

# Evolut Clinical Guideline 1767 for Percutaneous Sacroiliac Joint Fusion

<b>Guideline <del>or Policy</del> Number:</b> Evolent_CG_ <del>407</del> <u>1767</u>	<b><u>Applicable Codes</u></b>	
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<b>Original Date:</b> June 2021	<b>Last Revised Date:</b> <del>December 2023</del> <b><u>November 2024</u></b>	<b>Implementation Date:</b> July <del>2024</del> <b><u>2025</u></b>

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## STATEMENT

**All sacroiliac joint (SIJ) fusion surgeries will be reviewed on a case-by-case basis.**

Operative treatment is indicated when the natural history of surgically treated lesions is better than the natural history for non-operatively treated lesions. All operative interventions must be based on a positive correlation with clinical findings, the natural history of the disease, the clinical course, and diagnostic tests or imaging results. All individuals being considered for surgical intervention should receive a comprehensive neuromusculoskeletal examination to identify pain generators that may either respond to non-surgical techniques or may be refractory to surgical intervention.

Aggressive surgical approaches to fusion may be an indication for denial of cases (when such techniques have not been demonstrated to be superior to less morbid techniques) or recommendation for alternative procedure. Because of variable outcomes with fusion surgery, individuals should be actively involved in the decision-making process and provided appropriate decision-support materials explaining potential risks/benefits and treatment alternatives when considering this intervention.

## General Information

*It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*

## Scope

Spinal surgeries should be performed only by those with extensive and specialized surgical training (neurosurgery, orthopedic surgery).

Instrumentation, bone formation or grafting materials, including biologics, should be used at the surgeon's discretion; however, use should be limited to FDA approved indications regarding the specific devices or biologics.

**See Legislative Language for specific mandates in the State of Washington**

## PERCUTANEOUS SACROILIAC JOINT (SIJ) FUSION

- **Surgical indications (when ALL of the following are present) <sup>(1,2,3)</sup>:**
  - Low back/buttock pain that is typically unilateral and caudal to the lumbar spine localized over the SIJ that impairs daily activities for **at least 6 months**
  - Failure to improve with at least 6 months of appropriate active non-operative treatment (see **Background**) that must include medications, PT, and a home exercise program
  - Physical exam demonstrating pain to palpation over the sacral sulcus in the absence of tenderness of similar severity elsewhere
  - Absence of generalized pain behavior
  - Positive pain response to a cluster of 3 provocative tests (e.g., thigh thrust, compression test, Gaenslen's test, distraction test, Faber test)

- Diagnostic imaging studies that include **ALL** of the following:
  - Imaging (plain radiographs and a CT or MRI) of the sacroiliac (SI) joint that excludes the presence of destructive lesions (e.g., tumor, infection) or inflammatory arthropathy that would not be properly addressed by percutaneous SIJ fusion
  - Imaging of the pelvis (AP plain radiograph) to rule out concomitant hip pathology
  - Imaging of the lumbar spine (CT or MRI) to rule out neural compression or other degenerative condition that can be causing low back or buttock pain
  - Imaging of the SI joint that indicates evidence of injury and/or degeneration
- At least 75% reduction of pain for the expected duration of the anesthetic used following an image-guided, contrast -enhanced intra-articular SIJ injection on 2 separate occasions
- A trial of at least one therapeutic intra-articular SIJ injection (i.e., corticosteroid injection)

## RELATIVE CONTRAINDICATIONS FOR SPINE SURGERY

**NOTE: Cases may not be approved if the below contraindications exist:**

- **Medical contraindications to surgery** (e.g., ~~severe~~ osteoporosis; infection of soft tissue adjacent to the spine and may be at risk for spreading to the spine; severe cardiopulmonary disease; anemia; malnutrition and systemic infection) <sup>(4,5,6)</sup>
- **Psychosocial risk factors.** It is imperative to rule out non-physiologic modifiers of pain presentation or non-operative conditions (see **Background**) mimicking radiculopathy or instability (e.g., peripheral neuropathy, piriformis syndrome, myofascial pain, sympathetically mediated pain syndromes, sacroiliac dysfunction, psychological conditions, etc.) prior to consideration of elective surgical intervention. <sup>(6,7)</sup> Individuals with clinically significant depression or other psychiatric disorders being considered for elective spine surgery will be reviewed on a case-by-case basis and the surgery may be denied for risk of failure.
- **Active Tobacco or Nicotine use prior to fusion surgery.** Individuals must be free from smoking and/or nicotine use for at least six weeks prior to surgery and during the entire period of fusion healing. <sup>(8,9)</sup>
- **Morbid Obesity.** Contraindication to surgery in cases where there is significant risk and concern for improper post-operative healing, post-operative complications related to morbid obesity, and/or an inability to participate in post-operative rehabilitation. <sup>(10,11)</sup> These cases will be reviewed on a case-by-case basis and may be denied given the risk of failure.

## LEGISLATIVE LANGUAGE

### Washington

#### **20210618A – Sacroiliac joint fusion – rereview <sup>(12)</sup>**

Washington State Health Care Authority

Health Technology Clinical Committee

#### Findings and Decision

##### HTCC coverage determination:

In adults, 18 years old and older, with chronic sacroiliac joint pain related to degenerative sacroiliitis and/or sacroiliac joint dysfunction, minimally invasive and open sacroiliac joint fusion procedures are **not covered benefits**.

**Note** - The scope of this decision does not apply to the following:

- Low back pain of other etiology (e.g., radiculopathy, neurogenic claudication), sacroiliac joint pain related to recent major trauma or fracture, infection, cancer, or sacroiliitis associated with inflammatory arthropathies
- Sacroiliac joint fusion revision surgery

##### HTCC reimbursement determination:

**Limitations of coverage:** N/A

**Non-covered indicators:** N/A

## CODING AND STANDARDS

### Coding

#### **CPT Codes**

Percutaneous Sacroiliac Joint (SIJ) Fusion: 27279

#### Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

## BACKGROUND

- While sufficient time allowances for non-operative treatment are required to determine the natural cause and response to non-operative treatment of low back pain disorders, timely decision making for operative intervention is critical to avoid de-conditioning and increased disability
- In general, if the program of non-operative treatment fails, operative treatment is indicated when:
  - Improvement of the symptoms has plateaued or failed to occur, and the residual symptoms of pain and functional disability are unacceptable at the end of 6 months of active treatment, or at the end of longer duration of non-operative programs for debilitated individuals with complex problems; and/or
  - Frequent recurrences of symptoms cause serious functional limitations even if a non-operative active treatment program provides satisfactory relief of symptoms, and restoration of function on each recurrence

## POLICY HISTORY

Date	Summary
<u>November 2024</u>	<ul style="list-style-type: none"> <li>• <u>This guideline replaces Evolent Clinical Guideline 407 for Percutaneous Sacroiliac Joint Fusion</u></li> <li>• <u>Updated guideline formatting to Evolent standard</u></li> <li>• <u>Removed the word 'severe' before osteoporosis as a Relative Contraindication</u></li> <li>• <u>Edited language in the Relative Contraindications section for consistency across guidelines</u></li> <li>• <u>Updated references</u></li> </ul>
December 2023	<ul style="list-style-type: none"> <li>• Added legislative language for WA state</li> </ul>
May 2023	<ul style="list-style-type: none"> <li>• Updated references</li> </ul>

## LEGAL AND COMPLIANCE

### Guideline Approval

#### **Committee**

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

### Disclaimer

*Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent*



*uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.*

## REFERENCES

1. Himstead A, Brown N, Shahrestani S, Tran K, Davies J. Trends in Diagnosis and Treatment of Sacroiliac Joint Pathology Over the Past 10 Years: Review of Scientific Evidence for New Devices for Sacroiliac Joint Fusion. *Cureus*. 2021; 13: e15415. 10.7759/cureus.15415.
2. Polly D, Swofford J, Whang P, Frank C, Glaser J et al. Two-Year Outcomes from a Randomized Controlled Trial of Minimally Invasive Sacroiliac Joint Fusion vs. Non-Surgical Management for Sacroiliac Joint Dysfunction. *Int J Spine Surg*. 2016; 10: 28. 10.14444/3028.
3. Whang P G, Darr E, Meyer S C, Kovalsky D, Frank C et al. Long-Term Prospective Clinical And Radiographic Outcomes After Minimally Invasive Lateral Transiliac Sacroiliac Joint Fusion Using Triangular Titanium Implants. *Med Devices (Auckl)*. 2019; 12: 411-422. 10.2147/medr.S219862.
4. Puvanesarajah V, Shen F, Cancienne J, Novicoff W, Jain A et al. Risk factors for revision surgery following primary adult spinal deformity surgery in patients 65 years and older. *J Neurosurg Spine*. 2016; 25: 486-493. 10.3171/2016.2.Spine151345.
5. Varshneya K, Jokhai R, Fatemi P, Stienen M, Medress Z et al. Predictors of 2-year reoperation in Medicare patients undergoing primary thoracolumbar deformity surgery. *J Neurosurg Spine*. 2020; 1-5. 10.3171/2020.5.Spine191425.
6. Rajaei S, Kanim L, Bae H. National trends in revision spinal fusion in the USA: patient characteristics and complications. *Bone Joint J*. 2014; 96-b: 807-816. 10.1302/0301-620x.96b6.31149.
7. North American Spine Society. Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy. NASS. 2012; <https://www.spine.org/Portals/0/Assets/Downloads/ResearchClinicalCare/Guidelines/LumbarDiscHerniation.pdf>.
8. Jackson 2nd K, Devine J. The Effects of Smoking and Smoking Cessation on Spine Surgery: A Systematic Review of the Literature. *Global Spine J*. 2016; 6: 695-701. 10.1055/s-0036-1571285.
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10. Cofano F, Perna G, Bongiovanni D, Roscigno V, Baldassarre B et al. Obesity and Spine Surgery: A Qualitative Review About Outcomes and Complications. Is It Time for New Perspectives on Future Researches?. *Global Spine J*. 2022; 12: 1214-1230. 10.1177/21925682211022313.
11. Feeley A, McDonnell J, Feeley I, Butler J. Obesity: An Independent Risk Factor for Complications in Anterior Lumbar Interbody Fusion? A Systematic Review. *Global Spine J*. 2022; 12: 1894-1903. 10.1177/21925682211072849.
12. Washington State Health Care Authority. Sacroiliac joint fusion - rereview [Adopted July 9, 2021]. Washington State Health Care Authority. 2019; Accessed: September 23, 2024. [www.hca.wa.gov/assets/program/si-joint-fusion-final-findings-20210709.pdf](http://www.hca.wa.gov/assets/program/si-joint-fusion-final-findings-20210709.pdf).

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- Sacroiliac joint fusion revision surgery

#### HTCC reimbursement determination:

**Limitations of coverage:** N/A

**Non-covered indicators:** N/A

## CODING AND STANDARDS

### Coding

#### CPT Codes

Percutaneous Sacroiliac Joint (SIJ) Fusion: 27279

### Applicable Lines of Business

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## BACKGROUND

- While sufficient time allowances for non-operative treatment are required to determine the natural cause and response to non-operative treatment of low back pain disorders, timely decision making for operative intervention is critical to avoid de-conditioning and increased disability
- In general, if the program of non-operative treatment fails, operative treatment is indicated when:
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## LEGAL AND COMPLIANCE

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#### **Committee**

**Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee**

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7. North American Spine Society. Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy. NASS. 2012; <https://www.spine.org/Portals/0/Assets/Downloads/ResearchClinicalCare/Guidelines/LumbarDiscHerniation.pdf>.
8. Jackson 2nd K, Devine J. The Effects of Smoking and Smoking Cessation on Spine Surgery: A Systematic Review of the Literature. *Global Spine J*. 2016; 6: 695-701. 10.1055/s-0036-1571285.
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