Prehabilitation and rehabilitation – what do we really know?
– A debate built on the ISSLS membership

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Time line for spine surgery patients

Problem begins
Presurgical visit
Surgery
Follow-up visit
Adjust to normal life

“conservative treatments” analgesics, physiotherapy…..

Outcome of the surgery?

• What do we want to achieve with our treatment?

More important:
• What do the patients expect/want?

Overall:
…to have a life as good as possible…
Frequently used outcome measures

- Pain: VAS/NRS...
- QoL: EQ5D, SF36...
- Function (in relation to pain): ODI....

More focus on?

Activity level, function to meet daily life demands
- functional tests, motion tracking devices....

Predictors for poor outcome of lumbar spine surgery

**“Traditional factors”**
- Gender
- Smoking
- Pain duration
- BMI

**Bio-psycho-social factors**
- Presurgical psychological status
- depression
- negative personality traits
- negative outcome expectations
- fear-avoidance beliefs

Time line for spine surgery patients

- Problem begins
- Presurgical visit
- Surgery
- Follow-up visit
- Adjust to normal life

“conservative treatments”
- Analgesics, physiotherapy....

Debate - Guiding questions for discussion

- What are the identified gaps between clinical practice and evidence based literature?
- In what direction do we need to go in future clinical practice?
- What research questions do we need to address?
Why a survey? – Using a validated method

The ISSLS survey: through e-mail

ISSLS - Survey Results (N=77)

ISSLS Survey Results (N=77)

- Gender: Male (96%); Female (4%)
- Medical Discipline
  - Orthopaedics (94%)
  - Neurosurgery (5%)
  - Both (1%)
- Spine Fellowship: Yes (92%); No (8%)
- Mean Years of Experience: 25.5 (SD:14.2)
- Mean # lumbar fusions per year: 92.4 (SD:78)
- Setting
  - University/teaching hospital (77%)
  - Regional Hospital (8%)
  - Private practice (15%)

Spine Surgeons by Country

Thank you, Katarina
Prehabilitation – to optimize functional outcome after lumbar fusion surgery

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Prehabilitation:
Nielsen et al. 2010
Rolving et al. 2015
Lindbäck et al. 2017
Lotzke et al. 2019

Postoperative Rehabilitation:
Christensen et al. 2003
Mannion et al. 2007
Abbott et al. 2010
McGregor et al. 2011
Aalto et al. 2011
Oestergaard et al. 2012
Monticone et al. 2014
Archer et al. 2016
Ivsee et al. 2017

Preoperative Physical Therapy Program - according to the ISSLS membership

<table>
<thead>
<tr>
<th>Do you refer to a preoperative program?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
</tr>
<tr>
<td>43.4%</td>
</tr>
<tr>
<td>Often</td>
</tr>
<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Rarely</td>
</tr>
<tr>
<td>Never</td>
</tr>
</tbody>
</table>

44.5%

What should the prehabilitation contain?
- ISSLS membership response

Exercise therapy; strengthening 68.5%
What should the prehabilitation contain? - what does the literature say?

<table>
<thead>
<tr>
<th>Reference</th>
<th>Content</th>
<th>Effect</th>
</tr>
</thead>
</table>
| Nielsen et al 2010 (Denmark) | 1) Intensive training  
2) EDA (Analgesia)  
3) Intensified mobilisation  
4) Protein supplements | Effect on disability at the time of surgery  |
| Rolving et al 2015 (Denmark) | 9 times of multidisciplinary CBT sessions | Effect on catastrophizing and fear-avoidance beliefs 6 months after |
| Lindbäck et al 2017 (Sweden) | 1) 12 times of PT  
2) Treatment based classification  
3) Tailor made supervised exercise program  
4) Behavioral approach to reduce fear avoidance and increase activity level | Effect on physical activity level  |
| Lotzke et al 2019 (Sweden) | 4 sessions of CBT  
[Physical Education, Addressing fear-avoidance] | Effect on EQ5D 1 week preop [ES=0.57] |

Do you provide any written information sheets/booklets to patients preoperatively? - ISSLS membership

- Yes
- No

Written information preoperatively? - what does the literature say

"Booklet and leaflets"
- No evidence for lumbar fusion surgery

Pain neuroscience education
- No evidence for lumbar fusion
- Radiculopathy, effect on health care savings after 3 years

PREPARE - Our prehabilitation program

Use of the PREPARE (PREhabilitation, Physical Activity and exeRciSE) program to improve outcomes after lumbar fusion surgery for severe low back pain: a study protocol of a person-centred randomised controlled trial
PREPARE – targeting psychological risk

![Figure 1: The four-domain model with the moderating role of self-efficacy](image)

PREPARE – Results (Lundberg et al)

- Early effect on EQ5D (ES=0.57, one week preoperatively)
- Kinesiophobia and low self-efficacy contribute to low level of physical activity
- High levels of disability and fear of movement were associated with fewer steps per day

Our prehabilitation program - theses

PREPARE – effects on physical activity
Summary prehabilitation

- A prehabilitation program is safe (no side effects)
- Improves physical activity and health (not disability)
- Kinesiophobia and low self-efficacy contributes to low level of physical activity
- Gaps - Reconsider the outcome (health and patient selected outcomes instead of disability?)
- Gaps – what kind of exercise?

Postoperative Rehabilitation: optimize functional outcomes after lumbar surgery

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Associate Professor, Department of Physical Medicine and Rehabilitation
Director, Vanderbilt Center for Musculoskeletal Research
Vanderbilt University Medical Center

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Postoperative Physical Therapy Program
Lumbar Spine Fusion (N=77)

Do you refer to a postoperative program?

- Always: 17%
- Sometimes: 18%
- Often: 8%
- Rarely: 7%

Postoperative Physical Therapy Program

- How many physiotherapy sessions?
  - Mean 9.3 (SD: 11.4); Median 7

When does physiotherapy start?

- Immediately: 41%
- After 1 week: 17%
- After 3 weeks: 15%
- After 6 weeks: 8%
- After 12 weeks: 6%
Top physiotherapy interventions

- Postoperative Physical Therapy Program

Survey of Current Physiotherapy Practice for Patients Undergoing Lumbar Spinal Fusion in the United Kingdom


- Survey in United Kingdom of physiotherapists
  - 71 returned out of 85 (84%)
- Referred to postoperative rehabilitation – specific to lumbar fusion
  - 41% reported routine referral
  - 4% reported referral was arranged
- Preoperative visit: previous surgery, multiple comorbidities, reduced prep function, severe pain
  - Postoperative visit: reduced prep function, joint mobility, fear avoidance, slow recovery
- Start of physiotherapy: 2-6 weeks postoperatively
  - Average 8 visits
- Top treatments:
  - Back and abdominal exercises
  - Neurodynamic mobilization
  - Cardiorespiratory exercise

Postoperative Physical Therapy Program

- Main reason you refer?
  - Improve function/physical activity (28%)
  - Faster/earlier recovery (26%)
  - Regain strength, flexibility, balance (23%)
  - Gain confidence/motivation (6%)
  - Improve mental health (3%)
  - Reduce pain (1%)
- Other provider? (7% always; 23% sometimes, 70% never)
  - Occupational therapist
  - Acupuncturist
  - Clinical psychologist
  - Chiropractor
  - Social worker
  - Exercise physiologist

Survey in United Kingdom of physiotherapists

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Spinal Surgeons’ Opinions on Pre- and Postoperative Rehabilitation in Patients Undergoing Lumbar Spinal Fusion Surgery

- A Survey-Based Study in the Netherlands and Sweden

<table>
<thead>
<tr>
<th>Diastolic Blood Pressure</th>
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<tbody>
<tr>
<td>130 mm Hg</td>
</tr>
<tr>
<td>140 mm Hg</td>
</tr>
</tbody>
</table>

Figure 3. Flowchart of respondents.
Spinal Surgeons’ Opinions on Pre- and Postoperative Rehabilitation in Patients Undergoing Lumbar Spinal Fusion Surgery

A Survey-Based Study in the Netherlands and Sweden

Referred to postoperative rehabilitation – specific to lumbar fusion
- 44% in Netherlands
- 88% in Sweden

Start of physiotherapy: immediately to 9-12 weeks

Top treatments:
- Manual therapy
- Mechanical diagnosis therapy (McKenzie)
- Sensory stimulation (massage)

Prehabilitation:
- Nielsen et al. 2010
- Louw et al. 2014
- Rolving et al. 2015
- Lindbäck et al. 2017
- Lotzke et al. 2019

Postoperative Rehabilitation:
- Christensen et al. 2003
- Mannion et al. 2007
- Abbott et al. 2010
- McGregor et al. 2011
- Aalto et al. 2011
- Oestergaard et al. 2012
- Monticone et al. 2014
- Archer et al. 2016
- Ilves et al. 2017

What is the evidence base for postoperative rehabilitation?
Active rehab is more effective than usual care:
- Moderate quality evidence for short term and long term function and back pain
- Moderate quality evidence for long term leg pain
- Low quality evidence for short term leg pain
- Low quality evidence for short term and long term general health

Complex rehabilitation is more effective than usual care:
- Low quality evidence for short term and long term disability and fear avoidance
- Disability improvement is clinically significant (>12.4% in ODI)

Back Café Concept (peer support group)
- Café group vs. PT vs. Video (N=81)
  - Café group
    - 3 meetings over 8 weeks (1.5 hours)
  - PT group
  - Rehab 2x/week for 8 weeks (1.5 hours)
- 2-years improved function/leg pain/RTW in Cafe group
- Questions importance of intensive exercise
- Demonstrates relevance of coping strategies
**Phase III Trial: Objective**

We aimed to compare which of two treatments delivered by telephone - cognitive-behavioral based physical therapy (CBPT) program or an Education program – are more effective for improving patient-centered outcomes in patients following lumbar spine surgery.

- Disability (Oswestry Disability Index)
- Pain (Brief Pain Inventory)
- General Health (SF-12)
- Physical activity (accelerometer)
- Health care utilization (patients and hospital billing records)

**Key Points**

- Early start of rehabilitation (6 wk vs. 12 wk) after lumbar spinal fusion resulted in inferior outcomes.
- The steep rise of rehabilitation after lumbar spinal fusion is an important contributing factor for the overall outcome.
- Patients who initiated rehabilitation 6 weeks after surgery had better outcomes and performed better regarding functional mobility and daily activities than the group that initiated rehabilitation 12 weeks postoperatively.
Between Group Differences at 1-Year

<table>
<thead>
<tr>
<th>Measure</th>
<th>CBT</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disability (WOMAC)</td>
<td>6 months</td>
<td>-0.30 (-2.16, 1.56)</td>
</tr>
<tr>
<td></td>
<td>12 months</td>
<td>-0.30 (-1.56, 1.21)</td>
</tr>
<tr>
<td>Back Pain (SF 12-10)</td>
<td>6 months</td>
<td>-0.05 (-2.03, 1.93)</td>
</tr>
<tr>
<td></td>
<td>12 months</td>
<td>-0.23 (-1.35, 0.89)</td>
</tr>
<tr>
<td>General Physical Health (PCS 12-12)</td>
<td>6 months</td>
<td>0.29 (0.02, 0.56)</td>
</tr>
<tr>
<td></td>
<td>12 months</td>
<td>0.24 (0.07, 0.42)</td>
</tr>
</tbody>
</table>

Summary and Discussion

• Majority of surgeons are referring to physical therapy (PT) after fusion
  – Moderate-quality evidence for traditional active rehab vs. usual care
• Majority of surgeons start PT immediately to 1 week after fusion
  – One study demonstrates timing is important
  – 3 months may be better than 6 weeks
• Number of sessions is variable (median 7)
  – No study to date has examined number of sessions
  – Trials include programs that range from 3-12 sessions
• Majority of surgeons are not referring for psychosocial rehabilitation
  – Low-quality evidence for psychosocial vs. usual care
  – Preliminary evidence for targeted assessment and treatment

So what is the road forward for rehabilitation?

• Timing of supervised rehabilitation
  – Preoperative?
  – Postoperative – immediate or wait 6 weeks to 3 months
• Duration of supervised rehabilitation
  – Preoperative - 4-18 sessions
  – Postoperative – 6-8 sessions
  – Dose response?
• Content of supervised rehabilitation
  – Active exercise components
  – Psychosocial strategies - CBT
• Screening for patients at-risk for poor outcomes

Next Steps