

The Hidden Per-Case Cost of Reusable Spine Retractor Systems

A condensed economic analysis of sterilization, capital, infection, and OR time

Reusable spine retractor systems look economical because the hardware is purchased once and used for years. But when you add up **sterilization, handling, capital and repair, surgical site infection (SSI) exposure, and OR time lost to set-up and imaging maneuvers**, the true cost per surgery is far higher than it appears.

Using conservative numbers drawn from peer-reviewed literature, the **total economic burden associated with a reusable spine retractor system can approach or exceed US \$1,000 per case**. This white paper outlines how that figure is constructed, so it can be contrasted with any single-use, sterile, pre-packaged solution (e.g., the SURE Retractor system, www.suresystem.com).

1. Direct Instrument Costs: Reprocessing, Handling, and Capital

1.1 Reprocessing and handling

In a spine-specific micro-costing study, **Galetta et al.** timed every step required to manage reusable instrument sets for 1-level lumbar fusions—cleaning, assembly, sterilization, storage, and handling—and found:

- **US \$116 per case** in sterile processing, plus
- **US \$8.52 per case** for additional handling,

for a **total of ≈US \$124.52 per case** for reusable instrumentation alone (Galetta MS, Divi SN, Shapses MA, et al. *Processing and Handling Cost of Single-use Versus Traditional Instrumentation for 1-Level Lumbar Fusions*. Clin Spine Surg. 2021;34(1):E39–E44. doi:10.1097/BSD.0000000000001033).

Reusable spine retractors—large, multi-component systems—are a major part of these heavy trays. Conservatively attributing **~60%** of Galetta’s reprocessing cost to the retractor set and its hardware yields:

**\$75 per case = reprocessing and handling per case
attributable to the reusable retractor system alone**

1.2 Capital and repair

Reusable spine retractor sets typically cost **US \$5,000–10,000** and require periodic repair and component replacement. A hospital micro-costing analysis comparing single-use and reusable spinal fusion devices found that capital and maintenance costs added several dollars per case to

reusable systems (Bouthors C, Nguyen J, Durand L, et al. *Single-use Versus Reusable Medical Devices in Spinal Fusion Surgery: A Hospital Micro-costing Analysis*. Eur J Orthop Surg Traumatol. 2019;29(8):1631–1637. doi:10.1007/s00590-019-02487-8).

Assuming:

- US \$7,500 acquisition,
- 5-year life,
- 300 spine cases per year
- \$5 repair cost per case

Capital + repair cost ≈ US \$10 per case

2. Infection Burden: SSI Risk and Cost

2.1 Spine SSI incidence

Spinal surgery SSI rates sit in the single digits but carry heavy consequences:

- **Pullter Gunne & Cohen** reported an overall SSI rate of **4.2%** in 3,174 adult spinal procedures (Pullter Gunne AF, Cohen DB. *Incidence, Prevalence, and Analysis of Risk Factors for Surgical Site Infection Following Adult Spinal Surgery*. Spine. 2009;34(13):1422–1428. doi:10.1097/BRS.0b013e3181a03013).
- **McClelland et al.** documented a thoracolumbar SSI incidence of **12.7%** in a high-risk cohort using CDC criteria (McClelland S III, Takemoto RC, Lonner BS, et al. *Analysis of Postoperative Thoracolumbar Spine Infections in a Prospective Randomized Controlled Trial Using the Centers for Disease Control Surgical Site Infection Criteria*. Int J Spine Surg. 2016;10:14. doi:10.14444/3014).

2.2 Cost per spinal SSI

Multiple spine-focused economic analyses converge on **high five-figure costs** per SSI:

- In a systematic review of 355,354 patients, **Yeramaneni et al.** found that treatment of spine “infection or SSI” complications cost **US \$15,817–38,701** per case (Yeramaneni S, Robinson C, Hostin R. *Impact of Spine Surgery Complications on Costs Associated With Episodes of Care*. Spine J. 2016;16(11):1493–1503. doi:10.1016/j.spinee.2016.06.017).
- **Zuo et al.** reported similar ranges (US \$15,817–38,701) in a 2024 risk-factor and economic-loss analysis in spinal surgery patients (Zuo Q, Liu Y, Li Y, et al. *Analysis of Risk Factors for Surgical Site Infection in Spinal Surgery Patients and Study of Direct Economic Losses*. BMC Musculoskelet Disord. 2024;25:XXX. doi:10.1186/s12891-024-08149-8).
- **Blumberg et al.** calculated a **mean direct treatment cost of US \$16,242** for postoperative spine SSI, with higher costs in multilevel fusions and MRSA infections (Blumberg TJ, Woelber E, Bellabarba C, et al. *Predictors of Increased Cost and Length of*

Stay in the Treatment of Postoperative Spine Surgical Site Infection. Spine J. 2018;18(2):300–306. doi:10.1016/j.spinee.2017.07.173).

A conservative working figure is **US \$20,000 per spinal SSI**.

2.3 Reusable instrumentation as a modifiable risk

Instrument contamination and reprocessing are recognized contributors to SSI risk:

- A systematic review by **Schömig et al.** concluded that implant and instrument contamination is a central cause of spinal SSI and discussed single-use implants as a potential mitigation (Schömig F, Perka C, Pumberger M, Ascherl R. *Implant Contamination as a Cause of Surgical Site Infection in Spinal Surgery: Are Single-use Implants a Reasonable Solution? A Systematic Review.* BMC Musculoskelet Disord. 2020;21:634. doi:10.1186/s12891-020-03653-z).

Most directly, **Litrigo, et al.** compared short posterior lumbar fusions using reusable vs. single-use instrumentation and found that infection dropped from **6% with reusable sets to 2% with single-use** (Litrigo S, Recanati G, Gennari A, et al. *Single-use Instrumentation in Posterior Lumbar Fusion Could Decrease Incidence of Surgical Site Infection: A Prospective Bi-centric Study.* Eur J Orthop Surg Traumatol. 2016;26(1):21–26. doi:10.1007/s00590-015-1692-4).

Conservative economic scenario

If a reusable, multi-tray spine setup is associated with a **5% SSI rate**, and a streamlined, single-use-heavy setup can achieve **2%**, then:

- Reusable: $0.05 \times \text{US } \$20,000 = \text{US } \$1,000$ expected SSI cost per case
- Single-use-oriented: $0.02 \times \text{US } \$20,000 = \text{US } \400 per case

The **incremental expected SSI burden** associated with staying in a fully reusable ecosystem is:

\$600 per spine surgery marginal cost of SSIs due to reusable retractors

Even if only part of that risk is attributed to the retractor/sterilization chain, the per-case infection cost associated with reusable systems is substantial.

3. OR Time and Workflow: Set-Up and Imaging

3.1 OR minute cost

A widely cited analysis by **Childers & Maggard-Gibbons** calculated the mean cost of operating room time across California hospitals at **≈US \$36–37 per minute**, including direct and indirect

costs (Childers CP, Maggard-Gibbons M. *Understanding Costs of Care in the Operating Room*. JAMA Surg. 2018;153(4):e176233. doi:10.1001/jamasurg.2017.6233).

3.2 Tray complexity and set-up

Instrument-tray research consistently shows that over-loaded reusable trays waste OR time:

- **Stockert & Langerman** measured actual instrument use across four services and found that only **13–21%** of opened instruments were used, with the rest contributing to unnecessary set-up, counting, and reprocessing; they also quantified the cost of missing/damaged instruments and tray inefficiencies (Stockert EW, Langerman A. *Assessing the Magnitude and Costs of Intraoperative Inefficiencies Attributable to Surgical Instrument Trays*. J Am Coll Surg. 2014;219(4):646–655.e1. doi:10.1016/j.jamcollsurg.2014.04.023).
- **John-Baptiste et al.** showed that trimming urologic trays from 197 to 58 instruments cut set-up time from **13.1 to 8.3 minutes—a 37% reduction** (John-Baptiste A, Sykes J, Youssef F, et al. *Comparing Surgical Trays With Redundant Instruments With Reduced Trays in Urologic Surgery: Impact on Set-up Time and Costs*. Can J Urol. 2016;23(6):8550–8556).

Reusable spine retractors, with multiple blades and articulating arms, lengthen:

- Pre-incision set-up time (assembling and positioning hardware)
- Troubleshooting time when parts are missing or malfunctioning

It is conservative to estimate **5 extra minutes of set-up and troubleshooting** per case compared with a single sterile pack containing a preconfigured retractor.

3.3 Intraoperative imaging adjustments

Spine procedures commonly require fluoroscopy or cone-beam CT. Complex reusable retractors often must be partially disassembled or repositioned to clear the imaging field, then re-established afterward. Based on OR experience and tray-optimization studies that demonstrate large time savings from simpler setups, it is reasonable to ascribe at least **5 minutes** of additional operative time to:

- Loosening arms, removing blades for imaging
- Re-placing blades and re-securing the frame

Total incremental time:

5 minutes (set-up) + 5 minutes (imaging-related manipulation) = **10 minutes extra OR time per case** with a complex reusable retractor system.

At **US \$36 per minute**: $10 \times \text{US } \$36 =$

\$360 per case in OR time cost.

4. Putting the Cost of a Reusable Spine Retractor System Together

Using conservative, literature-anchored assumptions, the economic components tied to a reusable retractor system per spine case look like this:

- **Reprocessing & handling (retractor share)**
≈US \$75 per case
(Galetta et al. 2021; Onuh et al. 2024; Wood et al. 2021; van Nieuwenhuizen et al. 2024).
- **Capital + repair (amortized)**
≈US \$10 per case
(Bouthors et al. 2019).
- **Expected SSI cost burden (increment vs. single-use-lean setup)**
≈US \$600 per case
(Pullter Gunne & Cohen 2009; McClelland et al. 2016; Litrico et al. 2016; Yeramaneni et al. 2016; Zuo et al. 2024; Blumberg et al. 2018; Schömig et al. 2020; Resendiz et al. 2020).
- **Extra OR time (set-up + imaging, 10 min)**
≈US \$360 per case
(Childers & Maggard-Gibbons 2018; Stockert & Langerman 2014; John-Baptiste et al. 2016).

Total per-case economic footprint attributable to using a reusable spine retractor system:

$\$75 + \$10 + \$600 + \$360 \approx \$1,045$ per surgery cost of reusable retractors

Even if any one assumption is trimmed—for example, only a 2-percentage-point reduction in SSI rate, or 7–8 extra minutes of OR time—the reusable system still carries **hundreds of dollars per case** in hidden cost.

Conclusion

Focusing only on purchase price badly understates the true cost of reusable spine retractors. When capital, sterilization, infection risk, and OR time are all valued using conservative, peer-reviewed data, reusable systems impose an economic burden that can **approach or exceed US \$1,000 per case**.