

Prediction of outcome using registry data: Experience from Spine Tango

- Examples of studies on predictors
- Examples on prediction models
- EU Horizon consortium project

Which patients do benefit more from the treatment and which less

- very natural study question requiring analysis of patient characteristics!
- real life data are best to answer such questions

Prediction of QoL and Pain Relief in LSS

Eur Spine J
DOI 10.1007/s00586-015-4078-8



ORIGINAL ARTICLE

Predictors of improvement in quality of life and pain relief in lumbar spinal stenosis relative to patient age: a study based on the Spine Tango registry

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Christoph Röder⁵ · Emin Aghayev⁵

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Conclusion: ... results confirm that all age groups significantly benefit from the open decompressive treatment of LSS. Age group had no significant influence on any outcome.

Predictors of complications in LSS

Eur Spine J (2012) 21:411–417
DOI 10.1007/s00586-011-2016-y

ORIGINAL ARTICLE

Predictors of surgical, general and follow-up complications in lumbar spinal stenosis relative to patient age as emerged from the Spine Tango Registry

Rolf Sobottke · Emin Aghayev · Christoph Röder ·
Peer Eysel · Stephan K. Delank · Thomas Zweig

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Results/Discussion: *The study found that **age**, **ASA** status and **blood loss** were significant co-varieties for the occurrence of general complications. The risk of general complications is increased in **older** versus younger patients. Fusion or rigid stabilization does not lead to more complications. Surgical complications as well as complication rates at follow-up showed no significant age-related variation. Physician-based outcome was good or excellent in over 80% of patients in all age groups.*

Predictors of the length of hospital stay

➤ [Eur Spine J.](#) 2020 Feb;29(2):203-212. doi: 10.1007/s00586-019-06209-5. Epub 2019 Nov 16.

Non-medical factors significantly influence the length of hospital stay after surgery for degenerative spine disorders

D Mai ^{1 2}, C Brand ², D Haschtmann ¹, T Pirvu ¹, T F Fekete ¹, A F Mannion ³

Conclusion: Patients of advanced age and female gender are at increased risk of longer hospital stay after surgery for degenerative spinal disorders. Further studies should seek to understand the reasoning behind the gender disparity, in order to minimise potentially unnecessary costs of prolonged LOS. Targeted preoperative discharge planning may improve the utilisation of hospital resources.

Influence of preop Back Pain in lumbar Deco

> Spine (Phila Pa 1976). 2009 May 15;34(11):1198-203. doi: 10.1097/BRS.0b013e31819fcf35.

The influence of preoperative back pain on the outcome of lumbar decompression surgery

Frank S Kleinstück¹, Dieter Grob, Friederike Lattig, Viktor Bartanusz, Francois Porchet, Dezső Jeszenszky, David O'Riordan, Anne F Mannion

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Concomitant back pain as a predictor of outcome after single level lumbar micro-decompressive surgery – A study of 995 patients[☆]

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Eur Spine J (2011) 20:1166–1173
DOI 10.1007/s00586-010-1670-9

ORIGINAL ARTICLE

The outcome of decompression surgery for lumbar herniated disc is influenced by the level of concomitant preoperative low back pain

F. S. Kleinstueck · T. Fekete · D. Jeszenszky ·
A. F. Mannion · D. Grob · F. Lattig ·
U. Mutter · F. Porchet

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Conclusion: Overall, greater back pain relative to leg pain at baseline was associated with a significantly worse outcome after decompression. This finding seems intuitive, but has rarely been quantified in the many predictor studies conducted to date. Consideration of relative LBP and LP scores may assist in clinical decision-making and in establishing realistic patient expectations.

Risk factors for negative treatment outcome in LSS

Observational Study > World Neurosurg. 2020 Apr;136:e270-e283.

doi: 10.1016/j.wneu.2019.12.147. Epub 2019 Dec 31.

Risk Factors for Negative Global Treatment Outcomes in Lumbar Spinal Stenosis Surgery: A Mixed Effects Model Analysis of Data from an International Spine Registry

Emin Aghayev¹, Anne F Mannion², Tamas F Fekete², Sven Janssen³, Kelly Goodwin⁴, Marcel Zwahlen⁴, Ulrich Berlemann⁵, Tobias Lorenz³; Spine Tango Registry Group

Global treatment outcome:

- “Overall, how much did the operation that you received help your back problem?”
 - helped a lot
 - helped
 - helped only little
 - **did not help**
 - **made things worse**

Conclusions: LSS surgery fails to help at least 1 in 10 patients. High baseline back pain is the most important factor associated with a negative treatment outcome. Department-level and potentially country-level factors of unknown origin explained a nonnegligible variation in the treatment results.

Interestingly ...

LP

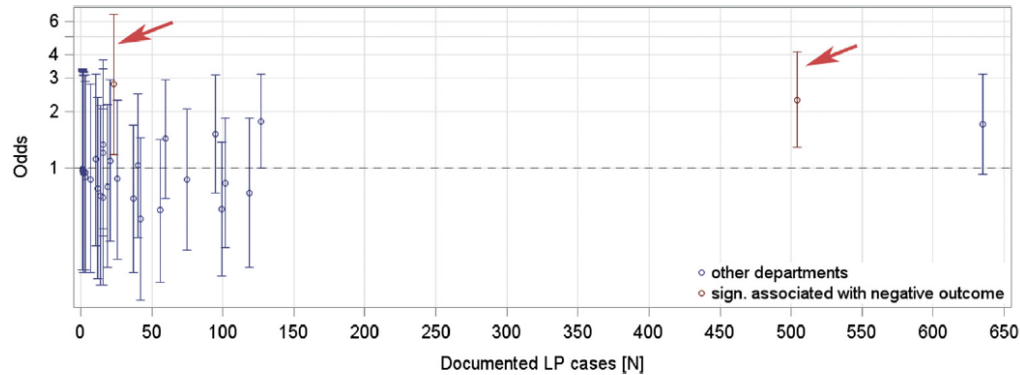


Figure 2. Deviations from the overall average for the odds of having a negative outcome in 35 treating departments, from the multivariate mixed effect model

in the LP sample. Note: the centers that deviated significantly are marked in red and with an arrow. LP, leg pain.

BP

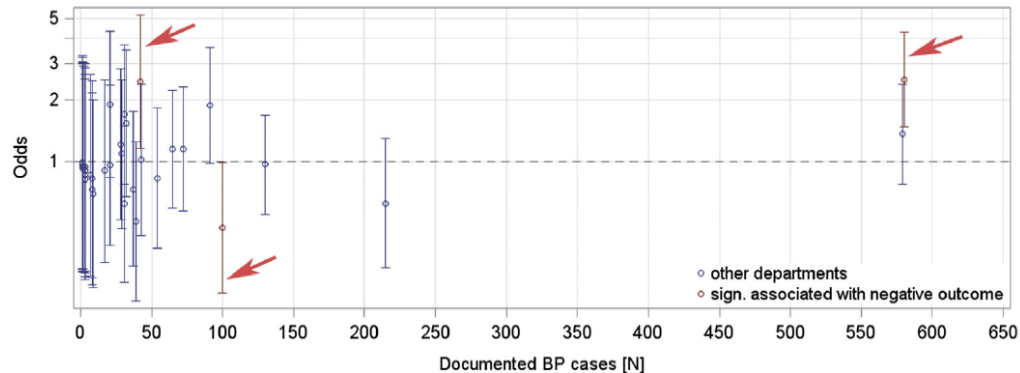


Figure 3. Deviations from the overall average of having of negative outcome in 36 treating departments, from the multivariate mixed effect model in the BP sample.

Note: the centers that deviated significantly are marked in red and with an arrow. BP, back pain.

... Interestingly, 3 out of 4 of the statistically significant negative effects of “department” were from a single country out of the 10 countries whose data were used in the analyses. One of the outlier departments was among the higher caseload centers. This finding may highlight the influence of national regulation, reimbursement models, and clinical guidelines rather than specific characteristics of individual treating departments alone. ...

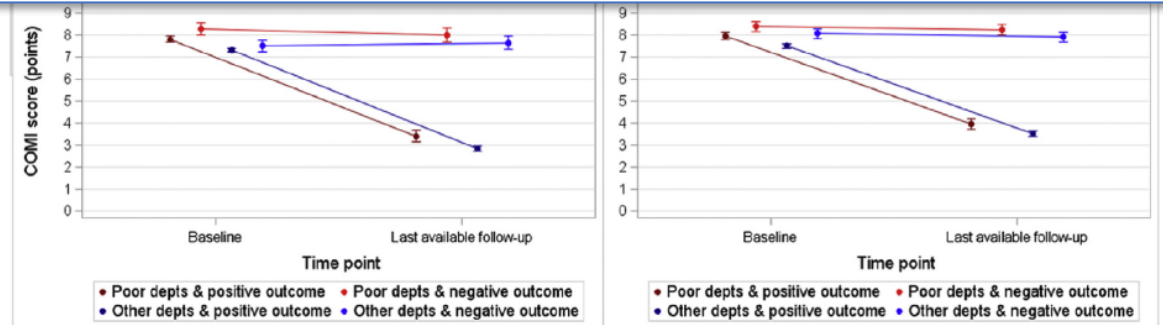


Figure 4. The pain relief and COMI score improvement in the hospital departments with greater odds of negative outcome versus other hospital

departments by group. COMI, Core Outcome Measures Index.

Prediction models

> Eur Spine J. 2021 May;30(5):1337-1354. doi: 10.1007/s00586-021-06777-5. Epub 2021 Mar 9.

Development of a model to predict the probability of incurring a complication during spine surgery

Pascal Zehnder ¹, Ulrike Held ², Tim Pigott ³, Andrea Luca ⁴, Markus Loibl ⁵, Raluca Reitmeir ⁵, Tamás Fekete ⁵, Daniel Haschtmann ⁵, Anne F Mannion ⁵

Conclusion: ... *Surgical complications were predicted with less discriminative ability than general complications. Reoperation at the same level was strongly predictive of surgical complications and a higher ASA score, of general complications. A web-based prediction tool was developed ([Link](#))*

> Eur Spine J. 2020 Jul;29(7):1742-1751. doi: 10.1007/s00586-020-06351-5. Epub 2020 Feb 27.

Development and temporal validation of a prognostic model for 1-year clinical outcome after decompression surgery for lumbar disc herniation

Lukas P Staub ¹, Emin Aghayev ², Veronika Skrivankova ³, Sarah J Lord ⁴, Daniel Haschtmann ², Anne F Mannion ²

Conclusion: *While the model accuracy was good overall, the prediction intervals indicated considerable predictive uncertainty on the individual level. Implementation studies will assess the clinical usefulness of the online tool. Updating the models with additional predictors may improve the accuracy and precision of outcome predictions.*

Limitation: Considerable proportion of unexplained variability.



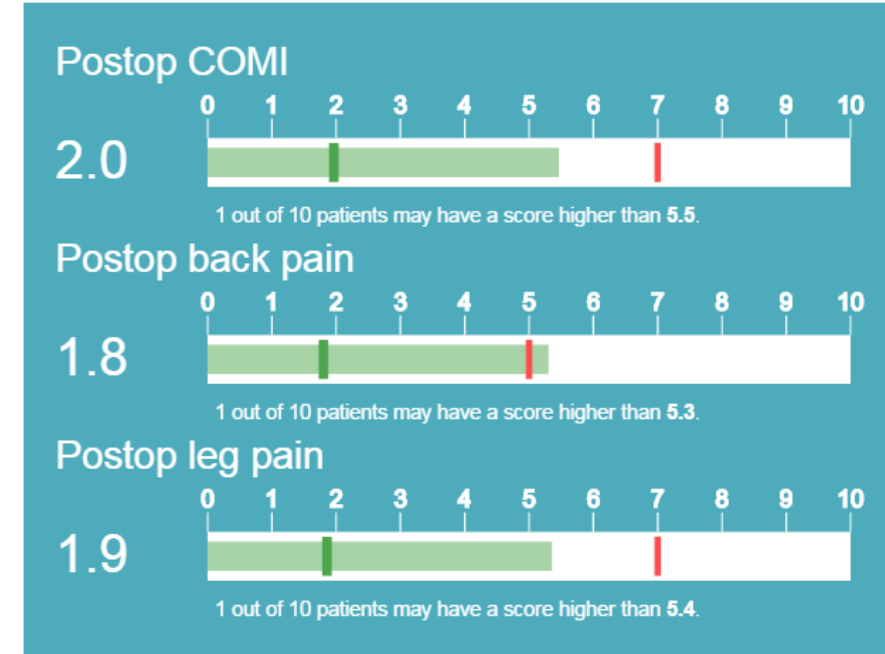
PrognosticTool: lumbar disc herniation

Input

Sex	male	▼
Age	56	(15-89)
Extent of lesion	>1 level	▼
Previous spine surgeries	0	▼
Surgeon experience	fellow (Oberarzt)	▼
Surgeon specialisation	orthop	▼
Main problem	leg pain	▼
Insurance	semi-private	▼
Morbidity state	ASA 1 (no disturbance)	▼
BMI	20-25	▼
Current smoker	no	▼
Preop COMI score	7	(0-10)
Preop back pain	5	(0-10)
Preop leg pain	7	(0-10)

Calculate

Output




Disclaimer

The authors do not guarantee the accuracy, reliability or currency of the information provided with this tool. Any errors in the information that are brought to our attention will be corrected as soon as possible. We reserve the right to change at any time without notice any information stored in the prognostic tool.

The authors accept no liability for any loss or damage a person suffers because that person has directly or indirectly relied on any information stored on this server.

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EU Horizon consortium project

- Spine Tango is part of the EU Horizon consortium project (2023 – 2026) aiming at applying AI methods to the data and developing prediction modelling for treatment outcomes

Facit

- Great that data on spinal therapies and outcome are collected and evaluated.
- The aim must be to reduce the proportion of unexplained variability (more data more standardisation and higher data quality, updating the models with additional predictors).
- We use the data far too little. The potential of the available data and the joint approaches (cross-border analyses and federated models, common dataset and standards) is enormous.

