, with an 8.1% annual decline in episodes.

For lumbosacral facet joint neurolysis (Table 2, Appendix Table 2, Figs. 3 and 4), there was substantial growth from 2000 to 2010, with an

Table 1. *Characteristics of Medicare beneficiaries and facet joint interventions from 2000 to 2022.*

	U.S. Population		Medicare Beneficiaries (,000)	Facet joint interventions			
	(,000)	> 65 years		Services*	Rate	Episodes (Primary)	Rate
Change							
2000-2022	18.1%	63.8%	63.3%	379.5%	193.7%	527.6%	284.4%
GM	0.8%	2.3%	2.3%	7.4%	5.0%	8.7%	6.3%
2000-2010	9.4%	14.8%	18.4%	353.0%	282.6%	347.6%	278.1%
GM	0.9%	1.4%	1.7%	16.3%	14.4%	16.2%	14.2%
2010-2019	6.3%	34.3%	30.5%	59.0%	21.9%	68.2%	29.0%
GM	0.7%	3.3%	3.0%	5.3%	2.2%	5.9%	2.9%
2019-2022	1.5%	6.3%	5.7%	-33.4%	-37.0%	-16.7%	-21.2%
GM	0.5%	2.1%	1.9%	-12.7%	-14.3%	-5.9%	-7.6%
2019-2020	0.8%	3.4%	2.3%	-16.6%	-18.5%	-17.4%	-19.3%
2020-2021	0.3%	-0.1%	1.3%	-7.6%	-8.8%	5.3%	4.0%
2021-2022	0.4%	2.8%	2.1%	-13.6%	-15.3%	-4.2%	-6.1%

* Facet joint blocks:64470 or 64490, 64472 64491 or 64492; L/S facet Joint Blocks 64475 or 64493, 64476 or 64494 or 64495; C/T Facet Neurolysis: 64626 or 64633, 64627 or 64634; L/S Facet Neurolysis: 64622 or 64635, 64623 or 64636
Rate Per 100,000 Medicare Beneficiaries
GM: Geometric average annual change ( ) facility percentage
PCFPY – Percentage of change from previous year

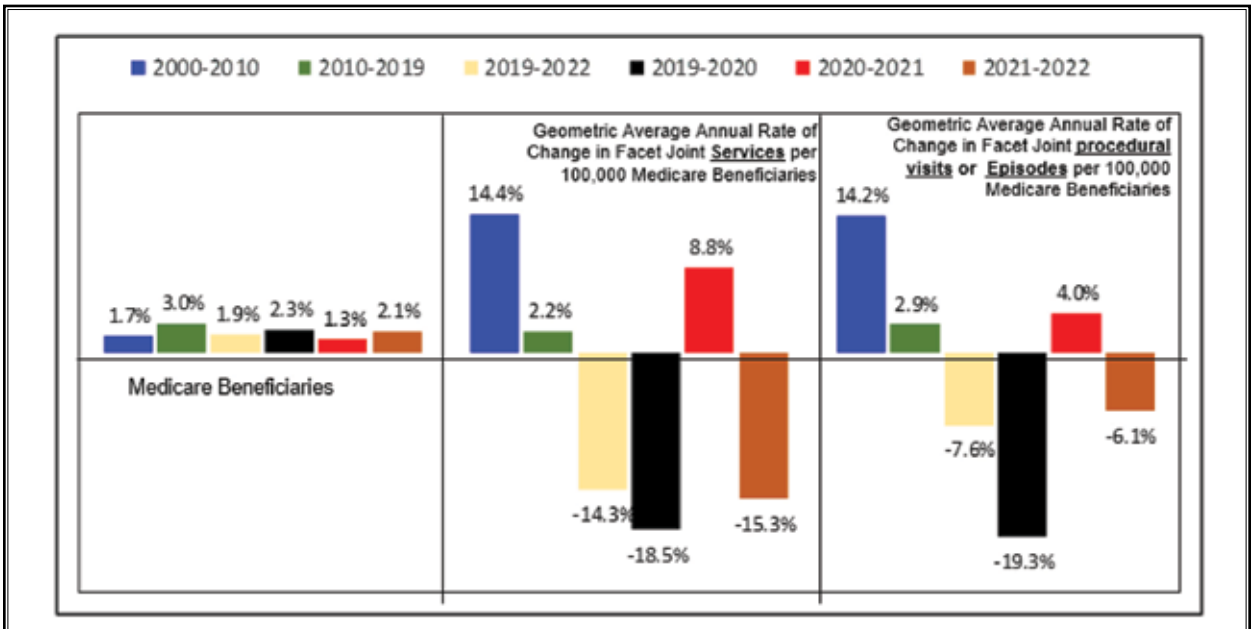

Fig. 1. *Comparative analysis of annual growth in the Medicare population and utilization rate of facet joint services and episodes (procedural visits) per 100,000 Medicare beneficiaries (2000–2022): Geometric average annual change.*

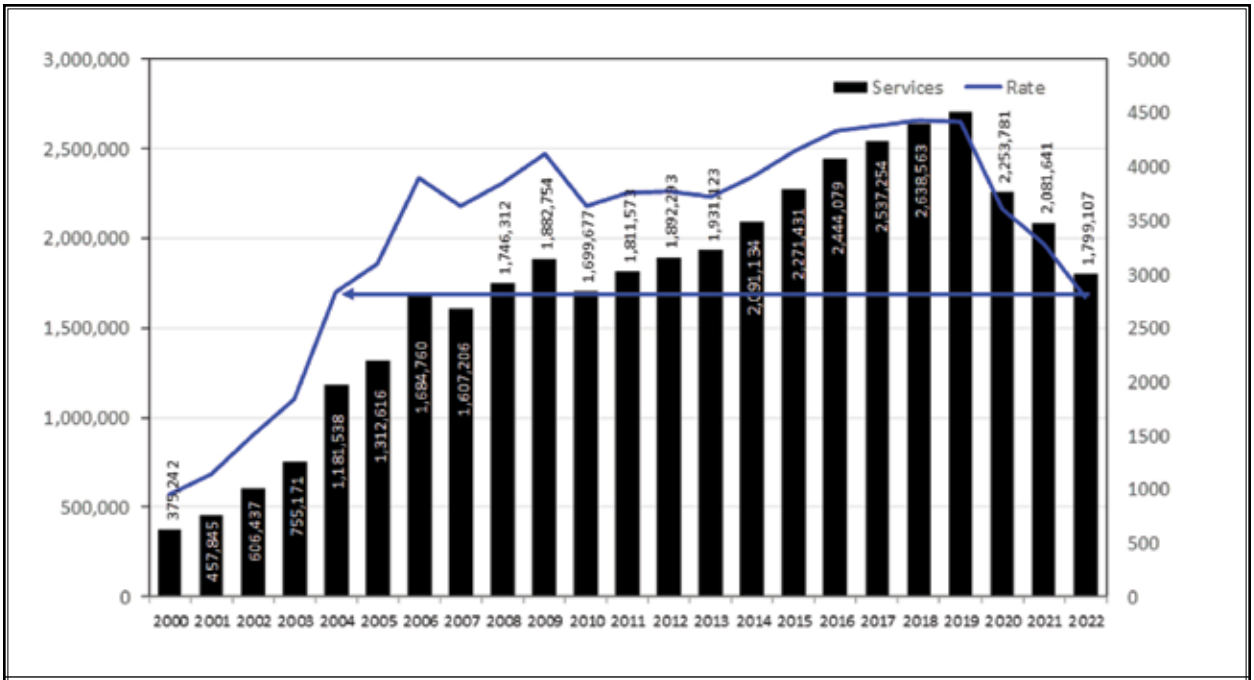

Fig. 2. *Growth of utilizations facet joint interventions from 2000-2022.*

annual increase of 19.6% in all services and 20.7% in episodes. This upward trend continued from 2010 to 2019, though at slower rates of 4.7% for all services and 7.4% for episodes. However, the COVID-19 pandemic brought declines, with radiofrequency neurolytic procedures decreasing by 15% in all services and 17.3% in episodes from 2019 to 2020. In 2021, services increased slightly by 2.8%, and episodes by 4.8%, but in 2022, both dropped significantly, with services decreasing by 19.6% and episodes by 8.1% per 100,000 Medicare beneficiaries. From 2019 to 2022, overall services decreased by 33.6%, while episodes declined by 20.4%.

Table 3, Appendix Table 3, and Figs. 3 and 5 reveal similar patterns for cervical/thoracic facet joint blocks. From 2000 to 2010, these blocks grew at an annual rate of 15.5% in total blocks and 14.6% in episodes (primary code only). Between 2010 and 2019, this growth slowed, with an annual increase of 1.8% for overall rate and 2.0% for primary codes. The onset of the COVID-19 pandemic in 2019 led to a 20.5% decrease in overall rate and a 20.2% decrease in primary code episodes from 2019 to 2020. In 2021, the decline continued, with a 13.4% reduction in episodes, though overall services saw a slight 3.1% increase. From 2019 to 2022, cervical/thoracic facet joint blocks had an annual decrease of 15.8%, and episodes declined by 7.8%.

Cervical/thoracic facet joint neurolysis services also showed robust growth from 2000 to 2010, with an annual increase of 23.5% in all services and 23.4% in episodes. From 2010 to 2019, the growth rate slowed to 6.5% annually for all services and 8.9% for episodes. With the COVID-19 pandemic, there was a 13.1% reduction in radiofrequency neurolytic procedures and a 14.1% decline in episodes from 2019 to 2020. In 2021, services fell by 1.1%, while episodes increased by 7.1%. By 2022, services decreased further by 19.5%, and episodes declined by 7.4% per 100,000 Medicare beneficiaries. Overall, from 2019 to 2022, services fell by 30.8%, and episodes by 14.8% (Table 3 & Appendix Table 3).

Patterns of Utilization of Nerve Blocks Compared to Radiofrequency Neurotomy

The utilization patterns of facet joint nerve blocks and radiofrequency neurotomy procedures have undergone significant changes in recent years (Fig. 6). To illustrate these shifts, we analyzed the rates of these procedures in 2005 and 2022. In 2005, the ratio of lumbar facet joint nerve blocks to radiofrequency neurotomy was 5.0 for episodes and 4.0 for total procedures. By 2022, these ratios had declined to 1.83 for episodes and 1.62 for total procedures, indicating a substantial reduction in the relative use of lumbar facet joint nerve blocks compared to radiofrequency neurotomy.

A similar trend was observed for cervical facet

Table 2. *Frequency of utilizations of lumbar facet joint interventions in the FFS Medicare population from 2000-2022.*

	L/S facet joint injections (64475 or 64493) Primary codes (episodes)		L/S facet joint injections (64475 or 64493 or 64476 or 64494 or 64495)		L/S facet neurolysis 64622 or 64635 Primary codes (episodes)		L/S facet neurolysis 64622 or 64635 or 64623 or 64636)		L/S facet joint interventions (64475 or 64493 or 64476 or 64494 or 64495 or 64622 or 64635 or 64623 or 64636)		L/S facet joint interventions (64475 or 64493 or 64622 or 64635) Primary codes (episodes)	
Year	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**
Change												
2000-2022	339.0%	168.9%	233.6%	104.3%	1510.1%	886.3%	880.9%	500.9%	345.6%	173.0%	490.7%	261.9%
GM	7.0%	4.6%	5.6%	3.3%	13.5%	11.0%	10.9%	8.5%	7.0%	4.7%	8.4%	6.0%
2000-2010	281.0%	221.9%	270.7%	213.1%	673.7%	553.6%	610.3%	500.1%	329.5%	262.8%	331.9%	264.9%
GM	14.3%	12.4%	14.0%	12.1%	22.7%	20.7%	21.7%	19.6%	15.7%	13.8%	15.8%	13.8%
2010-2019	40.3%	7.6%	39.2%	6.7%	147.3%	89.6%	96.7%	50.8%	55.6%	19.3%	65.1%	26.6%
GM	3.8%	0.8%	3.7%	0.7%	10.6%	7.4%	7.8%	4.7%	5.0%	2.0%	5.7%	2.7%
2019-2022	-17.9%	-22.3%	-35.3%	-38.8%	-15.8%	-20.4%	-29.8%	-33.6%	-33.3%	-36.9%	-17.2%	-21.7%
GM	-6.4%	-8.1%	-13.5%	-15.1%	-5.6%	-7.3%	-11.1%	-12.7%	-12.6%	-14.2%	-6.1%	-7.8%
2019-2020	-18.9%	-20.7%	-18.7%	-20.6%	-15.5%	-17.3%	-13.0%	-15.0%	-16.7%	-18.5%	-17.7%	-19.5%
2020-2021	4.7%	3.3%	-22.0%	-12.1%	6.1%	4.8%	-1.6%	2.8%	-7.5%	-8.6%	5.3%	4.0%
2021-2022	-3.3%	-5.2%	-10.6%	-12.4%	-6.2%	-8.1%	-17.9%	-19.6%	-13.5%	-15.3%	-4.3%	-6.3%

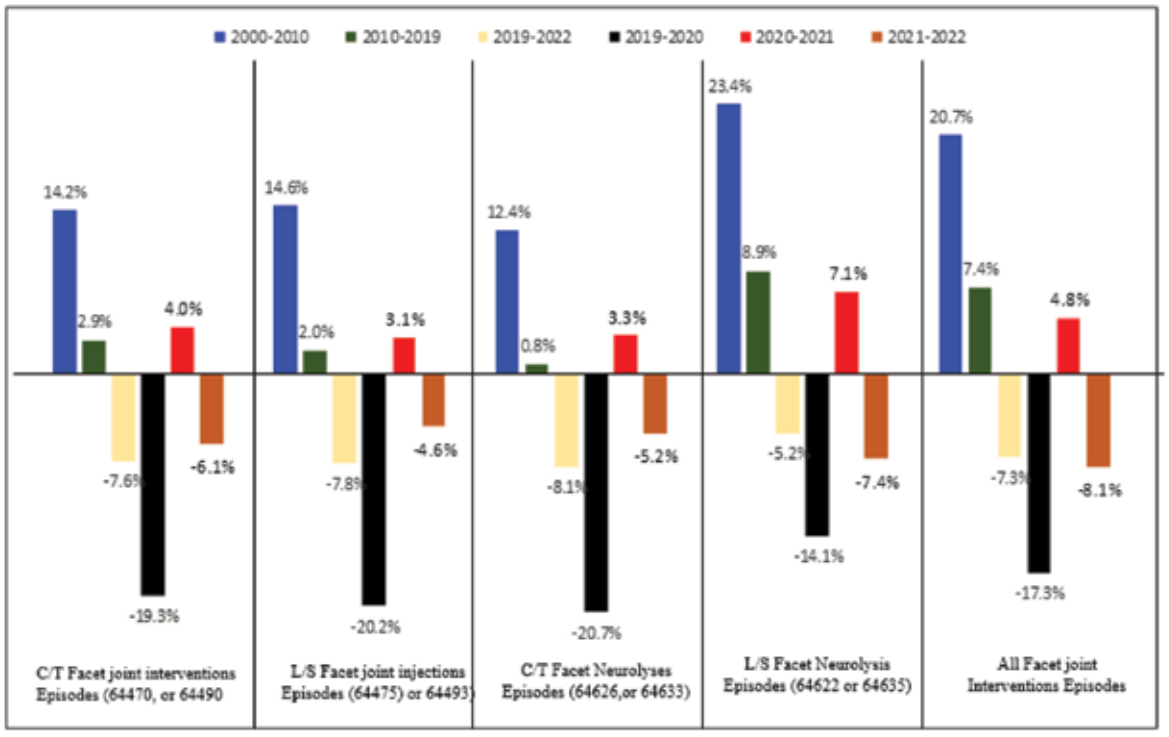

Fig. 3. *Annual change in frequency of utilization of facet joint interventions episodes or procedural visits from 2000 to 2022 in Medicare recipients.*

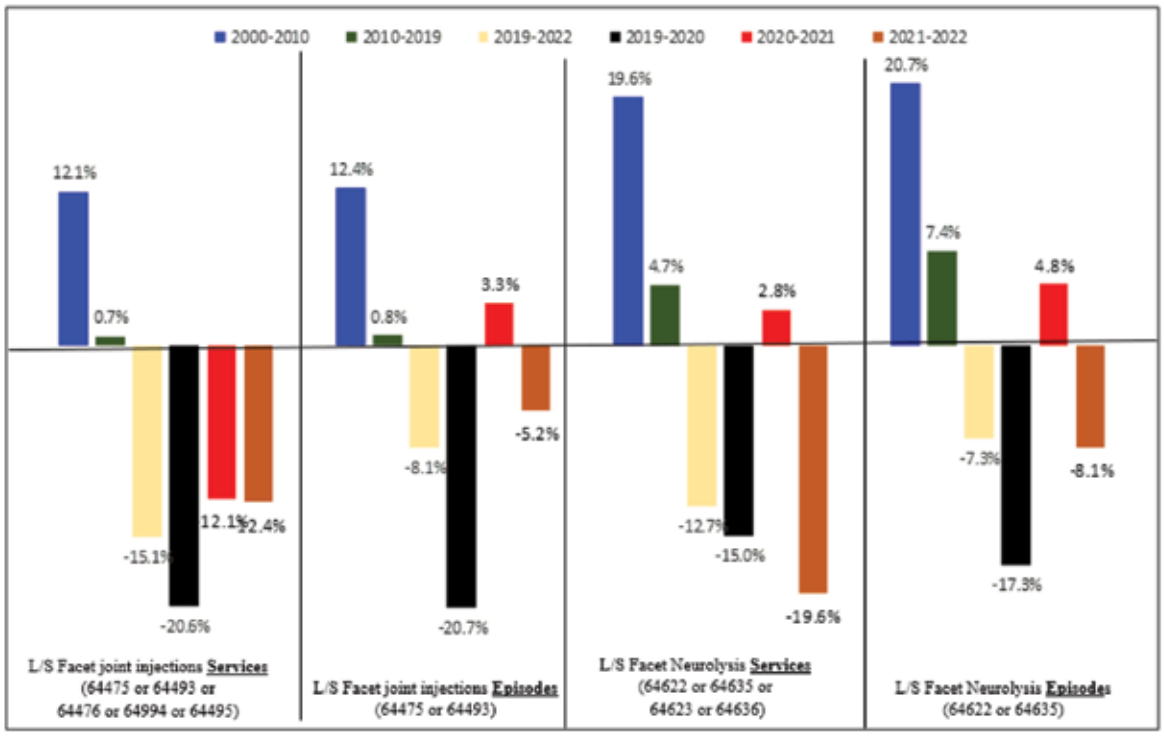

Fig. 4. *Comparison of rate of services and episodes or procedural visits of lumbar facet joint interventions.*

Table 3. *Frequency of utilizations of cervical facet joint interventions in the FFS Medicare population from 2000-2022.*

	C/T facet joint injections (64470 or 64490) Primary codes (episodes)		C/T facet joint injections (64470 or 64492 or 64490, 64472, 64491)		C/T facet neurolysis 64626 or 64633 Primary codes (episodes)		C/T facet neurolysis 64626 or 64627 or 64633 or 64634)		C/T facet joint interventions (64470 or 64492 or 64490, 64472, 64491 or 64626 or 64627 or 64633 or 64634)		C/T facet joint interventions (64470 or 64490 or 64626 or 64633) Primary codes (episodes)	
Year	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**
2000-2022	499.1%	267.0%	383.2%	196.0%	2346.0%	1398.3%	1538.5%	903.7%	534.7%	288.8%	683.8%	380.1%
GM	8.5%	6.1%	7.4%	5.1%	15.6%	13.1%	13.6%	11.1%	8.8%	6.4%	9.8%	7.4%
2000-2010	363.6%	291.7%	398.3%	321.0%	866.8%	716.8%	874.6%	723.4%	460.8%	373.7%	413.9%	334.2%
GM	16.6%	14.6%	17.4%	15.5%	25.5%	23.4%	25.6%	23.5%	18.8%	16.8%	17.8%	15.8%
2010-2019	55.8%	19.4%	53.5%	17.7%	180.9%	115.4%	129.8%	76.1%	70.9%	31.0%	79.3%	37.5%
GM	5.0%	2.0%	4.9%	1.8%	12.2%	8.9%	9.7%	6.5%	6.1%	3.0%	6.7%	3.6%
2019-2022	-17.0%	-21.5%	-36.8%	-40.2%	-10.0%	-14.8%	-26.8%	-30.8%	-33.8%	-37.3%	-15.0%	-19.6%
GM	-6.0%	-7.8%	-14.2%	-15.8%	-3.4%	-5.2%	-9.9%	-11.5%	-12.8%	-14.4%	-5.3%	-7.0%
2019-2020	-18.4%	-20.2%	-18.7%	-20.5%	-12.1%	-14.1%	-11.1%	-13.1%	-16.4%	-18.2%	-16.6%	-18.4%
2020-2021	4.5%	3.1%	-23.5%	-13.4%	8.5%	7.1%	-4.8%	-1.1%	-8.2%	-9.4%	5.7%	4.4%
2021-2022	-2.7%	-4.6%	-11.4%	-13.2%	-5.5%	-7.4%	-17.9%	-19.5%	-13.7%	-15.5%	-3.6%	-5.5%

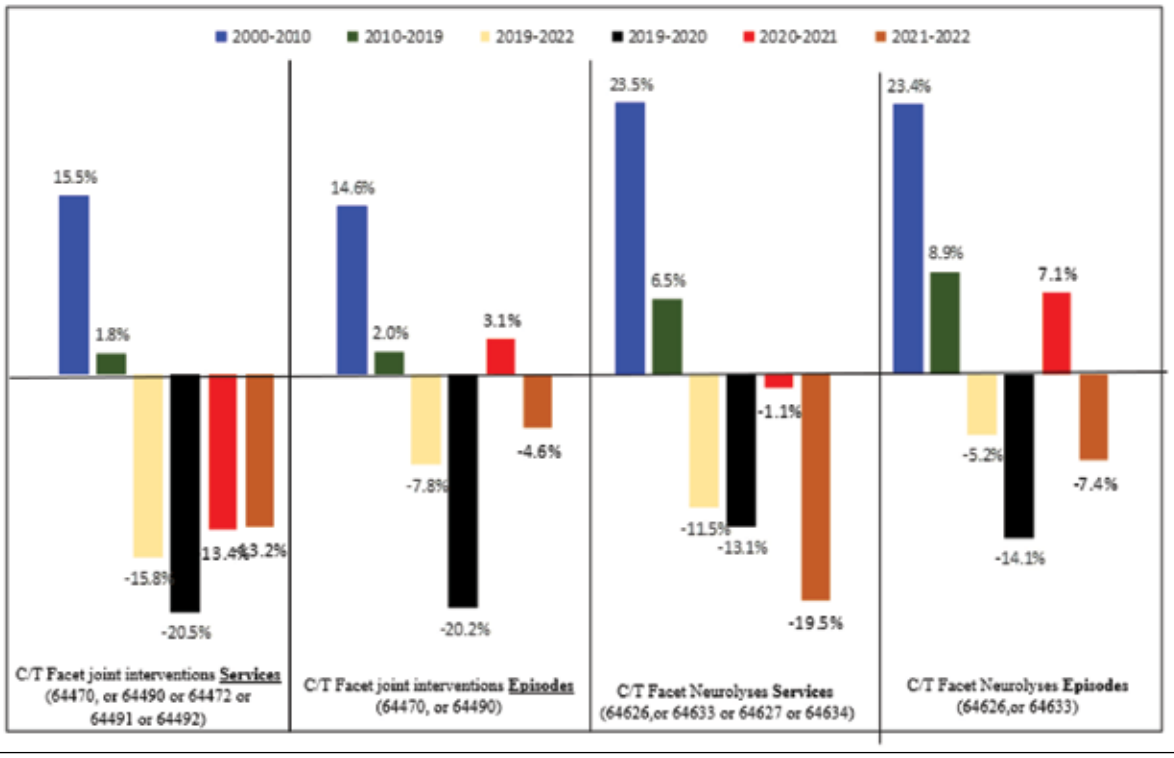

Fig. 5. *Comparison of rate of services and episodes or procedural visits of cervical facet joint interventions.*

joint procedures. The episode ratio for cervical facet joint nerve blocks versus radiofrequency neurotomy was 7.28 in 2005, while the procedure ratio was 5.97. By 2022, these ratios had decreased to 2.2 for episodes and 1.95 for procedures. Further changes are attributed to broad economic challenges. These shifts are further attributed to broad economic challenges and changes in LCD regulations.

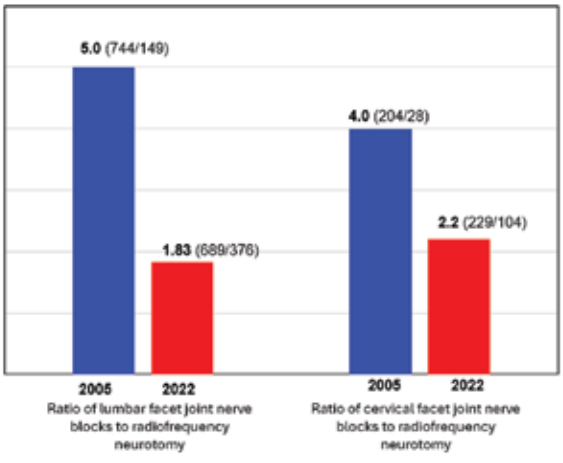

Fig. 6. *Comparison of facet joint nerve block to radiofrequency neurotomy episode (procedure rate) rates ratios in 2005 vs. 2022.*

Discussion

This updated analysis examines utilization data for facet joint interventions in the Medicare FFS population from 2000 to 2022, with particular attention to shifts from 2019 to 2022. The study spans three key periods: 2000-2010, 2010-2019, and 2019-2022. During this time, the U.S. population growth averaged 0.8% annually, with the population aged 65 and over, including Medicare beneficiaries, growing by 2.3%. Growth trends fluctuated within these intervals, with Medicare beneficiaries expanding by 1.7% annually from 2000 to 2010, by 3% from 2010 to 2019, and by 1.9% from 2019 to 2022 (Table 1, Appendix Table 1, Figs. 1 and 2).

The use of facet joint interventions showed marked variability in recent decades. From 2000 to 2010, utilization surged at an annual growth rate of 14.4%, then slowed to 2.2% annually from 2010 to 2019. Episodes of facet joint interventions (e.g., defined as all procedures performed in one setting) rose dramatically between

2000 and 2010, with an overall increase of 278.1% (14.2% annually), and continued growing by 2.9% annually from 2010 to 2019. However, significant reductions in episodes occurred between 2019 and 2022, with a 21.2% decline overall, contrasted with a 37% reduction in procedures, averaging annual declines of 7.6% for episodes and 14.3% for procedures. Yearly declines were also notable: 18.5% from 2019 to 2020, 8.8% from 2020 to 2021, and 15.3% from 2021 to 2022, resulting in a cumulative 37% decrease from 2019 to 2022. However, episodes showed a temporary 4% increase from 2020 to 2021, following a 19.3% drop, then declined again by 6.1%. These variations suggest discrepancies in procedure volume per patient, as services refer to specific levels or bilateral procedures, whereas episodes capture all procedures performed in one visit (36,40-42).

For lumbar facet joint blocks, utilization grew at an annual rate of 12.1% for blocks and 12.4% for episodes (primary code) from 2000 to 2010, then slowed to a 0.8% annual increase from 2010 to 2019. The most recent data indicate declines in 2019-2020, with 20.6% and 20.7% reductions for overall rate and episodes, respectively. The decline continued in 2021 with episodes dropping 12.1%, though services rose slightly by 3.3%. From 2019 to 2022, annual decreases averaged 15.1% for overall services and 8.1% for episodes (Table 2, Appendix Table 2, Figs. 3 and 4).

Lumbosacral facet joint neurolysis mirrored these trends. Annual utilization increased by 19.6% for all services and 20.7% for episodes from 2000 to 2010. While growth continued from 2010 to 2019, it slowed to 4.7% for services and 7.4% for episodes. With the onset of COVID-19, usage decreased 15% for services and 17.3% for episodes from 2019 to 2020. Services rose by 2.8% and episodes by 4.8% in 2021, but both declined sharply in 2022—by 19.6% and 8.1%, respectively, per 100,000 Medicare beneficiaries. Overall, services and episodes decreased 33.6% and 20.4% from 2019 to 2022, reflecting adherence to LCD policies that limit the procedure levels to two (36,40-42).

As shown in Table 3, Appendix Table 3, and Figs. 3 and 5, cervical/thoracic facet joint blocks also showed high growth, with annual increases of 15.5% for total blocks and 14.6% for episodes from 2000 to 2010. This slowed to a 1.8% increase from 2010 to 2019, with further declines during the pandemic: a 20.5% reduction in overall rate and 20.2% in episodes from 2019 to 2020. By 2021, episodes decreased 13.4%, while services showed a slight 3.1% increase. The overall annual decline from 2019 to 2022 was 15.8% in services and 7.8% in episodes.

Cervical/thoracic facet joint neurolysis services rose by 23.5% annually (episodes by 23.4%) from 2000 to 2010, with growth slowing to 6.5% (episodes by 8.9%) from 2010 to 2019. Pandemic-related reductions included a 13.1% drop in procedures and 14.1% in episodes from 2019 to 2020. In 2021, services fell by 1.1%, though episodes rose by 7.1%. By 2022, services dropped further by 19.5%, and episodes by 7.4% per 100,000 Medicare beneficiaries. From 2019 to 2022, there was a cumulative 30.8% decline in services and a 14.8% reduction in episodes (Table 3 & Appendix Table 3).

Several factors likely contribute to these declines, including the ongoing economic challenges brought on by the COVID-19 pandemic and policy changes introduced by the ACA, which imposed new coverage restrictions (36-38). Additionally, LCDs and other medical policies have played a significant role in shifting the focus of facet joint nerve blocks to radiofrequency neurotomy (36,40-42).

The utilization of facet joint interventions, particularly nerve blocks and radiofrequency neurotomy, has undergone significant evolution. A baseline comparison with 2005 illustrates this trend: in 2005, the lumbar facet joint nerve block-to-radiofrequency neurotomy ratio was 5.0 for episodes and 4.0 for procedures. By 2022, these ratios had declined to 1.83 and 1.62, respectively. Cervical facet joint procedures followed similar patterns, with episode and procedure ratios falling from 7.28 and 5.97 in 2005 to 2.2 and 1.95 in 2022, reflecting a broad shift from nerve blocks to radiofrequency neurotomy amid economic and regulatory changes (Fig. 6).

While declines in utilization may signify improved selectivity and adherence to evidence-based practices, they could also indicate reduced access to care. Some procedures may be denied based on contested guidelines and criteria for facet joint pain diagnosis and treatment (10,11,13,16,17,20,21). It is imperative to develop consistent, evidence-based guidelines using real-world data, as the CMS LCDs largely aim to do (13,54,59,60).

Limitations of this retrospective analysis include the exclusion of Medicare Advantage enrollees, who account for about half of Medicare beneficiaries.

Conclusion

This analysis reveals a substantial 28.9% decrease in the use of interventional pain management techniques per 100,000 Medicare beneficiaries, reflecting

an annual decline of 10.7% from 2019 to 2022. Multiple factors have driven this ongoing reduction, including the lasting impacts of COVID-19, economic challenges, the implementation of the ACA, and changing medical policies.

Author Contributions

The study was designed by LM, JH, and VP.

Statistical analysis was performed by VP.

All authors contributed to the preparation of this study, reviewed, and approved the content with the final version.

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Conflicts of Interests

Dr. Soin received support in the past from Neuros Medical and Avanos Medical, received consulting fees from Avanos Medical, owns several patents and is a co-inventor with Avanos Medical, and has stock options with Neuros Medical. Dr. Abd-Elsayed receives consulting fees from Medtronic and Curonix. Dr. Hirsch receives grants or contracts from Neiman Health Policy Institute, is a consultant for Medtronic, Relievant, and Sanofi, and is the Chair CSMB of neurovascular studies for Balt: Rapid Medical. All other authors certify that he or she, or a member of his or her immediate family, have no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.

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Appendix Table 1. *Characteristics of Medicare beneficiaries and facet joint interventions from 2000 to 2022.*

	U.S. Population (,000)		Medicare Beneficiaries (,000)	Facet joint interventions						
Year	**Total Population**	**≥ 65 years**		**Services***	**Rate**	**PCFPY**	**Primary**	**PCFPY**	**Rate**	**PCFPY**
2000	282,172	35,077	39,632	375,242	947		144,157		364	
2001	285,040	35,332	40,045	457,845	1,143	20.8%	178,341	23.7%	445	22.4%
2002	288,369	35,605	40,503	606,437	1,497	31.0%	228,489	28.1%	564	26.7%
2003	290,211	35,952	41,126	755,171	1,836	22.6%	281,413	23.2%	684	21.3%
2004	292,892	36,302	41,729	1,181,538	2,831	54.2%	431,758	53.4%	1035	51.2%
2005	295,561	36,752	42,496	1,312,616	3,089	9.1%	477,942	10.7%	1125	8.7%
2006	299,395	37,264	43,339	1,684,760	3,887	25.9%	585,617	22.5%	1351	20.1%
2007	301,290	37,942	44,263	1,607,206	3,631	-6.6%	579,233	-1.1%	1309	-3.2%
2008	304,056	38,870	45,412	1,746,312	3,845	5.9%	621,323	7.3%	1368	4.6%
2009	307,006	39,570	45,801	1,882,754	4,111	6.9%	682,903	9.9%	1491	9.0%
2010	308,746	40,268	46,914	1,699,677	3,623	-11.9%	645,197	-5.5%	1375	-7.8%
2011	311,583	41,370	48,300	1,811,573	3,751	3.5%	682,472	5.8%	1413	2.7%
2012	313,874	43,144	50,300	1,892,293	3,762	0.3%	734,514	7.6%	1460	3.3%
2013	316,129	44,704	51,900	1,931,123	3,721	-1.1%	753,922	2.6%	1453	-0.5%
2014	318,892	46,179	53,500	2,091,134	3,909	5.0%	825,287	9.5%	1543	6.2%
2015	320,897	47,734	54,900	2,271,431	4,137	5.9%	897,742	8.8%	1635	6.0%
2016	323,127	49,244	56,500	2,444,079	4,326	4.6%	967,868	7.8%	1713	4.8%
2017	326,625	51,055	58,000	2,537,254	4,375	1.1%	1,011,287	4.5%	1744	1.8%
2018	327,167	52,347	59,600	2,638,563	4,427	1.2%	1,055,571	4.4%	1771	1.6%
2019	328,293	54,074	61,200	2,702,551	4,416	-0.3%	1,085,479	2.8%	1774	0.1%
2020	331,002	55,939	62,600	2,253,781	3,600	-18.5%	896,308	-17.4%	1432	-19.3%
2021	332,049	55,885	63,400	2,081,641	3,283	-8.8%	943,929	5.3%	1489	4.0%
2022	333,272	57,470	64,700	1,799,107	2,781	-15.3%	904,686	-4.2%	1398	-6.1%
Change/GM										
2000-2022	18.1%	63.8%	63.3%	379.5%	193.7%		527.6%		284.4%	
GM	0.8%	2.3%	2.3%	7.4%	5.0%		8.7%		6.3%	
2000-2010	9.4%	14.8%	18.4%	353.0%	282.6%		347.6%		278.1%	
GM	0.9%	1.4%	1.7%	16.3%	14.4%		16.2%		14.2%	
2010-2019	6.3%	34.3%	30.5%	59.0%	21.9%		68.2%		29.0%	
GM	0.7%	3.3%	3.0%	5.3%	2.2%		5.9%		2.9%	
2019-2022	1.5%	6.3%	5.7%	-33.4%	-37.0%		-16.7%		-21.2%	
GM	0.5%	2.1%	1.9%	-12.7%	-14.3%		-5.9%		-7.6%	
2019-2020	0.8%	3.4%	2.3%	-16.6%	-18.5%		-17.4%		-19.3%	
2020-2021	0.3%	-0.1%	1.3%	-7.6%	-8.8%		5.3%		4.0%	
2021-2022	0.4%	2.8%	2.1%	-13.6%	-15.3%		-4.2%		-6.1%	

* Facet joint blocks:64470 or 64490, 64472 64491 or 64492; L/S facet Joint Blocks 64475 or 64493, 64476 or 64494 or 64495; C/T Facet Neurolysis: 64626 or 64633, 64627 or 64634; L/S Facet Neurolysis: 64622 or 64635, 64623 or 64636. PCFPY – Percentage of change from previous year
Rate Per 100,000 Medicare beneficiaries - GM - Geometric average annual change

Appendix Table 2. *Frequency of utilizations of lumbar facet joint interventions in the FFS Medicare population from 2000-2022.*

	L/S facet joint injections (64475 or 64493) Primary codes (episodes)		L/S facet joint injections (64475 or 64493 or 64476 or 64494 or 64495)		L/S facet neurolysis 64622 or 64635 Primary codes (episodes)		L/S facet neurolysis 64622 or 64635 or 64623 or 64636)		L/S facet joint interventions (64475 or 64493 or 64476 or 64494 or 64495 or 64622 or 64635 or 64623 or 64636)		L/S facet joint interventions (64475 or 64493 or 64622 or 64635) Primary codes (episodes)	
Year	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**
F2000	101,539	256	254,791	643	15,117	38	53,323	135	308,114	777	116,656	294
F2001	121,234	303	297,088	742	18,792	47	66,424	166	363,512	908	140,026	350
F2002	155,620	384	395,863	977	25,744	64	89,266	220	485,129	1,198	181,364	448
F2003	189,263	460	489,065	1,189	35,315	86	118,481	288	607,546	1,477	224,578	546
F2004	286,394	686	754,217	1,807	57,053	137	189,404	454	943,621	2,261	343,447	823
F2005	316,158	744	835,847	1,967	63,228	149	209,916	494	1,045,763	2,461	379,386	893
F2006	370,809	856	1,007,482	2,325	79,289	183	305,588	705	1,313,070	3,030	450,098	1,039
F2007	365,372	825	964,940	2,180	88,069	199	297,485	672	1,262,425	2,852	453,441	1,024
F2008	385,491	849	1,020,266	2,247	100,606	222	340,874	751	1,361,140	2,997	486,097	1,070
F2009	418,036	913	1,081,726	2,362	112,627	246	376,013	821	1,457,739	3,183	530,663	1,159
F2010	386,897	825	944,469	2,013	116,959	249	378,761	807	1,323,230	2,821	503,856	1,074
F2011	402,507	833	990,449	2,051	125,630	260	406,378	841	1,396,827	2,892	528,137	1,093
F2012	426,386	848	1,049,496	2,086	141,130	281	406,332	808	1,455,828	2,894	567,516	1,128
F2013	423,970	817	1,043,861	2,011	155,353	299	434,386	837	1,478,247	2,848	579,323	1,116
F2014	458,539	857	1,125,757	2,104	178,121	333	480,723	899	1,606,480	3,003	636,660	1,190
F2015	490,685	894	1,205,502	2,196	202,460	369	542,154	988	1,747,656	3,183	693,145	1,263
F2016	513,752	909	1,256,525	2,224	232,683	412	617,765	1,093	1,874,290	3,317	746,435	1,321
F2017	523,649	903	1,273,415	2,196	256,617	442	672,472	1,159	1,945,887	3,355	780,266	1,345
F2018	534,088	896	1,297,863	2,178	278,151	467	719,928	1,208	2,017,791	3,386	812,239	1,363
F2019	542,819	887	1,314,398	2,148	289,209	473	744,893	1,217	2,059,291	3,365	832,028	1,360
F2020	440,348	703	1,068,062	1,706	244,509	391	647,804	1,035	1,715,866	2,741	684,857	1,094
F2021	460,896	727	950,363	1,499	259,511	409	637,460	1,005	1,587,823	2,504	720,407	1,136
F2022	445,729	689	849,993	1,314	243,402	376	523,056	808	1,373,049	2,122	689,131	1,065
Change												
2000-2022	339.0%	168.9%	233.6%	104.3%	1510.1%	886.3%	880.9%	500.9%	345.6%	173.0%	490.7%	261.9%
GM	7.0%	4.6%	5.6%	3.3%	13.5%	11.0%	10.9%	8.5%	7.0%	4.7%	8.4%	6.0%
2000-2010	281.0%	221.9%	270.7%	213.1%	673.7%	553.6%	610.3%	500.1%	329.5%	262.8%	331.9%	264.9%
GM	14.3%	12.4%	14.0%	12.1%	22.7%	20.7%	21.7%	19.6%	15.7%	13.8%	15.8%	13.8%
2010-2019	40.3%	7.6%	39.2%	6.7%	147.3%	89.6%	96.7%	50.8%	55.6%	19.3%	65.1%	26.6%
Change	3.8%	0.8%	3.7%	0.7%	10.6%	7.4%	7.8%	4.7%	5.0%	2.0%	5.7%	2.7%
2019-2022	-17.9%	-22.3%	-35.3%	-38.8%	-15.8%	-20.4%	-29.8%	-33.6%	-33.3%	-36.9%	-17.2%	-21.7%
GM	-6.4%	-8.1%	-13.5%	-15.1%	-5.6%	-7.3%	-11.1%	-12.7%	-12.6%	-14.2%	-6.1%	-7.8%
2019-2020	-18.9%	-20.7%	-18.7%	-20.6%	-15.5%	-17.3%	-13.0%	-15.0%	-16.7%	-18.5%	-17.7%	-19.5%
2020-2021	4.7%	3.3%	-22.0%	-12.1%	6.1%	4.8%	-1.6%	2.8%	-7.5%	-8.6%	5.3%	4.0%
2021-2022	-3.3%	-5.2%	-10.6%	-12.4%	-6.2%	-8.1%	-17.9%	-19.6%	-13.5%	-15.3%	-4.3%	-6.3%

Appendix Table 3. *Frequency of utilizations of cervical facet joint interventions in the FFS Medicare population from 2000-2022.*

	C/T facet joint injections (64470 or 64490) Primary codes (episodes)		C/T facet joint injections (64470 or 64492 or 64490, 64472, 64491)		C/T facet neurolysis 64626 or 64633 Primary codes (episodes)		C/T facet neurolysis 64626 or 64627 or 64633 or 64634)		C/T facet joint interventions (64470 or 64492 or 64490, 64472, 64491 or 64626 or 64627 or 64633 or 64634)		C/T facet joint interventions (64470 or 64490 or 64626 or 64633) Primary codes (episodes)	
Year	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**	**Services**	**Rate**
2000	24,751	62	58,324	147	2,750	7	8,804	22	67,128	169	27,501	69
2001	34,500	86	82,184	205	3,815	10	12,149	30	94,333	236	38,315	96
2002	41,935	104	103,916	257	5,190	13	17,392	43	121,308	300	47,125	116
2003	49,958	121	125,447	305	6,877	17	22,178	54	147,625	359	56,835	138
2004	77,620	186	203,765	488	10,691	26	34,152	82	237,917	570	88,311	212
2005	86,541	204	228,540	538	12,015	28	38,313	90	266,853	628	98,556	232
2006	121,312	280	325,490	751	14,207	33	46,200	107	371,690	858	135,519	313
2007	108,103	244	287,382	649	17,689	40	57,399	130	344,781	779	125,792	284
2008	114,497	252	316,354	697	20,729	46	68,818	152	385,172	848	135,226	298
2009	126,730	277	341,532	746	25,510	56	83,483	182	425,015	928	152,240	332
2010	114,753	245	290,640	620	26,588	57	85,807	183	376,447	802	141,341	301
2011	124,431	258	317,220	657	29,904	62	97,526	202	414,746	859	154,335	320
2012	131,377	261	334,751	666	35,621	71	101,717	202	436,468	868	166,998	332
2013	135,544	261	343,919	663	39,055	75	108,957	210	452,876	873	174,599	336
2014	144,940	271	364,436	681	43,687	82	120,218	225	484,654	906	188,627	353
2015	154,275	281	387,042	705	50,322	92	136,733	249	523,775	954	204,597	373
2016	163,308	289	412,873	731	58,125	103	156,916	278	569,789	1,008	221,433	392
2017	166,955	288	420,046	724	64,066	110	171,321	295	591,367	1,020	231,021	398
2018	172,954	290	434,054	728	70,378	118	186,718	313	620,772	1,042	243,332	408
2019	178,753	292	446,104	729	74,698	122	197,156	322	643,260	1,051	253,451	414
2020	145,827	233	362,572	579	65,624	105	175,343	280	537,915	859	211,451	338
2021	152,336	240	318,176	502	71,186	112	175,642	277	493,818	779	223,522	353
2022	148,291	229	281,805	436	67,264	104	144,253	223	426,058	659	215,555	333
Change												
2000-2022	499.1%	267.0%	383.2%	196.0%	2346.0%	1398.3%	1538.5%	903.7%	534.7%	288.8%	683.8%	380.1%
GM	8.5%	6.1%	7.4%	5.1%	15.6%	13.1%	13.6%	11.1%	8.8%	6.4%	9.8%	7.4%
2000-2010	363.6%	291.7%	398.3%	321.0%	866.8%	716.8%	874.6%	723.4%	460.8%	373.7%	413.9%	334.2%
GM	16.6%	14.6%	17.4%	15.5%	25.5%	23.4%	25.6%	23.5%	18.8%	16.8%	17.8%	15.8%
2010-2019	55.8%	19.4%	53.5%	17.7%	180.9%	115.4%	129.8%	76.1%	70.9%	31.0%	79.3%	37.5%
Change	5.0%	2.0%	4.9%	1.8%	12.2%	8.9%	9.7%	6.5%	6.1%	3.0%	6.7%	3.6%
2019-2022	-17.0%	-21.5%	-36.8%	-40.2%	-10.0%	-14.8%	-26.8%	-30.8%	-33.8%	-37.3%	-15.0%	-19.6%
GM	-6.0%	-7.8%	-14.2%	-15.8%	-3.4%	-5.2%	-9.9%	-11.5%	-12.8%	-14.4%	-5.3%	-7.0%
2019-2020	-18.4%	-20.2%	-18.7%	-20.5%	-12.1%	-14.1%	-11.1%	-13.1%	-16.4%	-18.2%	-16.6%	-18.4%
2020-2021	4.5%	3.1%	-23.5%	-13.4%	8.5%	7.1%	-4.8%	-1.1%	-8.2%	-9.4%	5.7%	4.4%
2021-2022	-2.7%	-4.6%	-11.4%	-13.2%	-5.5%	-7.4%	-17.9%	-19.5%	-13.7%	-15.5%	-3.6%	-5.5%