Appendix 1: Questionnaire

In the Netherlands, a spinal fusion is usually indicated for degenerative conditions of the disc with or without spondylolisthesis and/or lysis. In this survey a lumbar spinal fusion is performed in L1-S1.

**Specialism:**

**Years of practice:**

**Hospital (optional):**

1. **Which conditions are needed to relate pain to degenerative conditions of the discus?**
   
   **A. Loss of disc height on a standing radiogram:**
   
   - Yes
   - No

   **B. Degenerative conditions of the disc on MRI (T2 imaging) according to the Pfirrmann classification:**
   
   - ≥ grade 1
   - ≥ grade 2
   - ≥ grade 3
   - grade 4 of 5
   - No

   **C. Presence of Modic changes of the endplates on MRI (T1 imaging):**
   
   - Yes
   - No

   **D. Presence of a vacuum phenomenon on radiogram or CT imaging:**
   
   - Yes
   - No

   **E. Recognizable pain on the symptomatic level during provocative discography with active leakage of contrast fluid:**
   
   - Yes
   - No

2. **When is a lumbar spinal fusion due to degenerative disorders indicated in your practice?** (multiple answers possible)
A. Back pain due to:
   - Degenerative conditions of the disc (as described in question 1) without radicular pain
   - Facet arthrosis without radicular pain
   - Instability on flexion/extension radiograms without radicular pain without radicular pain
   - Lysis/listhesis without radicular pain
   - A spinal fusion is not indicated in patients with back pain only

B. Leg pain with or without back pain due to:
   - Degenerative conditions of the disc (as described in question 1) with radicular pain
   - Facet arthrosis with radicular pain
   - Instability on flexion/extension radiograms without radicular pain with radicular pain
   - Lysis/listhesis with radicular pain

3. How many lumbar spinal fusions do you perform each year?
   - 0
   - 1-10
   - 10-25
   - 25-50
   - 50-75
   - > 75

4. What is your most used surgical technique for a lumbar spinal fusion
   - Open
   - Minimal invasive

5. What is your most used fusion technique for a lumbar spinal fusion? (1 answer only)
   A.
   - Posterior/posterolateral lumbar fusion (PF/PLF)
   - Unilateral posterior lumbar interbody fusion (PLIF)
   - Bilateral posterior lumbar interbody fusion (PLIF) with 1 cage
   - Bilateral posterior lumbar interbody fusion (PLIF) with 2 cages
   - Unilateral transforaminal lumbar interbody fusion (TLIF)
   - Bilateral transforaminal lumbar interbody fusion (TLIF) with 1 cage
o Bilateral transforaminal lumbar interbody fusion (TLIF) with 2 cages
o Anterior lumbar interbody fusion (ALIF)
o Extreme lateral lumbar interbody fusion (XLIF)
o Transaxial lumbar interbody fusion (AxiaLIF)
o Different technique (please proceed to question 5B)

B.

o Different technique: namely: ..............................................................

6. What type of visual tool do you normally use during surgery (as chosen in question 5)?
   o None
   o Loupes
   o Microscope
   o Endoscope

7. A. Does your procedure change due to an accompanying lytic/degenerative spondylolisthesis > grade 2?
   o No (please proceed to question 8)
   o These patients are not eligible for surgery in my practice (please proceed to question 8)
   o Yes (please proceed to question 7B)

B. If your procedure changes due to an accompanying lytic/degenerative spondylolisthesis > grade 2, what type of procedure do you use (1 answer only?)
   o Posterior/posterolateral lumbar fusion (PF/PLF)
   o Unilateral posterior lumbar interbody fusion (PLIF)
   o Bilateral posterior lumbar interbody fusion (PLIF) with 1 cage
   o Bilateral posterior lumbar interbody fusion (PLIF) with 2 cages
   o Unilateral transforaminal lumbar interbody fusion (TLIF)
   o Bilateral transforaminal lumbar interbody fusion (TLIF) with 1 cage
   o Bilateral transforaminal lumbar interbody fusion (TLIF) with 2 cages
   o Anterior lumbar interbody fusion (ALIF)
   o Extreme lateral lumbar interbody fusion (XLIF)
   o Transaxial lumbar interbody fusion (AxiaLIF)
   o Different technique (please proceed to question 7C)

C.

o Different technique: namely ..........................................................
8. **A. Does your procedure change due to an accompanying symptomatic central stenosis?**
   - No (please proceed to question 9)
   - These patients are not eligible for surgery in my practice (please proceed to question 9)
   - Yes (please proceed to question 8B)

**B. If your procedure changes due to an accompanying symptomatic central stenosis, what type of procedure are you using? (1 answer only)**
   - Posterior/posterolateral lumbar fusion (PF/PLF)
   - Unilateral posterior lumbar interbody fusion (PLIF)
   - Bilateral posterior lumbar interbody fusion (PLIF) with 1 cage
   - Bilateral posterior lumbar interbody fusion (PLIF) with 2 cages
   - Unilateral transforminal lumbar interbody fusion (TLIF)
   - Bilateral transforminal lumbar interbody fusion (TLIF) with 1 cage
   - Bilateral transforminal lumbar interbody fusion (TLIF) with 2 cages
   - Anterior lumbar interbody fusion (ALIF)
   - Extreme lateral lumbar interbody fusion (XLIF)
   - Transaxial lumbar interbody fusion (AxiaLIF)
   - Different technique (please proceed to question 8C)

C. Different technique: namely ......................................................... ...

9. **A. Does your procedure change due to an accompanying symptomatic foraminal stenosis?**
   - No (please proceed to question 10)
   - These patients are not eligible for surgery in my practice (please proceed to question 10)
   - Yes, (please proceed to question 9B)

**B. If your procedure changes due to an accompanying symptomatic foraminal stenosis, what type of procedure are you using? (1 answer only)**
   - Posterior/posterolateral lumbar fusion (PF/PLF)
   - Unilateral posterior lumbar interbody fusion (PLIF)
   - Bilateral posterior lumbar interbody fusion (PLIF) with 1 cage
   - Bilateral posterior lumbar interbody fusion (PLIF) with 2 cages
   - Unilateral transforminal lumbar interbody fusion (TLIF)
- Bilateral transforaminal lumbar interbody fusion (TLIF) with 1 cage
- Bilateral transforaminal lumbar interbody fusion (TLIF) with 2 cages
- Anterior lumbar interbody fusion (ALIF)
- Extreme lateral lumbar interbody fusion (XLIF)
- Transaxial lumbar interbody fusion (AxiaLIF)
- Different technique (please proceed to question 9C)

C.
- Different technique: namely ........................................... ...

10. Please estimate the percentage of the disc you remove during an interbody fusion (as chosen in question 5)
- 0 – 25%
- 25 – 50%
- 50 – 75%
- 75 – 90%
- > 90%
- I don’t use this technique

11. A. What type of material do you use to promote an interbody fusion during a spinal fusion (as chosen in question 5)? (1 answer only)
- Femoral allogeneous bone graft (not mentioned for cage packing)
- Allogeneous bone graft (not mentioned for cage packing)
- Autologous iliac crest graft (not mentioned for cage packing)
- Bone cement
- Titanium cage
- PEEK cage
- Tantalum cage (trabecular metal)
- BAK cage
- SiN cage (ceramic)
- I don’t use this technique
- Other, please proceed to question 12B
B.

○ Other, namely .............................................................

12. What kind of material do you use for packing of the cage (as chosen in question 5)? (1 answer only)

○ None

○ Allogeneous bone graft

○ Autologous iliac crest graft

○ Allogeneous iliac crest graft

○ Local autologous bone graft

○ Local autologous bone graft + substitute (example tricalciumphosphate)

○ BMP’s

○ BMP’s + autologous bone graft

○ BMP’s + allogeneous bone graft

○ BMP’s + substitute (example tricalciumphosphate)

○ Substitute (example tricalciumphosphate)

○ I don’t use this technique

13. If you have chosen for ALIF, TLIF or PLIF in question 5: Do you use additional bone graft around the cage and if so, at which position? (1 answer only)

○ Only anterior

○ Only posterior

○ Anterior and posterior

○ Between the cages

○ I don’t place any additional bone graft

14. How much bony graft do you use on average in the intervertebral space, as chosen in questions 13?

○ 0-2 cc

○ 2-5 cc

○ 5-10 cc

○ I don’t place any additional bone graft

15. If you have chosen for ALIF, TLIF or PLIF in question 5:

   A. How much time do you spend on average for the removal of the disc and the preparation of the end plates (with respect to the surgery time)? (1 answer only)

○ < 5%

○ 5 – 10 %
B. What materials do you use for the preparation of the endplates?
   - Curette
   - Grater
   - Answer 1+2
   - None
   - Inapplicable

16. Do you use neuromonitoring during a spinal fusion procedure (as chosen in question 5), not being scoliosis corrections:
   - Yes, in the minority of surgeries
   - Yes, in the majority of surgeries
   - No

17. A. Do you use additional pedicle screw fixation during a spinal fusion procedure (as chosen in question 5)?
   - Yes (please proceed to question 17B)
   - No (please proceed to question 17C)

B. Which type of system of which company do you use for pedicle screw fixation?
   - I am using ........................................of ........................................

C. If no, what type of additional fixation do you use
   - Stand alone cage without additional fixation
   - Stand alone cages with additional screw fixation
   - In situ posterolateral fixation with bone graft
   - Other (please proceed to question 17D)

D.
   - Other, namely ..............................................................

18. How do you place pedicle screws?
   - With anatomical landmarks
   - Fluoroscopy
   - With navigation
19. Please estimate the duration of a lumbar spinal fusion of 1 symptomatic level (2 vertebrae), as chosen in question 5?
   - < 90 min
   - 90 - 120 min
   - 120 - 150 min
   - 150 - 180 min
   - > 180 min

20. A. What is your standard policy for direct postoperative analgesic care, as chosen in question 5 (multiple answers possible)?
   - Patient Controlled Analgesia (PCA) - IV morphine
   - PCA - spinal/epidural morphine
   - Local anesthetics
   - NSAIDs
   - Paracetamol/perfalgan
   - Oral opioids
   - Gabapentin
   - Pregabalin
   - Other, please proceed to question 20B

B. Others: namely .................................................................

21. A. Aftercare: do you prescribe antibiotics as standard care postoperative (as chosen in question 5)?
   - No
   - Yes, only prophylactic
   - Yes, for 24 hours
   - Yes, for 48 hours
   - Yes, > 48 hours (please proceed to question 23B)

B. If you prescribe antibiotics > 48 hours, during what time?
   - ..........................................................

22. A. Aftercare: when is a patient allowed to mobilize (as chosen in question 5)?
A few hours after surgery
- day 1 after surgery
- day 2 after surgery
- longer, (please proceed to question 24B)

B. If your patient is allowed to mobilize more than 2 days after surgery, at what time are you allowing this?
- .......................................................... .................................

23. Aftercare: is your patient obligatory to wear a brace/corset as standard care postoperative (as chosen in question 5)?
- Yes, during hospitalization
- Yes, during 1-2 weeks
- Yes, during 2-4 weeks
- Yes, during 4-6 weeks
- Yes, > 6 weeks
- No

24.
A. Aftercare: do you prescribe dexamethasone as standard care postoperative (as chosen in question 5)?
- No
- Yes, during 24 hours
- Yes, during 48 hours
- Yes, during 72 hours
- Yes, > 72 hours (please proceed to question 26B)

B. If you prescribe dexamethasone> 72 hours after surgery, during what time?
- .......................................................... .................................

25. Aftercare: do you refer your patients to a physical therapist as standard care postoperative (as chosen in question 5)?
- Never
- Sometimes
- Regular
- Often
- Always
26. A. Do you prescribe anticoagulation as standard care postoperative (as chosen in question 5)?
   - No (please proceed to question 27)
   - Yes (please proceed to question 26B + 26C)

B. If you prescribe anticoagulation, during what time?
   - ..............................................................

C. Which anticoagulant do you prescribe?
   - ..............................................................

27. How do you assess the outcome of a spinal fusion in standard care (as chosen in question 5)?
   - Clinical
   - Radiographic
   - Both clinical and radiographic

28. A. Do you use questionnaires to assess the outcome of a spinal fusion in standard care, and if so, which one (multiple answers possible)?
   - No, I don’t use questionnaires
   - Roland Morris Disability Questionnaire
   - Oswestry Disability Index
   - VAS leg
   - VAS back
   - SF-36
   - EQ5D
   - Others (please proceed to questions 28B)

B. What other questionnaires do you using?
   - ..............................................................

29. If you use radiographic imaging to assess the outcome of fusion, what type of imaging do you use? (Multiple answers possible)?
   - CT-scanning
   - Radiogram
   - Dynamic radiogram (flexion/extension)
30. After what time do you assess the final outcome of a radiographic bony fusion?
   - 3 months
   - 6 months
   - 12 months
   - 24 months
   - Only in case of clinical symptoms

End of the questionnaire. Thank you very much!