The Myth of Failed Back Surgery Syndrome in the Setting of Complex Spinal Disorders

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Center for Neurosciences and Spine
Virginia Mason Franciscan Health

Disclosures

None Relevant

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Outline

- **Burden of Spinal Disease**
- **Failed Back Surgery Syndrome – What Does This Mean??**
- **Indications for Complex / Revision Spine Surgery**
- **Team approach to the treatment of Complex Spinal Disorders**
  - **How to avoid Failed Back Surgery!!**

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Burden of Spinal Disease

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Burden of Spinal Disease

- **Worldwide back pain is the single leading cause of disability**
- **Third most common reason for a doctor's visit**
- **Most back pain has no well-defined serious cause**
- **Costs Americans $100 billion annually in direct costs + lost wages / productivity**

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Demand for Spine Care Is Increasing!

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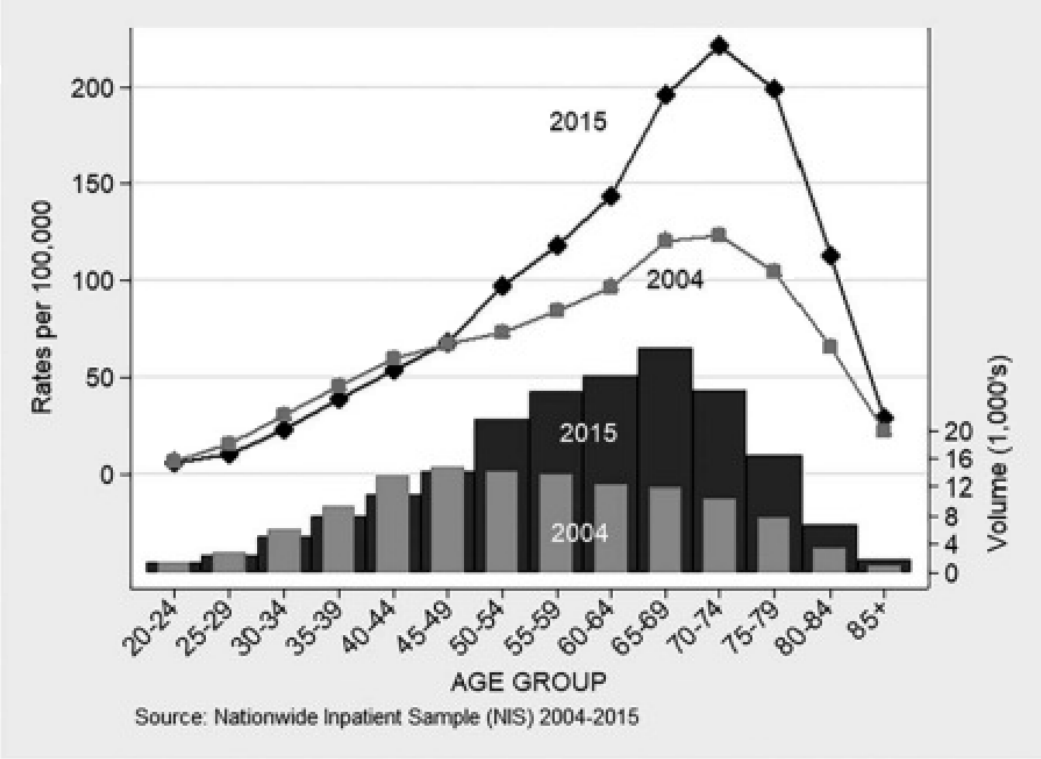
Rate of Lumbar Fusions Increasing



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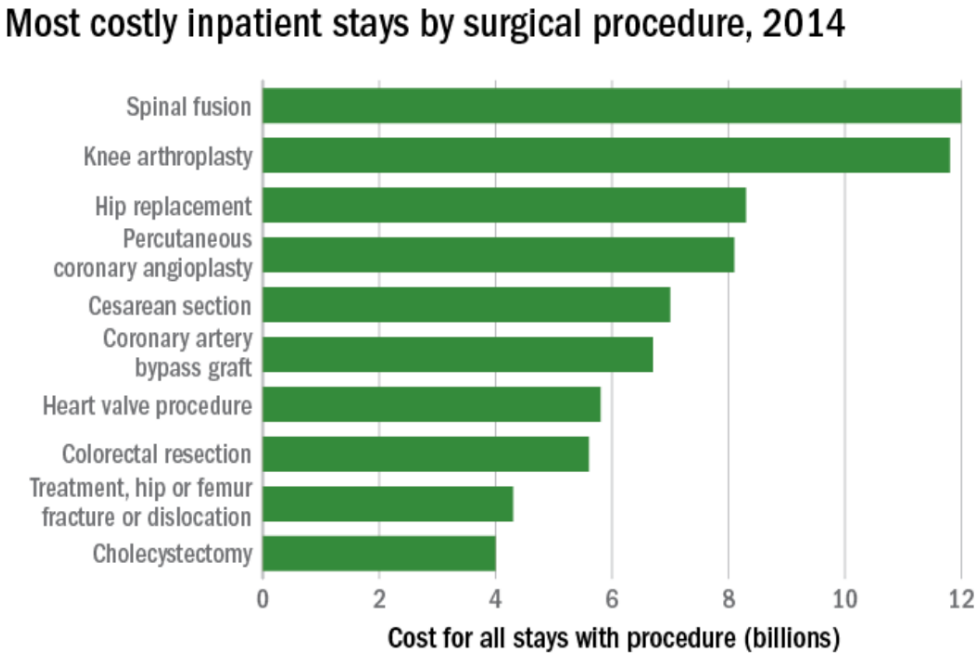
Martin et al., *Spine* 2019, 44:369

Health Care Costs Are Skyrocketing



Note: Based on data from the Healthcare Cost and Utilization Project.

Source: Agency for Healthcare Research and Quality

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Vast Majority of Patients Do Not Need Surgery!

- **Goal of initial evaluation is to identify features that may indicate a serious underlying cause**
- **Nonspecific LBP can and should be managed by primary care and/or physiatry (physical medicine & rehabilitation), NOT A SURGEON!**

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Vast Majority of Patients Do Not Need Spine Surgery!

Multidisciplinary Evaluation Leads to the Decreased Utilization of Lumbar Spine Fusion

An Observational Cohort Pilot Study

Vijay Yanamadala, MD, MBA,[*,†,‡] Yourie Kim, RN, BSN,[*,§] Quinlan D. Buchlak, MPsych,[*] Anna K. Wright, PhD,[*] James Babington, MD,[*,§] Andrew Friedman, MD,[*,§] Robert S. Mecklenburg, MD,[¶] Farrokh Farrokhi, MD,[*,†] Jean-Christophe Leveque, MD,[*,†] and Rajiv K. Sethi, MD[*,†,||]

TABLE 2. Number of Patients Deemed Operative and Nonoperative by the Outside Spine Surgeon and the Virginia Mason Medical Center Multidisciplinary Spine Conference

	Operative	Nonoperative
Outside surgeon	100	0
Conference	42	58

Note: Of the 50 patients we identified for the study, the multidisciplinary conference recommended that 29 patients (58%) should not undergo any spine surgery ($\chi^2 = 26.6$; $P < 0.01$).

TABLE 3. Reasons for the recommendation of Nonoperative Management by the Virginia Mason Medical Center Multidisciplinary Spine Conference

	Number of Patients	Percentage
Misdiagnosis by outside surgeon	6	6
Morbid obesity (BMI > 40)	10	10
Active smoking	10	10
Likely to benefit from additional physical therapy	22	22
Likely to benefit from ESI	6	6

BMI indicates body mass index; ESI, epidural steroid injections.

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Yanamadala et al, *Spine* 2017, 42: E1016

NEED TO PROVIDE THE RIGHT KIND OF CARE AT THE RIGHT TIME!

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What is Failed Back Surgery Syndrome??

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61M prior L3-5 fusion & stimulator

- 3 prior spine operations
- Neuropraxic left lumbar plexus injury after prior surgery with lateral transpsoas approach

- Worsening lower back pain and inability to stand upright

- Stimulator provided mild/mod relief of leg symptoms

- IS THIS FAILED BACK SURGERY SYNDROME??

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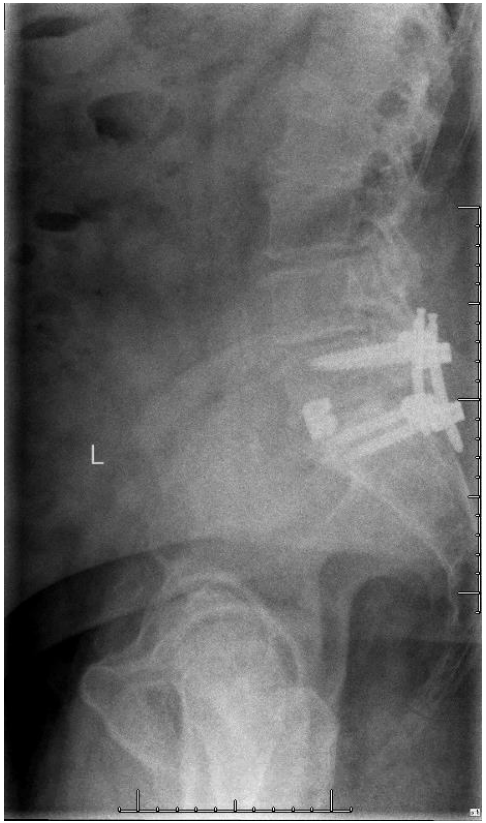
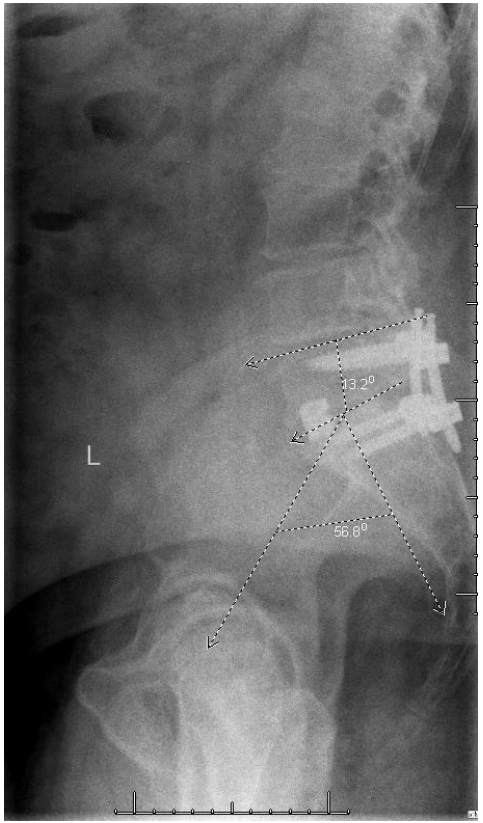
67M prior L5-S1 MIS TLIF, recurrent RLE pain





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- **Adjacent facets violated with L5 screws**

- IS THIS FAILED BACK SURGERY SYNDROME??

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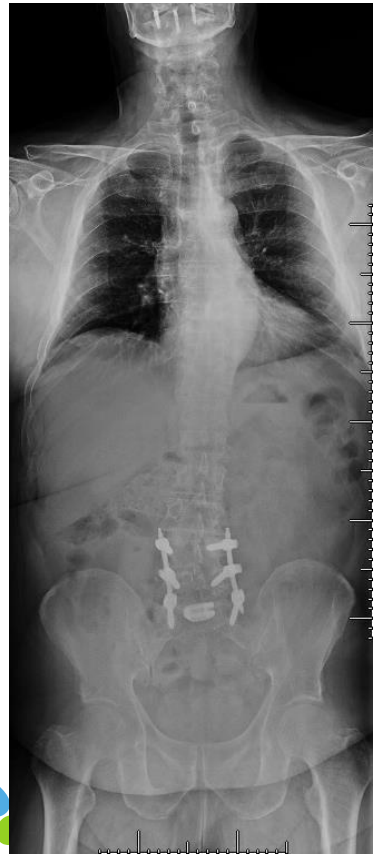
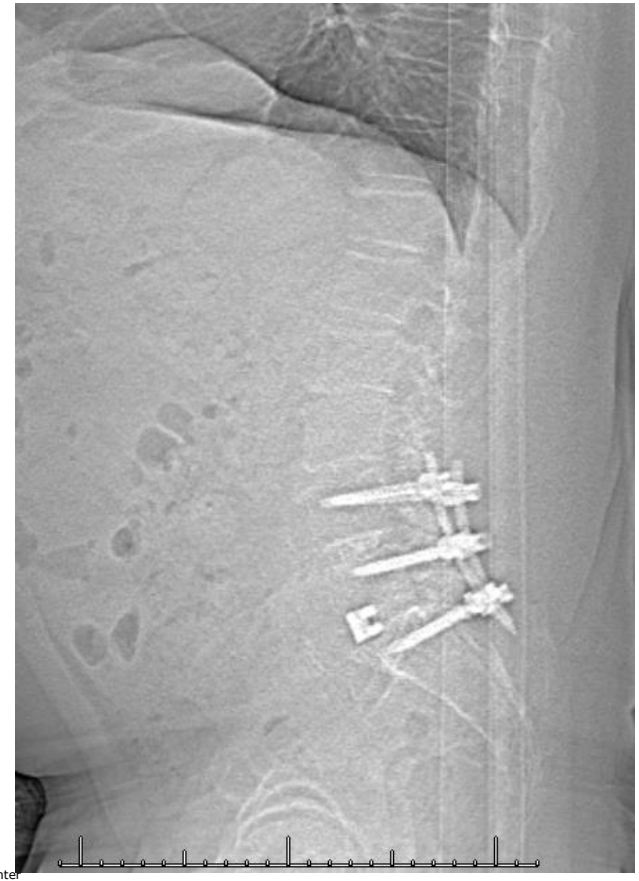
s/p extension of fusion to L4, recurrent RLE pain
OSH surgeon recommended extension of fusion to L2





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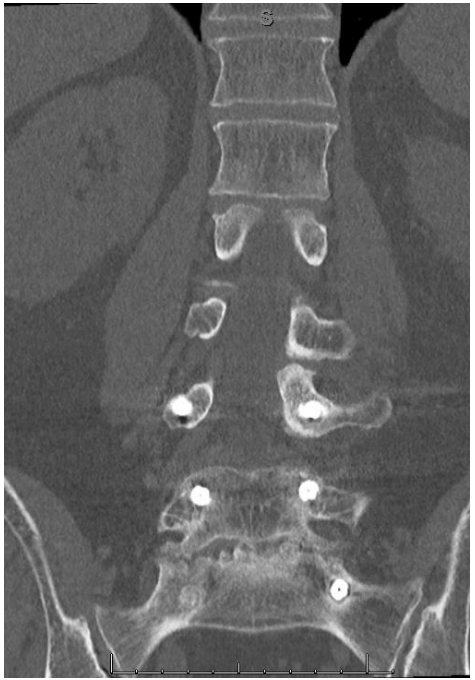

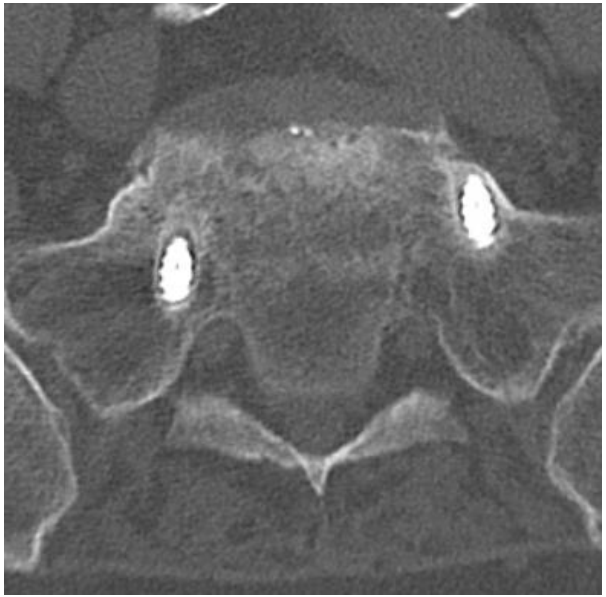

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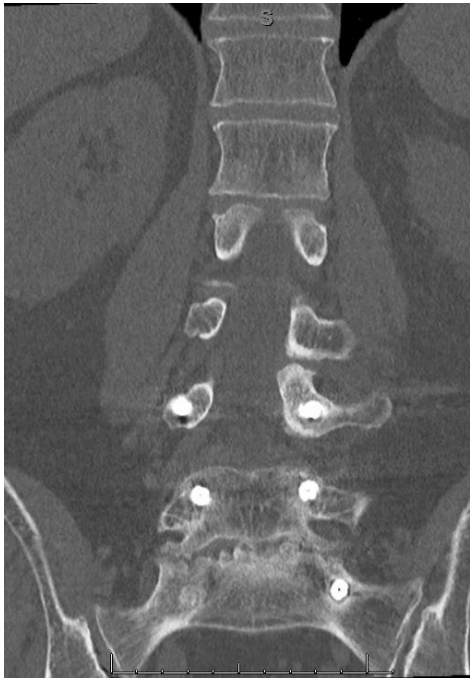

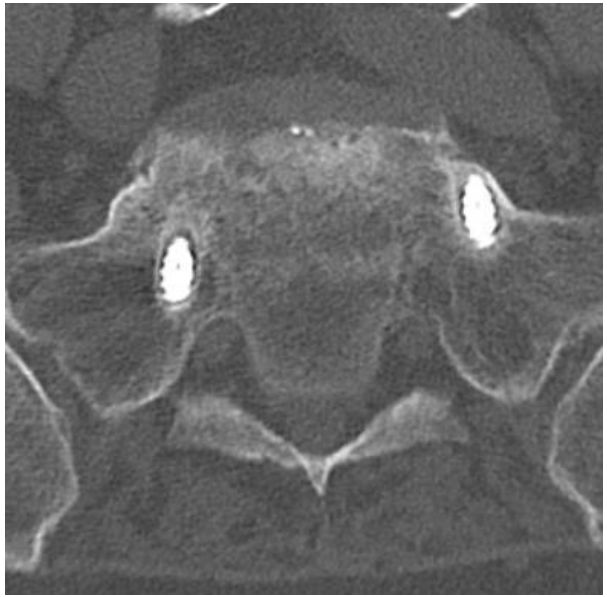

Diagnosis: Pseudarthrosis L5-S1

IS THIS FAILED BACK SURGERY SYNDROME??

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Failed Back Surgery Syndrome (FBSS)

- **Lumbar spinal pain of unknown origin either persisting despite surgical intervention or appearing after surgical intervention for spinal pain originally in the same topographical location**

- **The pain may originate after surgery, or the surgery may exacerbate or insufficiently ameliorate existing pain**

IASP
INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN

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Stat Pearls, PubMed

Failed Back Surgery Syndrome (FBSS)

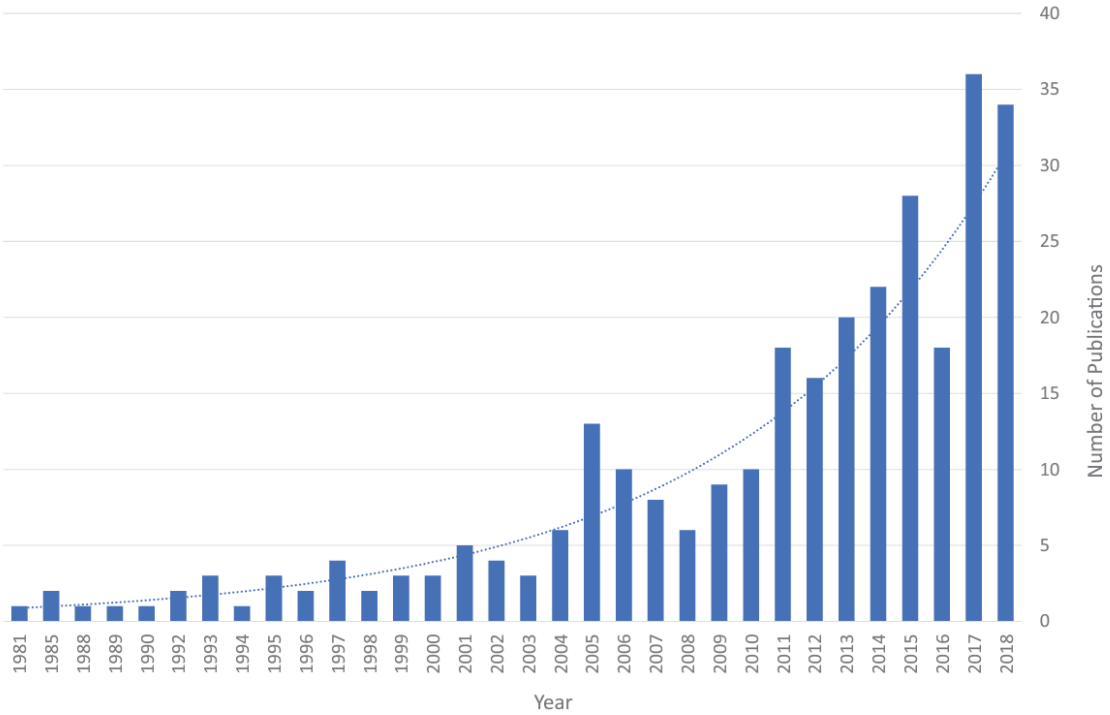

Figure 1. Number of publications indexed in PubMed using the term "Failed back surgery syndrome" in the title.

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Christelis et al, *Pain Medicine*, 2021

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Failed Back Surgery Syndrome (FBSS)

- **Failed vascular surgery syndrome = 0**
- **Failed heart surgery syndrome = 0**
- **Failed thoracic surgery syndrome = 0**
- **Failed orthopaedic surgery syndrome = 0**
- **Failed plastic surgery syndrome = 0**

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Failed Back Surgery Syndrome (FBSS)

- **Failed plastic surgery syndrome**

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Why Does Spine Surgery Fail?

- **Pre-operative**
- **Intra-operative**
- **Post-operative**

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FBSS – Pre-Operative Factors

- **POOR PATIENT SELECTION IS THE NUMBER ONE REASON SPINE SURGERY FAILS!**
  - **Wrong diagnosis**
  - **Wrong patient**

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How Do We Decide Who Can Benefit From Spine Surgery?

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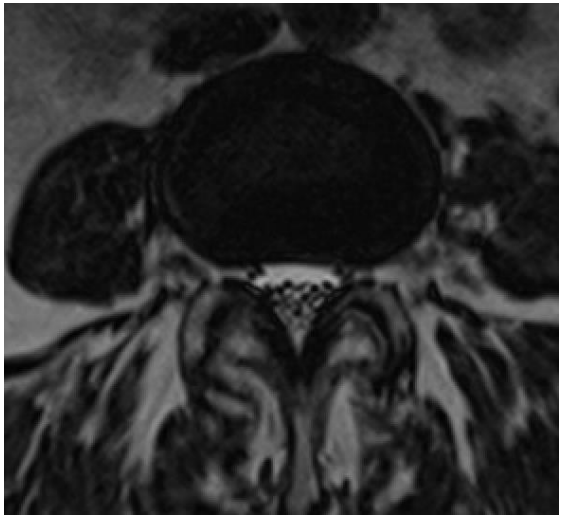
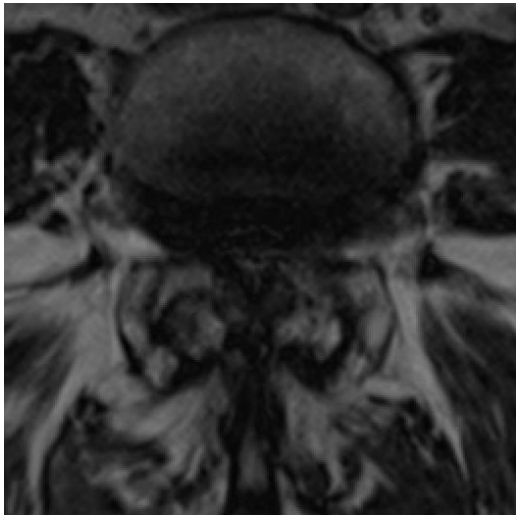
When is Spinal Surgery Indicated?

- **Radiculopathy (cervical or lumbar)**
- **Claudication**
- **Spondylolisthesis**
- **Trauma (Fractures)**
- **Myelopathy**
- **Infections**
- **Tumors**
- **Severe Spinal Deformities**
  - **Scoliosis**
  - **Kyphosis**
  - **Flatback**



NORMAL



SEVERE SPINAL STENOSIS

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When is Spinal Surgery Indicated?

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  - Scoliosis
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  - Flatback

SPONDYLOLISTHESIS

TRANSITIONAL L5-S1

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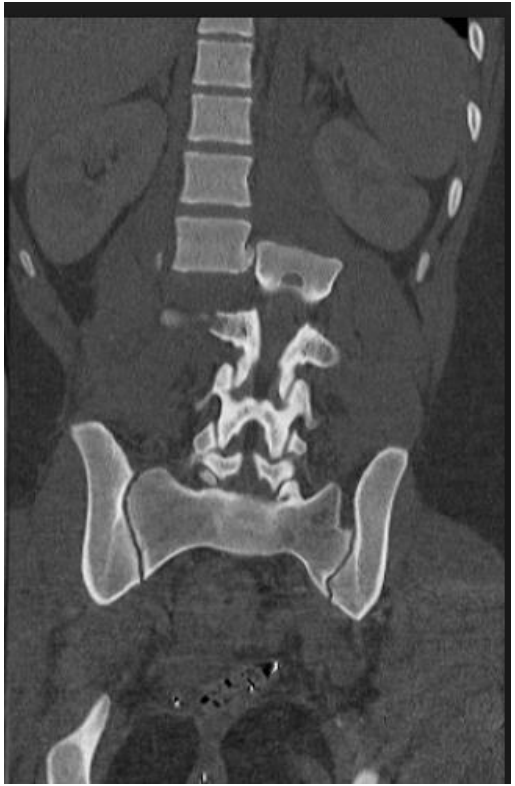

LUMBAR SPINE

FRACTURE / DISLOCATION

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When is Spinal Surgery Indicated?

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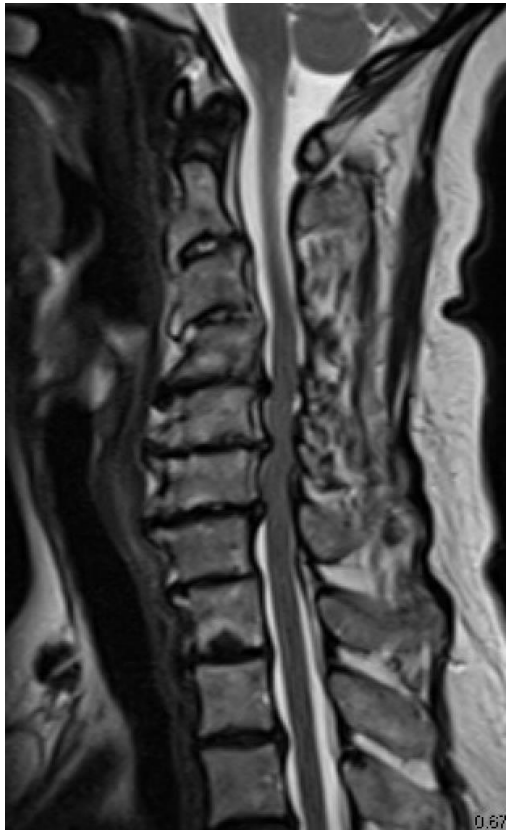

SEVERE CERVICAL SPINAL CORD COMPRESSION

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When is Spinal Surgery Indicated???

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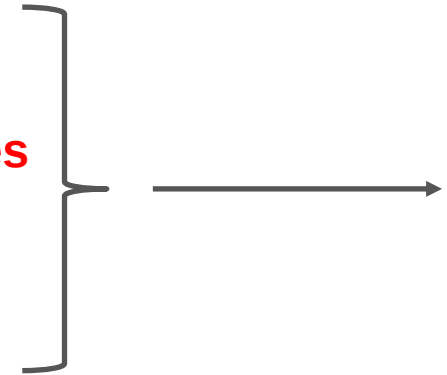

COMPLEX SPINAL DISORDERS

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Initial Treatment is CONSERVATIVE

- **Mild deformities don't need surgery**
- **Severe deformities often will eventually need surgery**
- ****Unfortunately conservative treatment cannot improve HRQOL, only surgery has been shown to improve HRQOL****

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What Spinal Deformities May Need Surgery?

- **Large coronal imbalance**
- **Rib on pelvis impingement**
- **Large sagittal imbalance**
- **Iatrogenic flatback**
- **Spondylolisthesis or lateral listhesis**

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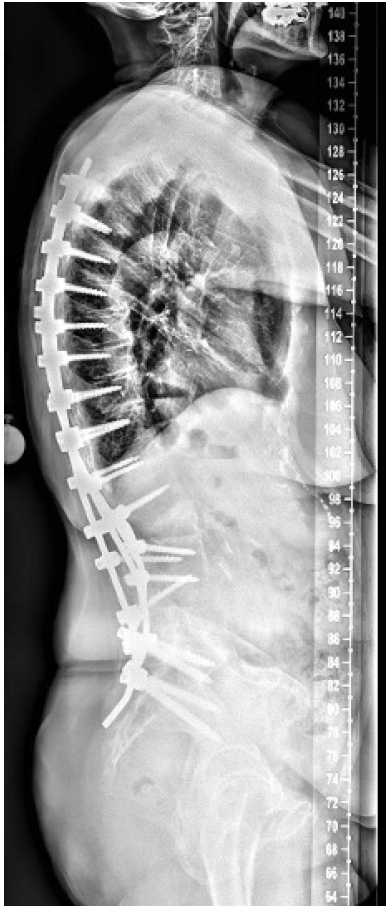

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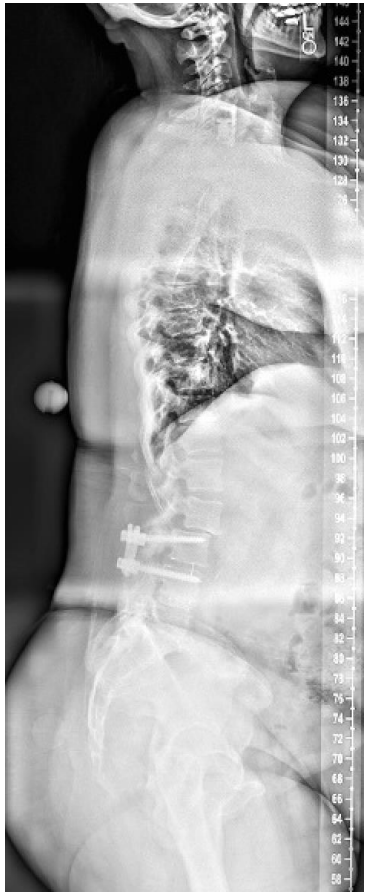

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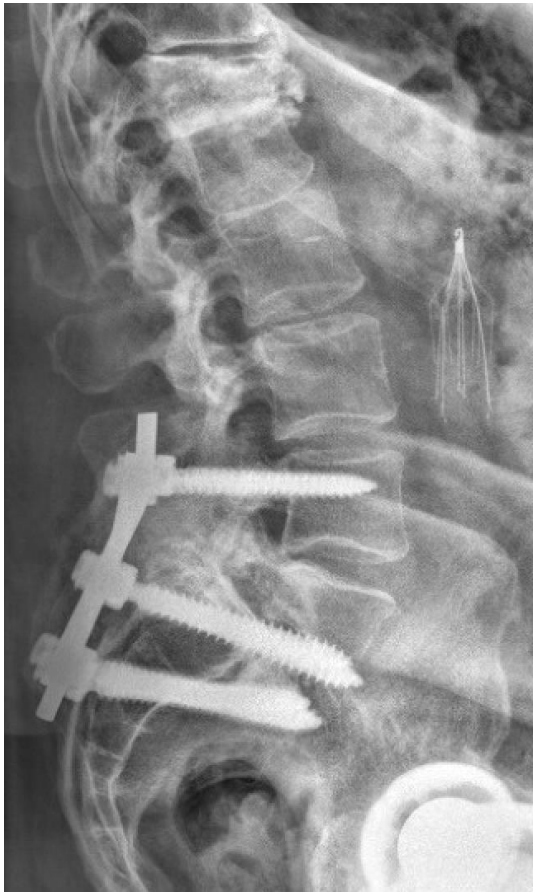

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When is Spinal Surgery NOT Indicated???

- **Lumbar**
  - **Back pain with “degenerated discs”**
  - **Stable grade 1 degenerative spondylolisthesis without radiculopathy or claudication**
  - **Mild/moderate scoliosis**
  - **Most osteoporotic spinal fractures**
- **Cervical**
  - **Neck pain with “degenerated discs”**
  - **Mild cervical kyphosis**

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Wrong Patient – When to Think Twice About Spine Surgery

- Obesity (BMI > 35)
- Depression / Anxiety
- Nicotine use
- Frailty
- Previous poor outcome despite appropriately performed operation
- Open L&I claim
- Ongoing litigation
- Poor social support network
- Unrealistic expectations

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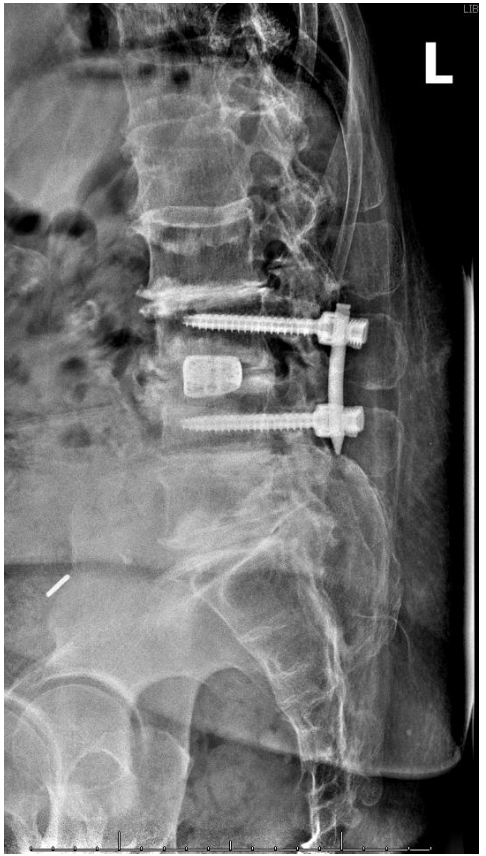
FBSS – Operative Factors

- **Wrong operation for the pathology**
- **All of the pathology / pain generators were not addressed**
- **Intraoperative complications**
- **Poor technique**



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How Can We Ensure We’re Doing The Correct Operation?

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How Can We Ensure We’re Doing The Correct Operation?

TEAM APPROACH!

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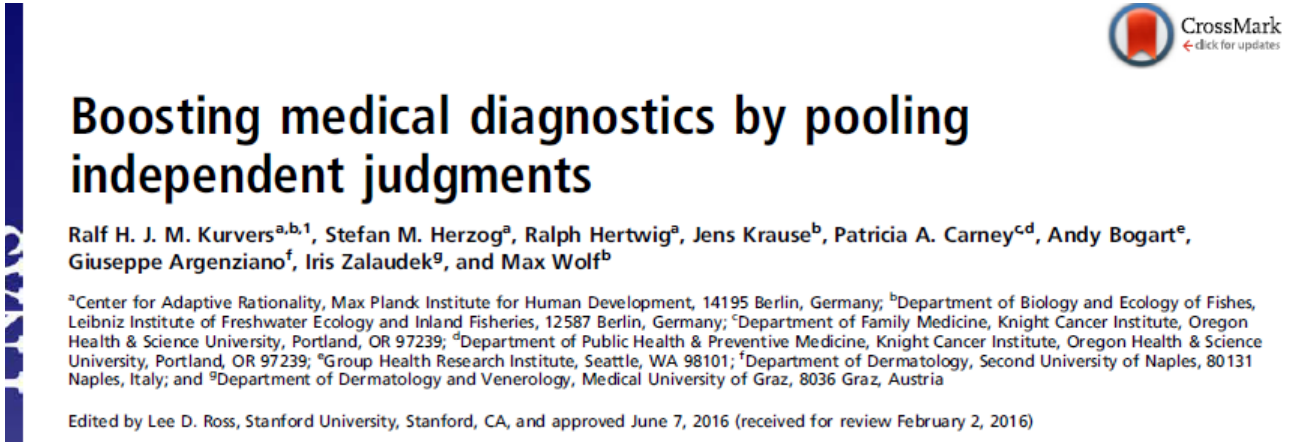
Preop: Multidisciplinary Decision-Making Team



Boosting medical diagnostics by pooling independent judgments

Ralf H. J. M. Kurvers[a,b,1], Stefan M. Herzog[a], Ralph Hertwig[a], Jens Krause[b], Patricia A. Carney[c,d], Andy Bogart[e], Giuseppe Argenziano[f], Iris Zalaudek[g], and Max Wolf[b]

[a]Center for Adaptive Rationality, Max Planck Institute for Human Development, 14195 Berlin, Germany; [b]Department of Biology and Ecology of Fishes, Leibniz Institute of Freshwater Ecology and Inland Fisheries, 12587 Berlin, Germany; [c]Department of Family Medicine, Knight Cancer Institute, Oregon Health & Science University, Portland, OR 97239; [d]Department of Public Health & Preventive Medicine, Knight Cancer Institute, Oregon Health & Science University, Portland, OR 97239; [e]Group Health Research Institute, Seattle, WA 98101; [f]Department of Dermatology, Second University of Naples, 80131 Naples, Italy; and [g]Department of Dermatology and Venerology, Medical University of Graz, 8036 Graz, Austria

Edited by Lee D. Ross, Stanford University, Stanford, CA, and approved June 7, 2016 (received for review February 2, 2016)

"Aggregating the independent judgments of ~~doctors~~ outperforms the best ~~doctor~~ in a group"

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Definition: Team

“A team is a group of people who are interdependent with respect to information, resources, knowledge and skills and who seek to combine their efforts to achieve a common goal.”

Leigh Thompson, Kellogg School of Management, 2008

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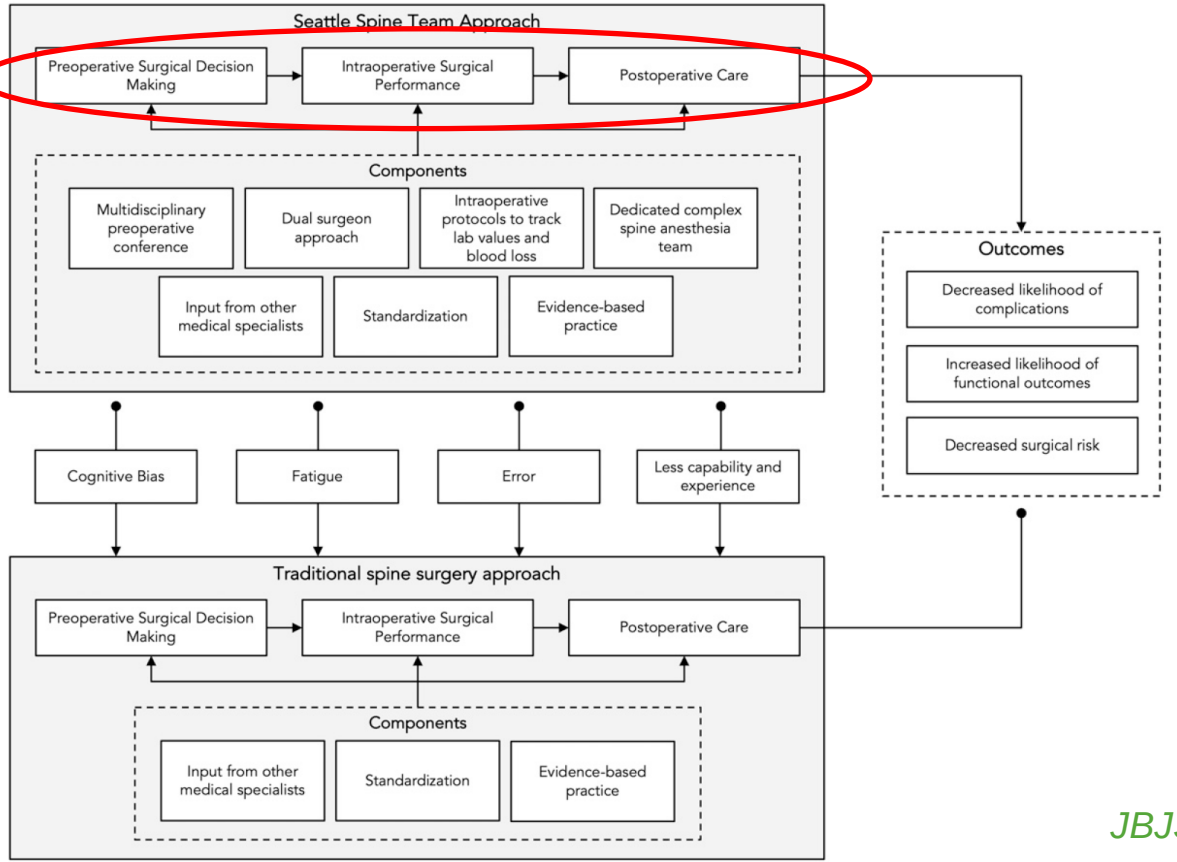
Team Approach: Safety and Value in the Practice of Complex Adult Spinal Surgery



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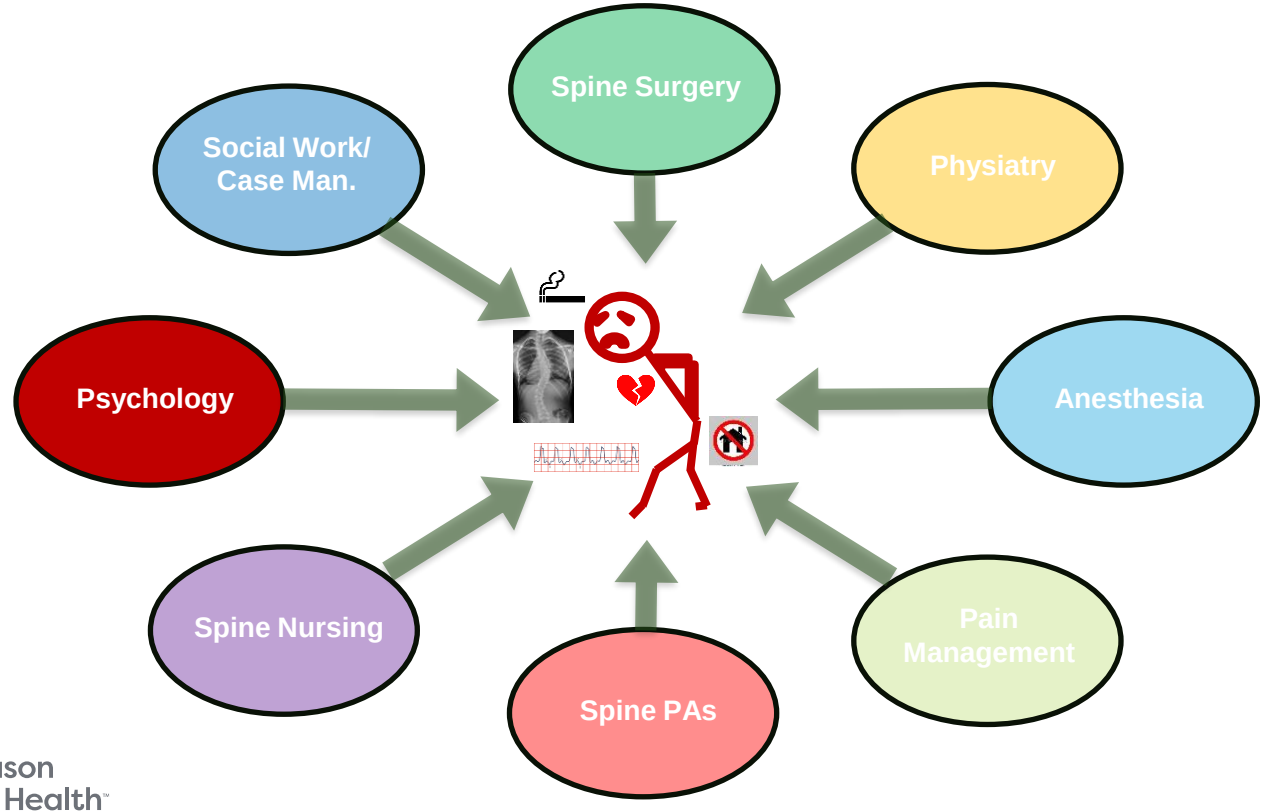
David W. Polly, MD

JBJS Reviews, 2020, 8:e0145

Preop: Multidisciplinary Decision-Making Team



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Multidisciplinary Pre-Operative Eligibility Conference

Team Members:

- Complex Spine Surgeons (Ortho and Neuro)
- Anesthesia Complex Spine Team (MD and CRNA)
- Physiatrists
- Internist / Hospitalist
- Pain Management Physicians
- Spine PA and NPs
- Spine Clinic RNs
- Research Personnel
- Neuropsychologists

2010-2017: 1540 spinal deformity patients from all regions of USA discussed in this format

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Multidisciplinary Pre-Operative Eligibility Conference

Spine Deformity (2020) 8:413–420
https://doi.org/10.1007/s43390-020-00057-w

CASE SERIES

Check for updates

Helping spine surgeons detect pre-surgical psychological distress in complex spine patients: an observational pilot study

Matt Sikora[1] · Venu M. Nemani[1] · Rochelle L. Winnett[1] · Andrew S. Friedman[1] · Joel S. Peterman[1] · Kellen Nold[1] · Rajiv K. Sethi[1]

"Only 17% of patients had a combination of realistic expectations for surgery, a good social support plan, and were without a history of mental illness."

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Preop: Multidisciplinary Decision-Making Team

Team Building

- Need to INVOLVE all team members in the decision-making process
- Everyone has veto power which helps with ENGAGEMENT
- All team members have a stake in the patient's outcome

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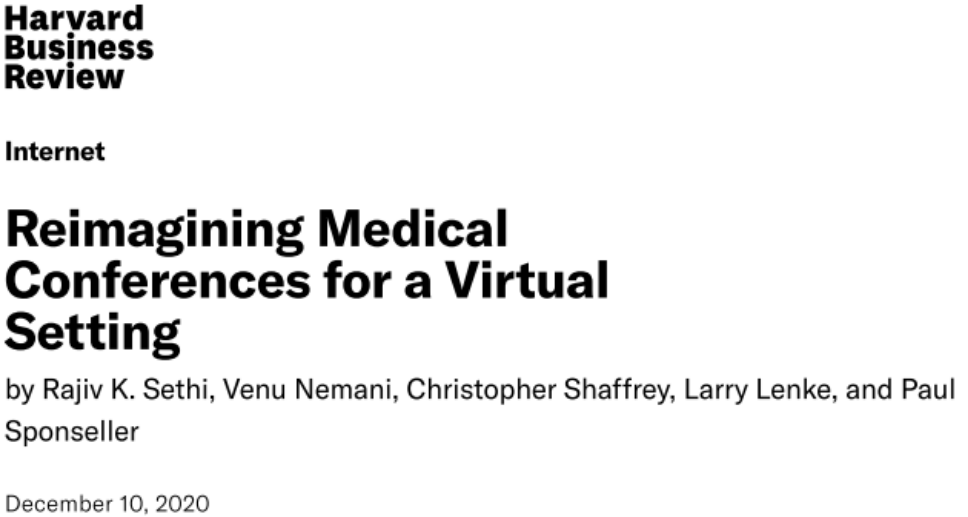
Preop: Multidisciplinary Decision-Making Team

Team Building

- Difficulties are finding the time and funding to get everyone together
- Virtual conference options have made this easier!
- Still need to build team rapport and trust which is easier in person → culture of collaboration


Harvard Business Review

Internet

Reimagining Medical Conferences for a Virtual Setting

by Rajiv K. Sethi, Venu Nemani, Christopher Shaffrey, Larry Lenke, and Paul Sponseller

December 10, 2020

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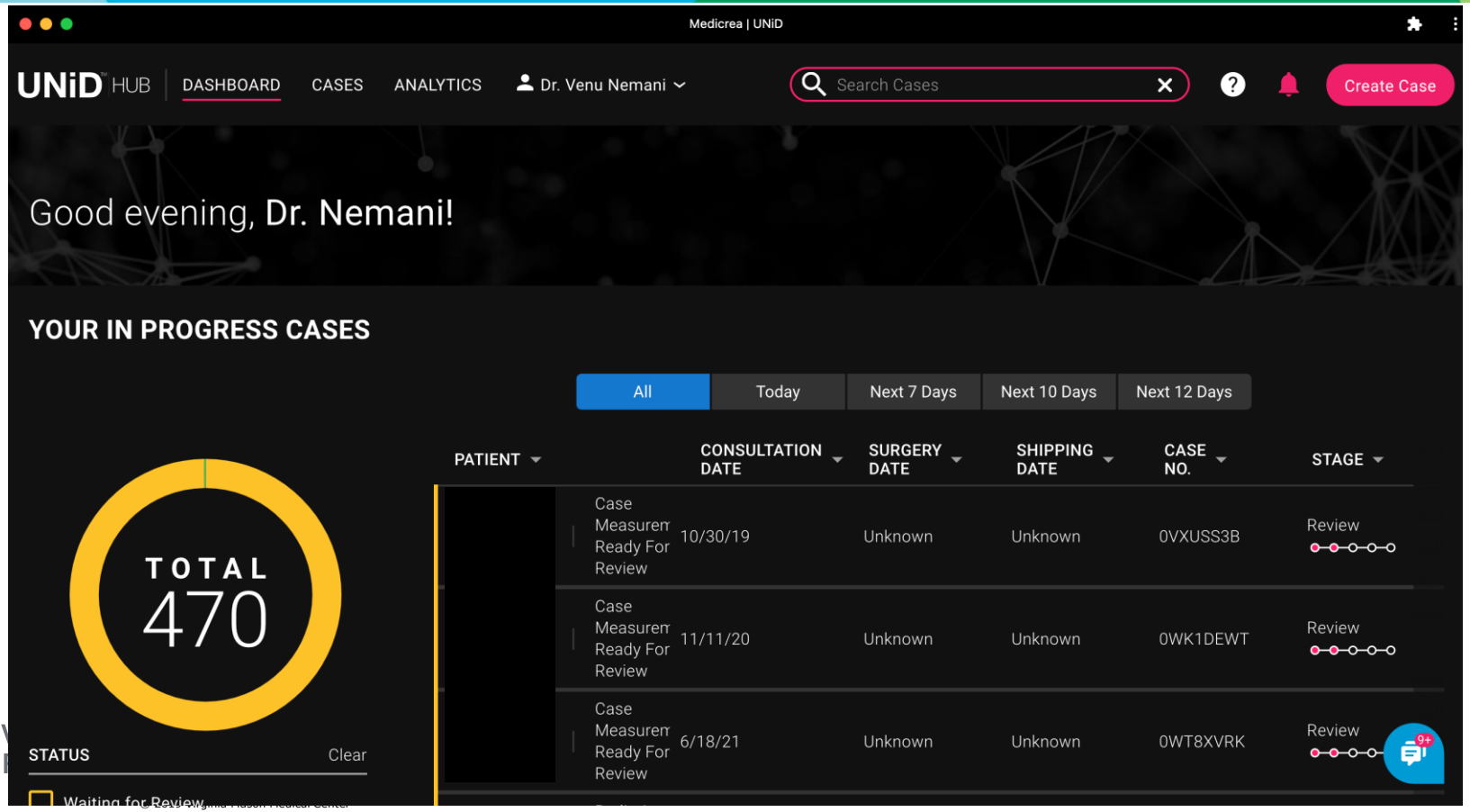
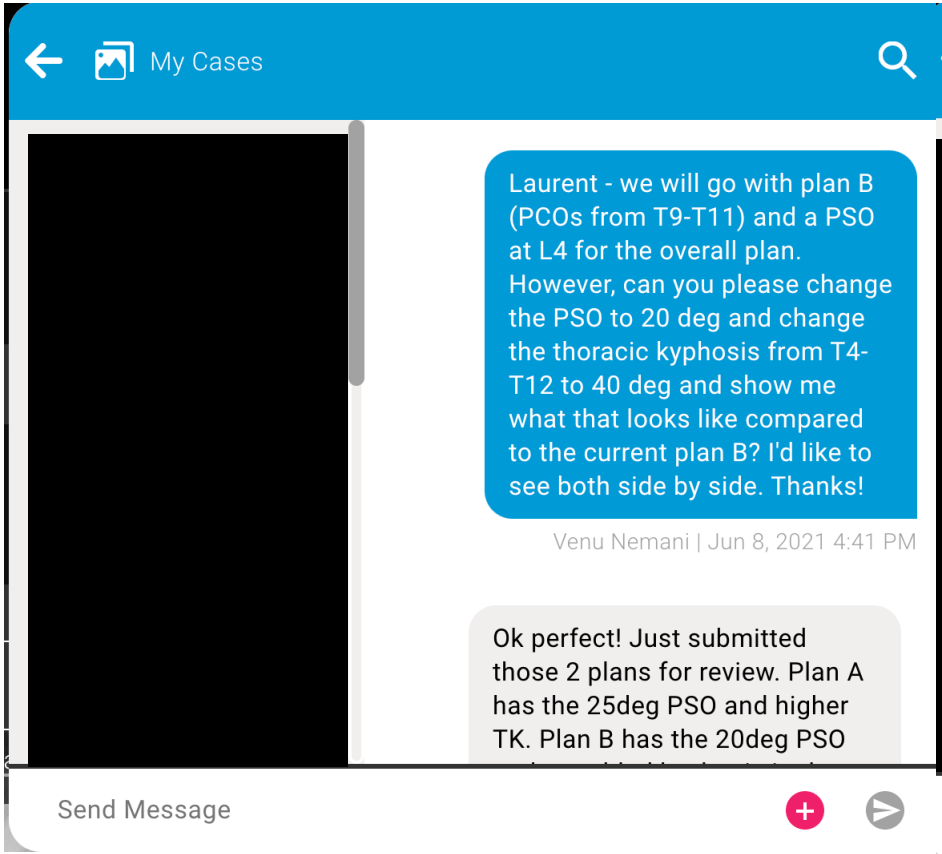
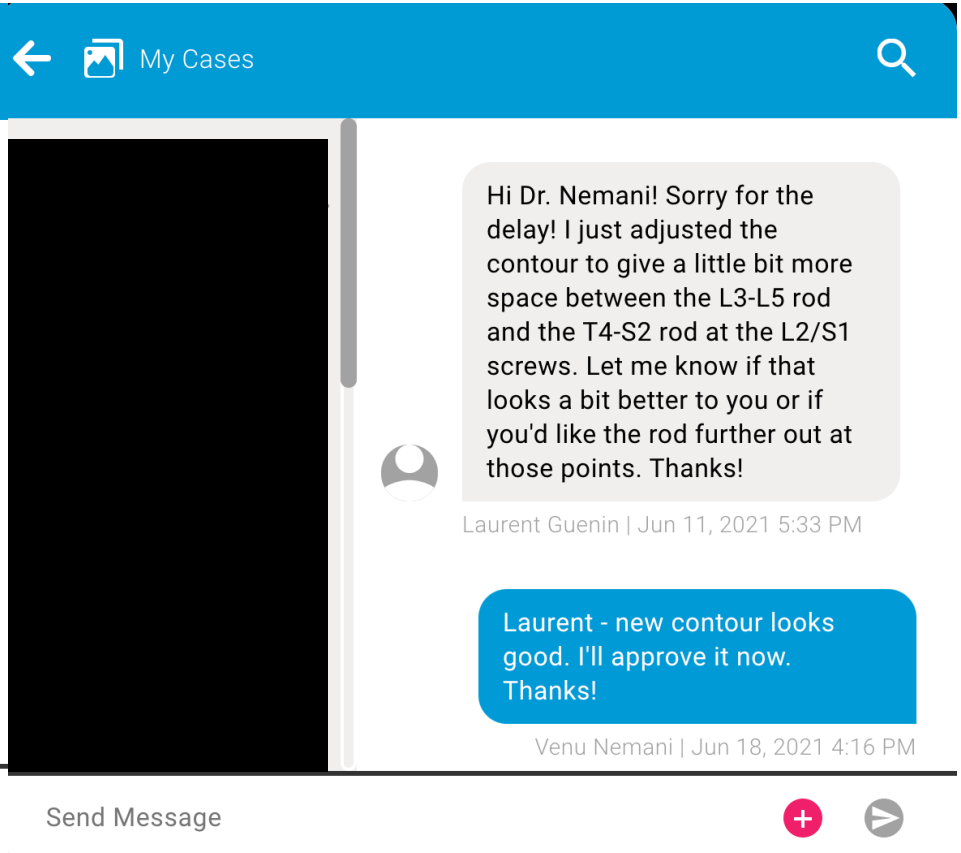
Preop: Advanced Surgical Planning with Artificial Intelligence



Preop: Advanced Surgical Planning with Artificial Intelligence





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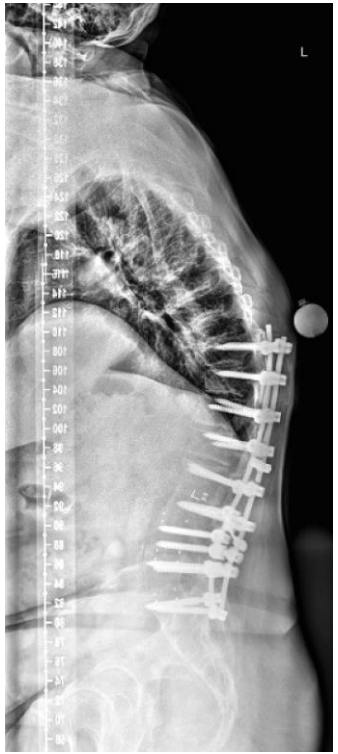
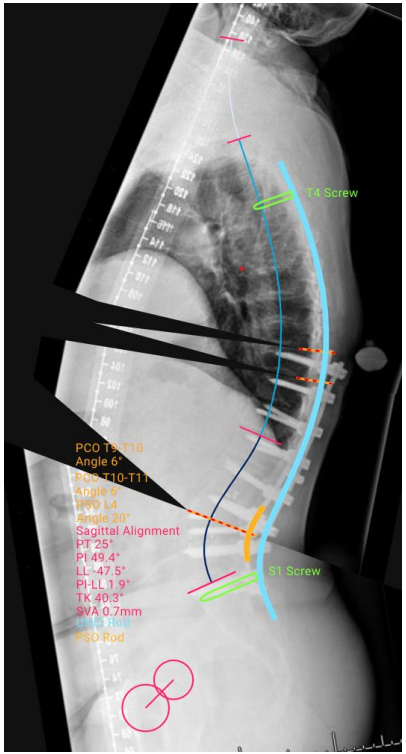
Preop: Advanced Surgical Planning with Artificial Intelligence





Virginia Mason **PREOP**
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PLAN

POSTOP

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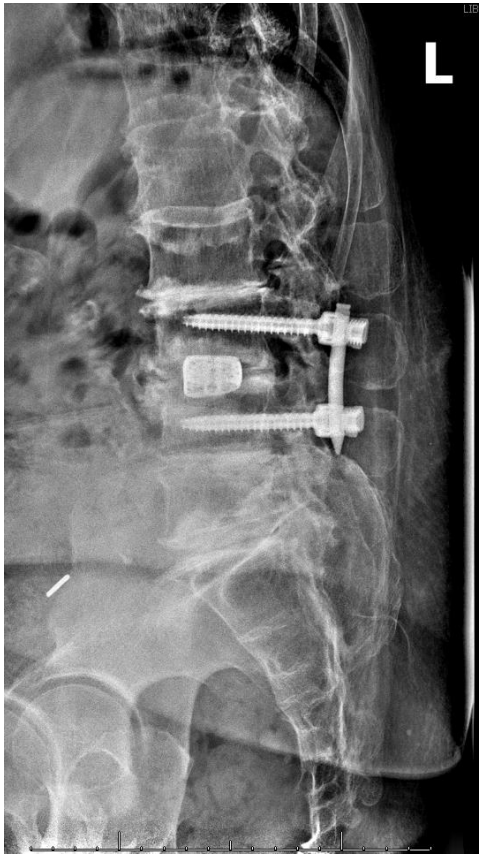
FBSS – Operative Factors

- **Wrong operation for the pathology**
- **All of the pathology / pain generators were not addressed**
- **Intraoperative complications**
- **Poor technique**



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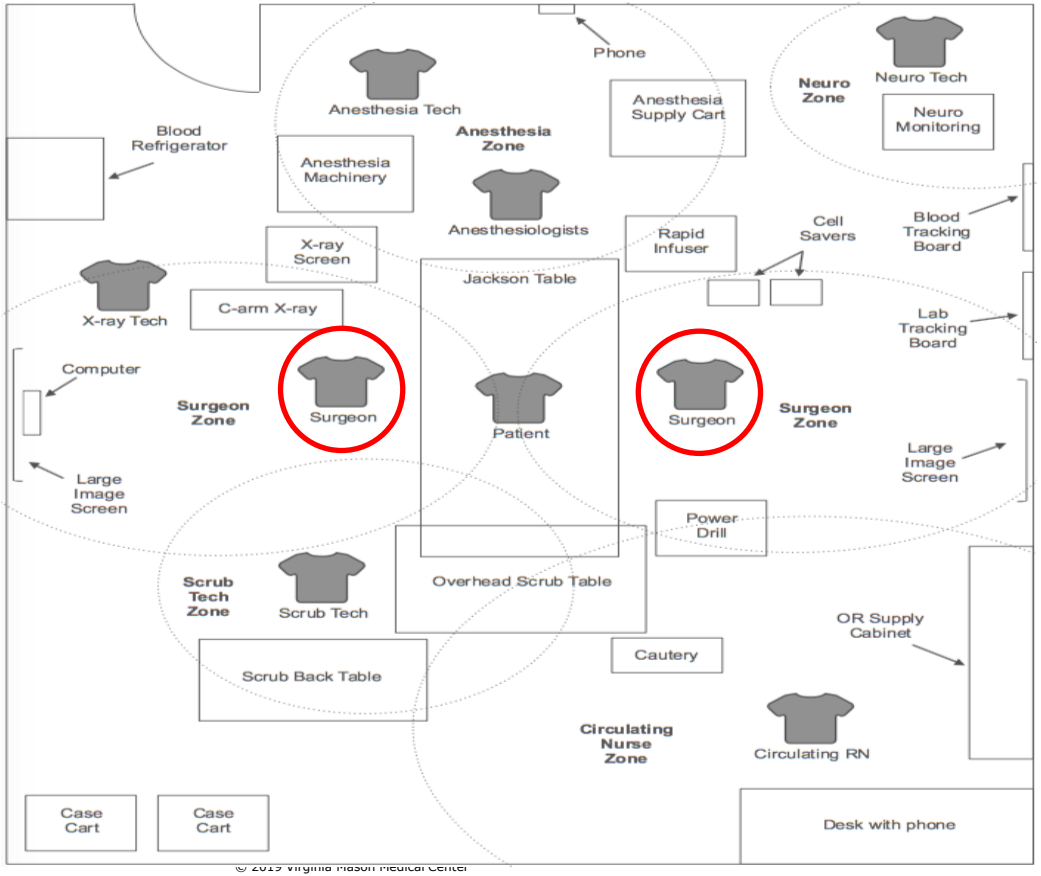
How Can We Ensure We’re Doing The Operation Correctly and Safely?

How Can We Ensure We’re Doing The Operation Correctly and Safely?

TEAM APPROACH!

Intraop: Two-Surgeon Model and Dedicated Complex Spine Team



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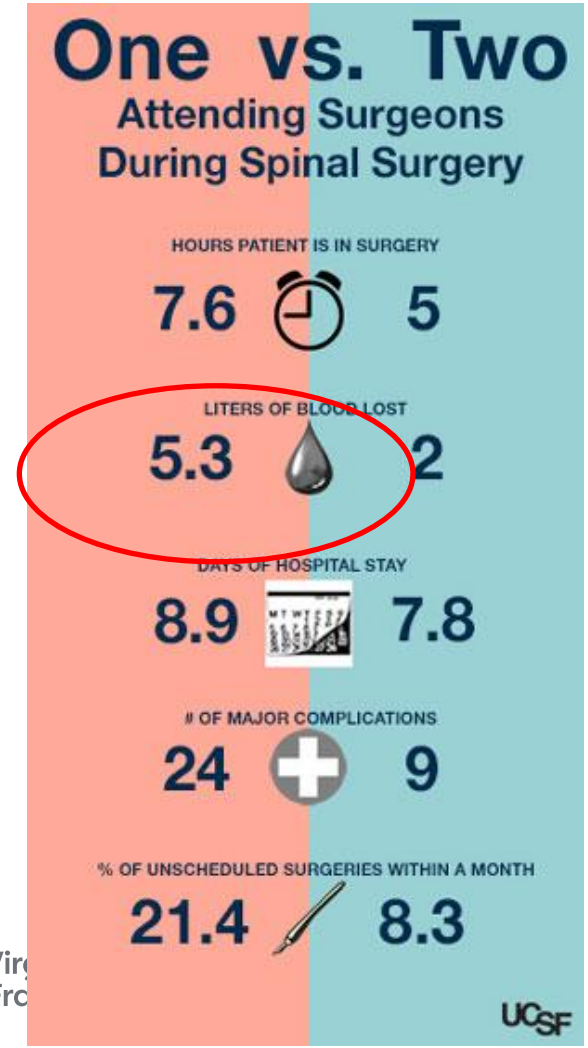

Spine Deformity
www.spine-deformity.org

Spine Deformity 1 (2013) 51–58

Perioperative Outcomes and Complications of Pedicle Subtraction Osteotomy in Cases With Single Versus Two Attending Surgeons

Christopher P. Ames, MD[a,*], Jeffrey J. Barry, MD[b], Sassan Keshavarzi, MD[a], Ozgur Dede, MD[b], Michael H. Weber, MD[b], Vedat Deviren, MD[b]

The Seattle Spine Team Approach

- Definition of complex spine:
  - ≥ 6 levels of fusion
  - Staged surgery
  - Multiple co-morbidities

- Case presentation to and approved for surgery by a live multidisciplinary spine conference
- Mandatory completion of patient education course in preparation for surgery and post-op care
- Two attending surgeons
- Intra-operative standardized protocol without case to case variability
- **3 fold reduction in readmissions and 12 fold decrease in return to surgery in the first year**

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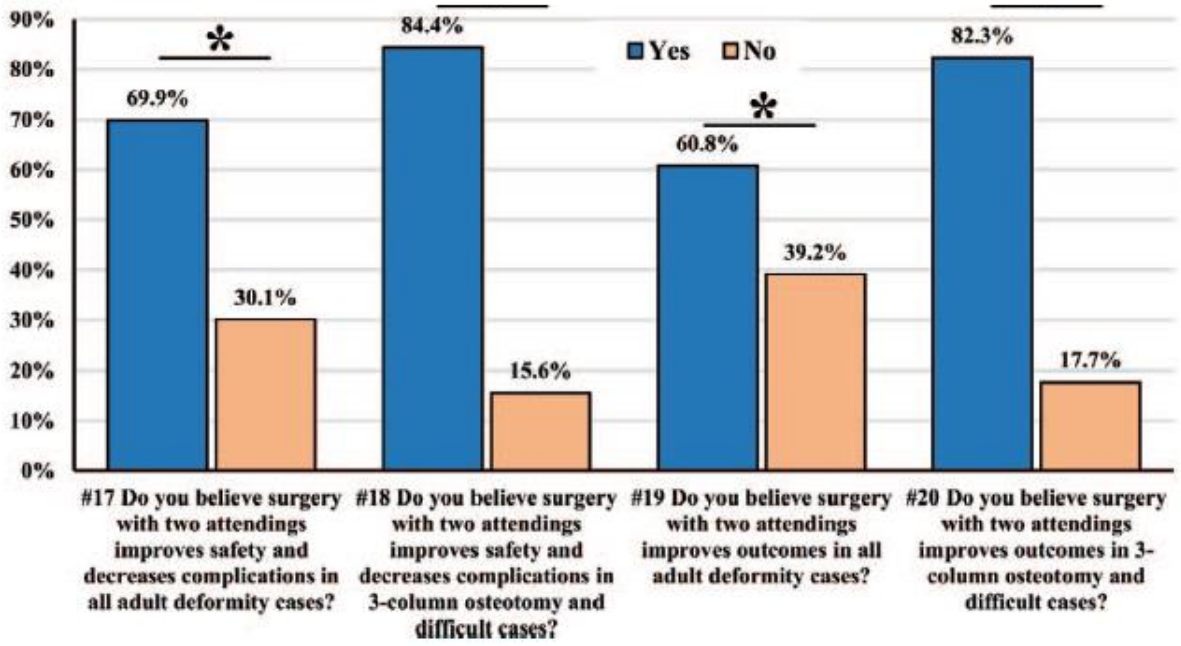
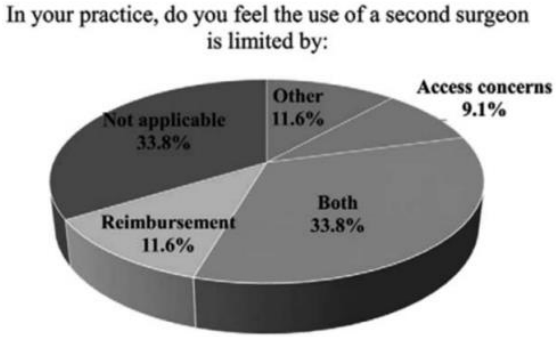
Intraop: Two-Surgeon Model and Dedicated Complex Spine Team

Results of the 2015 Scoliosis Research Society Survey on Single *Versus* Dual Attending Surgeon Approach for Adult Spinal Deformity Surgery

Justin K. Scheer, MD,* Rajiv K. Sethi, MD,† Lloyd A. Hey, MD,‡ Michael O. LaGrone, MD,§ Malla Keefe, BS,¶ Henry E. Aryan, MD,|| Thomas J. Errico, MD,** Vedat Deviren, MD,†† Robert A. Hart, MD,‡‡ Virginie Lafage, PhD,§§ Frank Schwab, MD,§§ Michael D. Daubs, MD,¶¶ Christopher P. Ames, MD¶, and the SRS Adult Spinal Deformity Committee

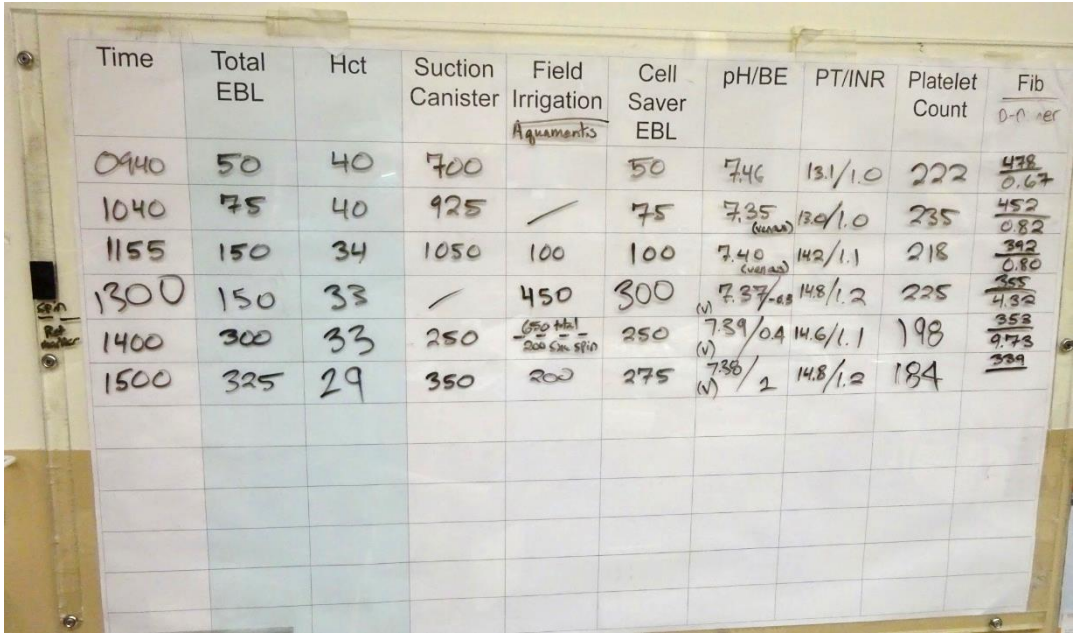




Over 50% limited by reimbursement or access concerns

Intraop: Two-Surgeon Model and Dedicated Complex Spine Team

- Careful tracking of coagulopathy
- Open communication between dedicated complex spine anesthesia team and surgeons
- This collaboration starts at the pre-op conference!



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Intraop: Two-Surgeon Model and Dedicated Complex Spine Team

- Surgery with a “co-pilot” is safer!
- Combats decision fatigue
- "Fog of war”
- Dedicated OR team (scrub tech, RNs) builds comradery, confidence, and fosters a culture of “speaking up” when problems arise
- Two surgeons DON’T make up for a poor overall OR / hospital environment

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Postop: Dedicated Spine APP (PA/NP) and RN team

- PAs and NPs are EMPOWERED in managing the in-hospital complex spine service
- Many of our postop pathways were designed / modified by the APP and nursing team
- Several are leading and driving ongoing research projects

Helping spine surgeons detect pre-surgical psychological distress in complex spine patients: an observational pilot study.

Sikora M, Nemani VM, Winnett RL, Friedman AS, Peterman JS, **Nold K**, Sethi RK.

Spine Deform. 2020 Jun;8(3):413-420. doi: 10.1007/s43390-020-00057-w. Epub 2020 Feb 28.

PMID: 32112351

The Seattle spine score: Predicting 30-day complication risk in adult spinal deformity surgery.

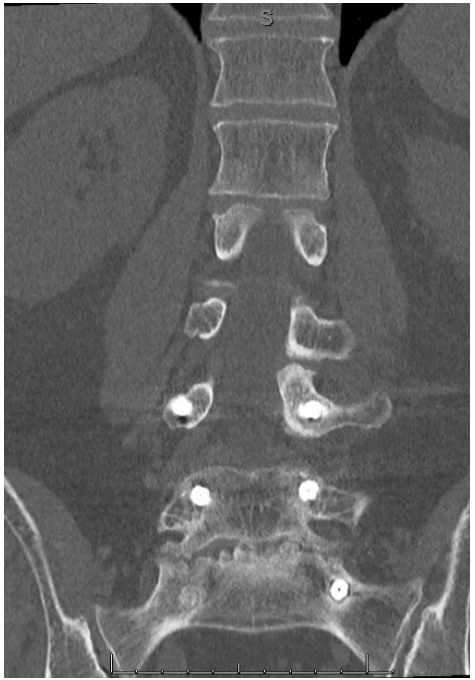
Buchlak QD, Yanamadala V, Leveque JC, Edwards A, **Nold K**, Sethi R.

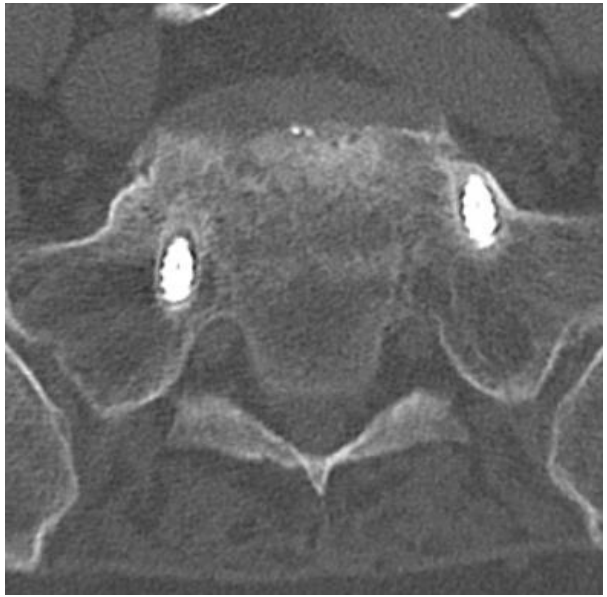
J Clin Neurosci. 2017 Sep;43:247-255. doi: 10.1016/j.jocn.2017.06.012. Epub 2017 Jul 1.

PMID: 28676311

Implementation of an Opioid Reduction Protocol for Simple Outpatient Neurosurgical Procedures: A Single-Center Experience

Nicholas Eley [1,2], Matt Sikora [1], Anna K Wright [1], Jean-Christophe Leveque [1,2]





Diagnosis: Pseudarthrosis L5-S1

IS THIS FAILED BACK SURGERY SYNDROME??

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Pitfalls

- L&I (not a contraindication, just something to consider)
- Obese (BMI 36)
- Higher than average pelvic incidence
- Hard to restore alignment with MIS TLIF
- Missed diagnosis and had upcoming plan for incorrect surgery

ALL OF THESE ARE RISKS FOR FAILURE OF SUCCESS OF SURGERY, BUT THESE CAN ALL BE MITIGATED AGAINST!!

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61M prior L3-5 fusion & stimulator

- 3 prior spine operations
- Neuropraxic left lumbar plexus injury after prior surgery with lateral transpsoas approach

- Worsening lower back pain and inability to stand upright

- Stimulator provided mild/mod relief of leg symptoms

- IS THIS FAILED BACK SURGERY SYNDROME??

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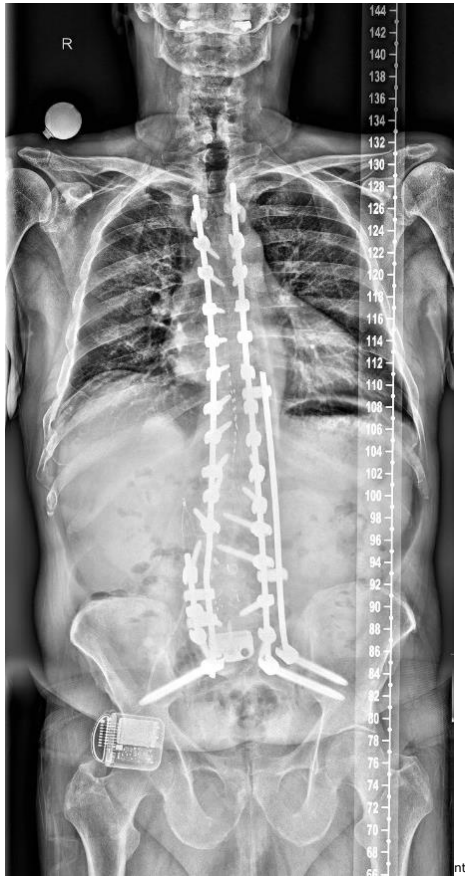
ALIF L5-S1, PSF T4-pelvis



Summary

- **Successful spine surgery is all about the indication for surgery!**
- **Beware of patient-specific factors that can affect outcomes**
- **Pre-operative optimization and team decision making is key**
- **Many patients with spinal malalignment or deformity will be told they have “failed back syndrome” when they have a fixable problem!**
- **Team approach to surgical planning and execution to minimize complications and maximize outcomes**

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