



The percentage of sacroiliac fusions done in the U.S. by non-surgical specialties has increased

Mathew Cyriac^{1^}, Bela P. Delvadia^{1^}, Julianna E. Winter^{1^}, Jacob S. Budin^{1^}, Olivia C. Lee^{2^}, William F. Sherman^{1^}

¹Department of Orthopaedic Surgery, Tulane University School of Medicine, New Orleans, LA, USA; ²Department of Orthopaedic Surgery, Louisiana State University Health Sciences Center School of Medicine, New Orleans, LA, USA

Contributions: (I) Conception and design: WF Sherman, M Cyriac, OC Lee; (II) Administrative support: WF Sherman; (III) Provision of study materials or patients: WF Sherman; (IV) Collection and assembly of data: BP Delvadia, JS Budin, JE Winter; (V) Data analysis and interpretation: BP Delvadia, JS Budin, JE Winter; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Dr. William F. Sherman, MD, MBA. Department of Orthopaedic Surgery, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, LA 70112, USA. Email: swilliam1@tulane.edu.

Background: Surgical fusion of the sacroiliac (SI) joint is often performed to manage chronic lower back or buttock pain. When Current Procedural Terminology (CPT) codes were introduced, SI joint fusion procedures were done primarily by orthopaedic surgeons and neurosurgeons. The purpose of this study was to examine the utilization of SI joint fusion CPT codes by physician specialty over time.

Methods: A retrospective cohort study was conducted using the PearlDiver database. The database was queried using CPT codes to identify patients who underwent SI joint fusion via percutaneous, open, or trauma codes. Specialties queried included surgical specialties (orthopaedic surgery and neurosurgery) and non-surgical specialties [physical medicine and rehabilitation (PM&R), neurology, anesthesiology, pain medicine]. Total number and number per year of SI joint fusion procedures were identified for each specialty group. Trends of SI fusion billing for the years 2015 to 2021 were compared between surgical specialties and non-surgical specialties.

Results: Comparing 2015 and 2021, the SI fusion codes submitted across all three groups (percutaneous, open, and trauma) increased for non-surgical specialties compared to surgical specialties. Between 2015 and 2021, the total number of percutaneous procedures submitted by all specialties increased by 294%, while the number of procedures being submitted by non-surgical specialties increased by 25,050%.

Conclusions: Our study demonstrated how quickly and to what degree the procedure market can react to higher work relative value unit (RVU) value codes. Despite requiring less overall time and utilizing an intra-articular rather than a transfixing approach, non-surgical specialties submitted the same CPT code as surgical specialties performing the transfixing procedure at an increasing rate during the study period. With the introduction of new technologies to perform SI fixation and a new code to capture the intra-articular procedure, future studies could examine whether the number of SI fusion procedures performed by the various physician specialties stabilizes over time.

Keywords: Sacroiliac joint (SI joint); sacroiliac fusion (SI fusion); Current Procedural Terminology codes (CPT codes); billing; relative value unit (RVU)

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[^] ORCID: Mathew Cyriac, 0000-0001-5254-8180; Bela P. Delvadia, 0009-0004-3373-7962; Julianna E. Winter, 0009-0008-1591-0011; Jacob S. Budin, 0009-0002-9016-4481; Olivia C. Lee, 0000-0002-1024-9729; William F. Sherman, 0000-0002-4097-5668.

Introduction

Sacroiliac (SI) joint dysfunction can be a significant source of pain for patients with lower back or buttock pain (1). It is estimated that 15–30% of individuals with chronic low back pain have SI joint dysfunction (2,3). Various factors may contribute to SI joint dysfunction such as persistent strain, trauma, pregnancy, arthritis, previous spine surgery, gait abnormalities, leg length discrepancies, increasing age, obesity, and scoliosis (2,4). The treatments for SI joint pain vary based on severity and range from physical therapy and medication to more invasive options such as steroid injections, prolotherapy, radiofrequency ablation, or surgical joint fusion (4). When nonoperative approaches fail to adequately manage pain for patients with chronic SI joint dysfunction, surgical joint fusion may be considered. Surgical access to the SI joint for fusion procedures is typically through an open approach or minimally invasive approach (5). Traditionally, open surgical joint fusion was recommended, however, in recent years minimally invasive surgical (MIS) approaches and percutaneous surgical implants have become more popular (6,7).

The American Medical Association (AMA) Current Procedural Terminology (CPT) codebook has well-established procedural code descriptions that are used to both distinguish between procedures and assist in physician compensation (5,8). Historically, SI joint fusion procedures

were primarily performed by orthopaedic surgeons and neurosurgeons. In recent years, there has been a rise in interventional pain management and the utilization of surgical codes by non-surgical specialties.

While many studies have looked at the effectiveness of SI fusions in reducing low back pain, there is a paucity of literature examining which specialties are performing these procedures and which billing codes are being submitted. The purpose of this study was to utilize CPT codes to examine which specialties have been billing for surgical SI joint fusions. It was hypothesized there would be an increase in the percentage of non-surgical specialties billing for SI joint fusions when compared to surgically trained physicians. We present this article in accordance with the STROBE reporting checklist (available at <https://jss.amegroups.com/article/view/10.21037/jss-24-60/rc>).

Methods

Data source and study design

Patient records were queried from the PearlDiver Mariner Database (PearlDiver Inc., Colorado Springs, CO, USA), a commercially available administrative claims database which contains deidentified patient data from the inpatient and outpatient settings. The database contains the medical records of patients across the United States from 2010 through the third quarter of 2022 which are collected by an independent data abstractor. This study utilized the “M161Ortho” dataset within PearlDiver, which contains a random sample of 161 million patients. All health insurance payors are represented including commercial, private, and government plans. Researchers extract data using CPT and International Classification of Diseases, Ninth and Tenth revision (ICD-9 and ICD-10) diagnosis and procedural codes. This study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Institutional Review Board exemption was granted as provided data was deidentified and compliant with the Health Insurance Portability and Accountability Act.

Using CPT codes, the database was queried to identify patients who underwent SI joint fusion. Codes were separated into three categories: percutaneous, open, and trauma. The CPT codes for SI joint fusion are listed in [Appendix 1](#). The data was queried each year from 2010 through 2021. No patients were excluded. For each percutaneous, open, and trauma code billed, the database was queried to identify the specialty of the provider who

Highlight box

Key findings

- Despite requiring less overall time and utilizing an intra-articular rather than a transfixing approach, non-surgical specialties submitted the same Current Procedural Terminology code as surgical specialties performing the transfixing procedure at an increasing rate during the study period.

What is known and what is new?

- In recent years, there has been a rise in interventional pain management and the utilization of surgical codes by non-surgical specialties. In recent years minimally invasive surgical approaches and percutaneous surgical implants have become more popular.
- Between 2015 and 2021, the total number of percutaneous procedures submitted by all specialties increased by 294%, while the number of procedures being submitted by non-surgical specialties increased by 25,050%.

What is the implication, and what should change now?

- In the future there must be careful monitoring to ensure surgical codes are not used to bill for other procedures that do not require the same level of complexity.

Table 1 Medical comorbidities for all SI fusion codes in surgical *vs.* non-surgical specialties

Variable	Surgical specialties (orthopaedic surgery and neurosurgery)	Non-surgical specialties (anesthesia, pain, PM&R, and neurology)	P value
Number	29,280	2,160	–
Age, years	53 (3 to 84)	63 (23 to 84)	<0.001*
ECI	4.9 (0 to 24)	7.7 (0 to 25)	<0.001*
Gender (male)	11,289 (38.6)	626 (29.0)	<0.001*
Obesity	12,129 (41.4)	1,143 (52.9)	<0.001*
Diabetes	9,857 (33.7)	988 (45.7)	<0.001*
Hypertension	19,521 (66.7)	1,786 (82.7)	<0.001*
COPD	9,846 (33.6)	870 (40.3)	<0.001*
CKD	4,203 (14.4)	501 (23.2)	<0.001*
CAD	7,062 (24.1)	734 (34.0)	<0.001*
Rheumatoid arthritis	1,544 (5.3)	179 (8.3)	<0.001*

Data are presented as mean (range) or n (%). *, statistical significance $P < 0.05$. SI, sacroiliac; PM&R, physical medicine and rehabilitation; ECI, Elixhauser comorbidity index; COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; CAD, coronary artery disease.

billed for the procedure. Specialties queried included orthopaedic surgery, neurosurgery, physical medicine and rehabilitation (PM&R), neurology, anesthesiology, and pain medicine. PM&R, neurology, anesthesiology, and pain medicine were grouped together and categorized as non-surgical specialties. Total number and number per year of SI joint fusion procedures were identified for each of the following specialty groups: orthopaedic surgery, neurosurgery, and non-surgical specialties. Four groups were created from CPT codes to examine the specialties coding for SI fusion procedures: all SI fusion codes, only percutaneous SI fusion codes, only open SI fusion codes, and only trauma SI fusion codes. The all SI fusion codes group was comprised of open, percutaneous, and trauma codes (see [Appendix 1](#)).

Demographic data

Demographic data and medical comorbidities were compared between patients operated on by surgical specialties (orthopaedic surgery and neurosurgery) versus non-surgical specialties (PM&R, neurology, anesthesiology, and pain medicine) across all codes for SI fusion (*Table 1*). Demographic and comorbidity data queried included age in years, Elixhauser comorbidity index (ECI), gender, obesity status, diabetes, hypertension, chronic obstructive pulmonary disease (COPD), chronic

kidney disease (CKD), coronary artery disease (CAD), and rheumatoid arthritis.

Comparison of SI fusion codes submitted over time

Trends of SI fusion billing for the years 2015 to 2021 were compared between surgical specialties and non-surgical specialties; 2015 was picked as the starting year for comparison because this was the first year that a non-surgical specialty submitted a percutaneous code. The number of codes submitted for percutaneous, open, and trauma SI fusion were compared between the two time points. Comparisons were made between non-surgical and surgical specialties for only the percutaneous SI fusion codes.

The population adjusted trend of all codes submitted for SI fusion from 2010 to 2021 for surgical and non-surgical specialties was also calculated. This was adjusted by dividing by the number of total patients in the database per year.

SI fusion relative value units (RVUs)

Work RVUs per the medical fee schedule were compiled for the percutaneous, open, and trauma CPT codes for the years 2015 and 2021. Data was collected by accessing the medical fee schedule on the U.S. Department of Labor's website under the Office of Workers' Compensation

Table 2 Contingency table of SI fusion codes submitted

Fusion type & year	Surgical specialties (orthopaedic surgery and neurosurgery), n (%)	Non-surgical specialties (anesthesia, pain, PM&R, and neurology), n (%)	Aggregate
Percutaneous			
2015	928 (99.6)	4 (0.4)	932
2021	2,670 (72.6)	1,006 (27.4)	3,676
Open			
2015	675 (99.4)	4 (0.6)	679
2021	971 (95.1)	50 (4.9)	1,021
Trauma			
2015	831 (99.9)	1 (0.1)	832
2021	1,318 (99.3)	9 (0.7)	1,327
All codes			
2015	2,434 (99.6)	9 (0.4)	2,443
2021	4,959 (82.3)	1,065 (17.7)	6,024

SI, sacroiliac; PM&R, physical medicine and rehabilitation.

Program (OWCP) (9).

Statistical analysis

All data analyses were performed using the R statistical software (R Project for Statistical Computing, Vienna, Austria) integrated within PearlDiver and Microsoft Excel (Microsoft Corp., Redmond, WA, USA) with the XLStat statistical package add-on (Addinsoft Inc., New York, NY, USA) with an α level set to 0.05.

Results

Demographic data

Patients who had any type of SI fusion from non-surgical specialties were significantly more medically complex in terms of age, ECI, obesity, diabetes, hypertension, COPD, CKD, CAD, and rheumatoid arthritis when compared to surgical specialties (*Table 1*). The surgical specialty group operated on significantly more males compared to the non-surgical group.

Comparison of SI fusion codes submitted over time

Comparing 2015 and 2021, the SI fusion codes submitted across all three groups (percutaneous, open, and trauma)

increased for non-surgical specialties compared to surgical specialties (*Table 2*). In 2015, only 4 (0.4%) of the 932 percutaneous SI codes submitted were from non-surgical specialties. In 2021, 1,006 (27.4%) of the 3,676 percutaneous SI codes submitted were from non-surgical specialties. While the total number of percutaneous procedures submitted by all specialties increased 3.9-fold, the number of procedures being submitted by non-surgical specialties went up 251.5-fold. In 2015, only 4 (0.6%) of the 679 open SI codes submitted were from non-surgical specialties. In 2021, 50 (4.9%) of the 1,021 percutaneous SI codes submitted were from non-surgical specialties. While the total number of open procedures submitted by all specialties increased 1.5-fold, the number of open procedures being submitted by non-surgical specialties went up 12.5-fold. In 2015, 1 (0.1%) of the 832 trauma SI codes submitted were from non-surgical specialties. Similarly, in 2021, 9 (0.7%) of the 1,327 trauma SI codes submitted were from non-surgical specialties. Of note, less than ten trauma SI fusion cases were coded per year by non-surgical specialties.

In the years between 2015 and 2021, the percentage of percutaneous SI fusion codes submitted by non-surgical specialties increased by 27.0% (*Figure 1*). During that same timespan, the percent of percutaneous SI fusion codes submitted by orthopaedic surgery decreased by 14.5%, from 56.2% (524/932) to 41.7% (1,533/3,676), and

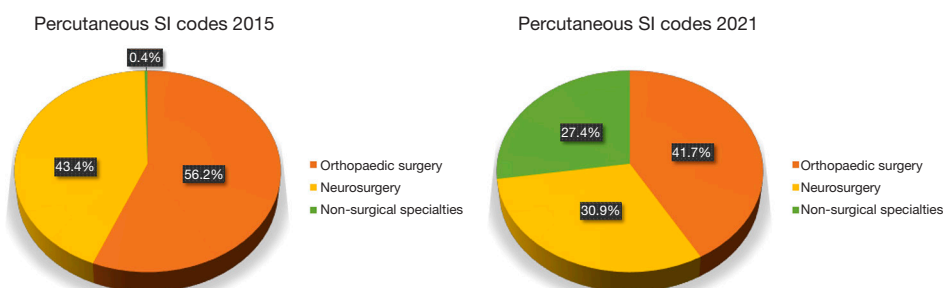


Figure 1 Pie charts demonstrating proportions of percutaneous SI fusion codes submitted by surgical and non-surgical specialties in 2015 vs. 2021. SI, sacroiliac; percentages may not total to 100% due to rounding.

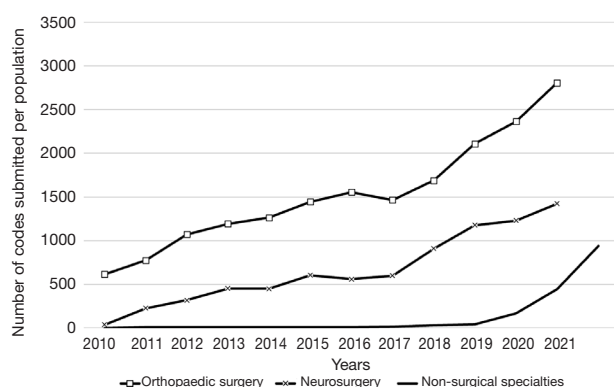


Figure 2 Line graphs showing trends of SI fusion codes submitted by specialty over time. SI, sacroiliac.

neurosurgery decreased by 12.5%, from 43.4% (404/932) to 30.9% (1,137/3,676). Altogether, the percentage of codes submitted by surgical specialties decreased by 27.0% from 2015 to 2021.

Over the years 2010 to 2021, the number of all codes (percutaneous, open, & trauma) submitted increased, with a profound increase seen in the number of codes submitted by non-surgical specialties starting in 2019 (*Figure 2*).

SI fusion RVUs

Work RVU's for the percutaneous and open CPT codes for SI joint fusion increased from 2015 to 2021 (*Table 3*). The percutaneous code for SI fusion (CPT-27279) had a work RVU of 9.03 in 2015 and a work RVU of 12.13 in 2021. The open code for SI fusion (CPT-27280) had a work RVU of 14.64 in 2015 and a work RVU of 20.00 in 2021. The trauma code for SI fusion (CPT-27216) had a work RVU of 15.73 in both 2015 and 2021. The trauma code for SI

fusion (CPT-27218) had a work RVU of 20.93 in both 2015 and 2021.

Discussion

In the past two decades, MIS approaches for SI joint fusions have become more common in practice (3,5,10). Today, there are various accepted surgical approaches for SI joint fusion: anterior, posterior/dorsal, and lateral/transiliac (5). The MIS technique for SI joint fusion can be performed via the lateral/transiliac or posterior/dorsal approach (3,5). In 1993, the AMA developed a CPT code for open SI joint fusion, CPT-27280. In 2008, one of the first MIS lateral devices for SI joint fusion, the iFuse Implant system from SI-Bone, gained Food and Drug Administration (FDA) approval and in 2012, a temporary code to describe this percutaneous procedure was established, CPT-0334T (5,11). As this procedure gained popularity and demonstrated success in clinical trials, the AMA replaced CPT-0334T with CPT-27279 in 2015 to specifically describe this transfixing procedure (5,12). Per the coding guide for the iFuse Implant system from SI-Bone, a transfixing device must take a trans-sacro-iliac trajectory, first passing through the ilium, crossing the SI joint, and then entering the sacrum (13).

In 2015, after the approval of CPT-27279 for transfixing percutaneous SI fusion, other companies and vendors began to create alternative devices for this procedure including PainTec and CornerLoc (14,15). These companies primarily market to non-surgical specialties in contrast to SI-Bone, which focuses on surgical specialists (11,16). The small allografts from PainTec and CornerLoc are not transfixing devices, and instead use an alternate, simplified approach and are placed within the SI joint

Table 3 Work RVU by CPT codes for 2015 and 2021

Fusion type & CPT code	Short description	2015 RVU	2021 RVU
Percutaneous			
CPT-27279	Arthrodesis sacroiliac joint	9.03	12.13
Open			
CPT-27280	Fusion of sacroiliac joint	14.64	20.00
Trauma			
CPT-27216	Treat pelvic ring fracture	15.73	15.73
CPT-27218	Treat pelvic ring fracture	20.93	20.93

Data source: U.S. Department of Labor. Office of Workers' Compensation Programs (OWCP) Fee Schedule. Available from: <https://www.dol.gov/agencies/owcp/regs/feeschedule/fee>. Accessed January 10, 2024. RVU, relative value unit; CPT, Current Procedural Terminology.

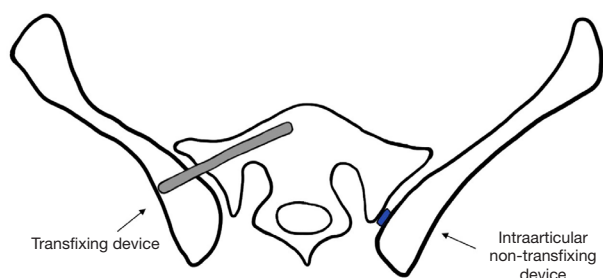


Figure 3 Pelvis cross section showing transfixing *vs.* non-transfixing devices.

(Figure 3). The iFuse Implant system from SI-Bone consists of three transfixing titanium implants that span a length of the SI joint (11,16). In contrast, the PainTec and CornerLoc devices are much smaller, not FDA approved, and typically cover the posterior aspect of the SI joint (14,17,18). Additionally, the smaller implants require significantly less time to place (17-19).

Although the trans-sacro-iliac fixation procedure is inherently different than the intraarticular procedure, our study demonstrated they were being coded identically. Prior to 2023, there was no alternative established code for an intraarticular procedure. The work RVU for the transfixing percutaneous code, CPT-27279 was 9.03 in 2015 and increased to 12.13 in 2021 (9,20). Over that time, the number of percutaneous codes submitted went up by nearly 300% and those submitted by non-surgical specialties went up by over 25,000%. This implies not only rapid uptake of new technology, however the staggering increase by non-surgical specialties may also have been due to a mismatched work value compared to the more simple intraarticular

procedure.

Not surprisingly, this code was scrutinized such that in 2023 a new experimental code, CPT-0775T, came out specifically for the intraarticular procedure. However, experimental codes do not have reliably assigned work RVU associations and require physician negotiation for reimbursement. Therefore, they are less likely to be utilized. Beginning in January of 2024, this code was converted to CPT-27278, which has now been specified as the code to use for these percutaneous intraarticular non-transfixing procedures. This new non-transfixing code, CPT-27278, has a proposed work RVU of 7.86 in contrast to the work RVU of 12.13 for the transfixing code, CPT-27279 (20). In the future there must be careful monitoring to ensure surgical codes are not used to bill for other procedures that do not require the same level of complexity. More importantly, these alternate short-cut procedures should not be marketed as equivalent to the surgeries that require more time, skill, training, and expertise.

In the past decade, more than 20 devices have been FDA approved for SI fusion. The 25,050% increase in the number of percutaneous SI fusion codes submitted by non-surgical specialties may also be due to the increase in medical devices on the market, making this procedure more readily accessible to non-surgical specialties. Another possible explanation may be due to successful patient outcomes from these procedures. A prospective study examining PainTec's LinQ implant in 69 patients demonstrated safe single point fixation with improvements in pain and function from baseline (7). Similarly, data from 50 patients who had MIS posterior SI joint fusion with PainTec's LinQ implant demonstrated no adverse events or complications (21). However, one caveat with these

two studies was that follow-up time was 6 and 12 months, respectively, which may not be an adequate length of time to assess long-term complications and outcomes.

Additionally, literature has demonstrated non-transfixing procedures done by non-surgical specialties can typically be done without the need for general anesthesia (7). In two studies examining MIS SI joint fusion via the lateral approach with SI-Bone's iFuse Implant, patients required general anesthesia and the majority required overnight stay in the hospital post-operatively (12). Conversely, the MIS posterior SI joint fusion procedure using the CornerLoc implant is done under local anesthesia and takes less than 45 minutes to complete (18). This may explain why non-surgical specialties operate on more medically complex patients as a less invasive option for patients who are not able to undergo general anesthesia.

Limitations

There are several limitations to this study. The use of an administrative claims database relies on the appropriate selection of CPT codes and is subject to human error. Yet, instances of coding errors are rare and made up only 0.7% of Medicare and Medicaid payments in 2021 (22). In 2023, a new code was recommended for use when billing for non-transfixing SI joint fusions using devices including LinQ by PainTec and CornerLoc (23,24). This experimental code, CPT-0775T, was recently replaced at the start of 2024 with CPT-27278, specifically for percutaneous non-transfixing SI fusion (25). Since our database only includes data up to 2021, we were unable to assess the usage of the new codes for these procedures. An additional study looking at the utilization of these new codes may be useful in the future.

Conclusions

Our study demonstrated how quickly and to what degree the procedure market can react to higher work RVU value codes. Despite requiring less overall time and utilizing an intra-articular rather than a transfixing approach, non-surgical specialties submitted the same CPT code as surgical specialties performing the transfixing procedure at an increasing rate during the study period. With the introduction of new technologies to perform SI fixation and a new code to capture the intra-articular procedure, future studies could examine whether the number of SI fusion procedures performed by the various physician specialties stabilizes over time.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013).

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