

SPINE TANGO Report

International 2010



The International Spine Registry
EuroSpine

C. Röder, M. Neukamp, G. Perler, E. Munting, M. Aebi

CONTENTS

2

Introduction	M. Aebi	3
Profile	C. Röder, T. Zweig	4
New developments	C. Röder	5
Surgery and follow up 2011 drafts		6
Application	C. Röder, T. Zweig	10
Data entry		12
A complete case		13
Major forms		15
Epitome of available data / benchmarking	M. Neukamp, C. Röder, G. Perler	20
Participants	C. Röder, M. Neukamp	50
Security concept	T. Ambrose	52
Available questionnaires Spine Tango	E. Rösli	54
Publications	M. Neukamp	55

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INTRODUCTION

Since the year 2000 EuroSpine – The Spine Society of Europe has been developing and enhancing a documentation system for spinal surgery in form of a registry. With Spine Tango we are meeting the growing demand to assess the safety and comparative effectiveness of surgical interventions of the spine. Only few other fields in medicine are under comparable scrutiny. Reacting to these tendencies, endeavors of pioneer clinicians and the Spine Tango team, in collaboration with the Institute for Evaluative Research in Medicine of the University of Bern, have led to the implementation of the only international spinal registry to date. The idea for Spine Tango was born a decade ago and developments and participation have constantly progressed since those days. Now, having reached a recognized status we would like to encourage national societies and individual partners to join the registry. Health and reimbursement authorities are already limiting the accessibility of our treatment modalities since we are lacking evidence in many aspects. Therefore we are offering Spine Tango as a common language to make our services visible and transparent. With a constantly increasing activity in the registry we would like to inform you about its history, its objectives and its current status.

3

M. Aebi

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**UNIVERSITÄT
BERN**

PROFILE

Spine Tango enables you to document the whole spectrum of spinal pathologies and the possible surgical and non-surgical treatment options. The generic approach of the Spine Tango documentation system is a must to reach the maximum number of participants using a common web based technology. This, in turn, reduces the potential for customizing the Tango in order to meet the individual expectations of specific users. There are, nevertheless, still a number of possibilities to parameterize the data collection processes according to the various hospital workflows in the user community. To give you the opportunity to document not only the surgical treatments, we have developed Spine Tango Conservative, which will be available as of summer 2011.

4

Spine Tango is an international, non-commercial system under the auspices of EuroSpine aiming at enabling national societies to control their own part of the registry. For that a technology called “national module concept” has been implemented to enhance participation options and to provide the hardware structure for appropriate security measures for patient and user privacy protection. In conclusion, Spine Tango is a unique applied medical and scientific documentation and technology solution. It is to the benefit of patients, physicians and therapists whilst generating evidence based findings to improve spinal care (1).

1. Aebi M, Grob D (2004)

SSE Spine Tango: a European Spine Registry promoted by the Spine Society of Europe (SSE)
Eur Spine J 13: 661-662. DOI 10.1007/s00586-004-0868-0



NEW DEVELOPMENTS

Spine Tango Conservative: for the past three years we have been working on a documentation instrument for the non-surgical spinal therapies in order to complement the registry and make possible the assessment of all spinal treatments within the framework of one and the same registry. A first version of Spine Tango conservative was tested on a series of patients in 2009 and the results of this study are meanwhile available in the literature. Also, after another round of refinements the first official version of the questionnaire will go live in summer 2011. In parallel a reliability and validation study of the instrument is under way.

Spine Tango 2011: data analysis and new inventions in the spinal field have been the major drivers for developing the 2011 generation of the Spine Tango surgery, staged surgery and followup forms. They will be available as of summer 2011. Check out the following pages for a first impression.

Quality report: in our constant striving for improving the value of your data collection we do now provide the first version of a Spine Tango quality report, a comprehensive and stratified output about your interventions, followups, and outcomes. A pooled sample analysis of the 2010 Spine Tango data set is available on the Spine Tango web page.

5



**SSE Spine Tango Pathways
Manual for Entering and Querying Data**



Spine Tango
Newsletter September 2010



Surgery form 2011 draft front side

SPINE TANGO



SURGERY

2011

Directions

- Use a #2 soft pencil for marking.
- Text answers must be entered with the web interface.
- All questions must be answered unless otherwise indicated.
- Completely fill in boxes to record answers.

Question types

- only 1 answer allowed
- multiple answers allowed
- mandatory questions
- please specify

Format
 minimal
 complete

Internal Use Only / Not read by scanner

Last name		First name		Gender	
Street			M.R.N.		
Country code		Zip code		City	
Social security number			Birthdate (DD.MM.YYYY)		

Level of main pathology

- | | | | | | |
|---|---|--|---|---------------------------------------|---------------------------------|
| <input type="checkbox"/> upper cervical | <input type="checkbox"/> cervicothoracic | <input type="checkbox"/> thoracic | <input type="checkbox"/> thoraco-lumbo-sacral | <input type="checkbox"/> lumbo-sacral | <input type="checkbox"/> coccyx |
| <input type="checkbox"/> mid lower cervical | <input type="checkbox"/> cervico-thoraco-lumbar | <input type="checkbox"/> thoracolumbar | <input type="checkbox"/> lumbar | <input type="checkbox"/> sacral | |

Admission / Pathology

- Day: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
- Month: 1 2 3 4 5 6 7 8 9 10 11 12
- Year: 10 11 12 13 14 15 16 17 18 19 20

Main pathology

- | | | | | |
|---|--|---|------------------------------------|---|
| <input type="checkbox"/> degenerative disease | <input type="checkbox"/> fracture/trauma | <input type="checkbox"/> spondylolisthesis (non degen.) | <input type="checkbox"/> infection | <input type="checkbox"/> repeat surgery |
| <input type="checkbox"/> non degen. deformity | <input type="checkbox"/> pathological fracture | <input type="checkbox"/> inflammation | <input type="checkbox"/> tumor | <input type="checkbox"/> other: specify |

Specification of Main Pathology

Only answer questions related to Main Pathology (Main Pathology "other" requires no specification.).

<p>Degen. disease</p> <p>Type of degeneration</p> <p><input type="checkbox"/> disc herniat./protrusion</p> <p><input type="checkbox"/> central stenosis</p> <p><input type="checkbox"/> lateral stenosis</p> <p><input type="checkbox"/> foraminal stenosis</p> <p><input type="checkbox"/> degen. disc disease</p> <p><input type="checkbox"/> degen. deformity</p>	<p>Specify grade of spondyl.</p> <p><input type="checkbox"/> degen. spondylolisthesis</p> <p><input type="checkbox"/> other instability</p> <p><input type="checkbox"/> myelopathy</p> <p><input type="checkbox"/> facet joint arthrosis</p> <p><input type="checkbox"/> other</p> <p><small>Specify type of deformity below</small></p>	<p>Spondylolisthesis</p> <p>Type of spondylolisthesis</p> <p><input type="checkbox"/> Type I (congenital, dysplastic)</p> <p><input type="checkbox"/> Type II (isthmic)</p> <p><input type="checkbox"/> Type III see type of degen.</p> <p><input type="checkbox"/> Type IV (traumatic)</p> <p><input type="checkbox"/> Type V (pathologic)</p> <p><input type="checkbox"/> Type VI (postsurgical)</p>	<p>Extent of dysplasia</p> <p><input type="checkbox"/> high</p> <p><input type="checkbox"/> low</p> <p><input type="checkbox"/> unknown</p>	<p>Grade of spondylolisthesis</p> <p><input type="checkbox"/> Grade 0</p> <p><input type="checkbox"/> Grade I</p> <p><input type="checkbox"/> Grade II</p> <p><input type="checkbox"/> Grade III</p> <p><input type="checkbox"/> Grade IV</p> <p><input type="checkbox"/> Spondylolip-tosis (V)</p>
--	---	--	--	--

Deformity

Type of deformity Also specify type of degenerative deformity

scoliosis

kyphosis

other

Type of scoliosis

single curve

double curve

Predominant etiology

idiopathic

congenital

neuromuscular

posttraumatic

M. Scheuermann

other

Additional fractures w/different treatments require separate forms

(Pathological) Fracture/Trauma

Type of (pathological) fracture/trauma

condylar (CO)

C0/1 dissociation

C1 fracture

C1/2 instability

C2 dens fracture

C2 other fracture

soft tissue injury neck

fracture C3-L5/S1

sacrum fracture

other

Dens fracture type

I

II

III

C3-L5/S1 AO fracture type

Type: A B C

Group: 1 2 3

Subgroup: 1 2 3

Pathological fracture due to ...

osteoporosis

tumor

other

Fracture age

fresh fracture

old fracture

In case of tumor, answer questions "Type of tumor" and "Localization" in section "TUMOR"

Inflammation

Type of inflammation

inflammatory arthritis (seropos)

seronegative arthritis

ankylosing spondylitis (M. Bechterew)

other

Infection

Infection specification

pyogenic

parasitic

tuberculous

fungal

other

Affected structure(s)

spondylitis

discitis

epidural space

paravertebral infection

other

Tumor

Type of tumor

primary malignant

primary benign

secondary malignant

tumor like lesion

other

Localization

extraosseous soft tissues

intraosseous (superficial)

intraosseous (deep)

extraosseous (extradural)

extraosseous (intradural)

other

Specify type of tumor

Repeat surg.

Type or reason of repeat surgery

hardware removal

non-union

instability

failure to reach therapeutic goals

neurocompression

postop. infection

postop. infect. deep

implant malposition

implant failure

sagittal imbalance

adjac. segment pathology

other

Comments regarding main pathology:

In segments, mark cranial VB SA = sacrum / CO = coccyx

Most severely affected segment vertebral body

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Extent of lesion (segments/vertebral bodies)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Additional pathology (Answer to question "Main pathology" is excluded.)

- | | | | | | |
|---|--|---|---------------------------------------|---|---------------------------------|
| <input type="checkbox"/> none | <input type="checkbox"/> n. degen. deformity | <input type="checkbox"/> pathological fracture | <input type="checkbox"/> inflammation | <input type="checkbox"/> tumor | <input type="checkbox"/> other: |
| <input type="checkbox"/> degen. disease | <input type="checkbox"/> fracture/trauma | <input type="checkbox"/> spondylolisthesis (non-degen.) | <input type="checkbox"/> infection | <input type="checkbox"/> repeat surgery | specify |

Number of previous spine surgeries

- 0 1 2 3 4 5 6

Answer: "0" excludes both "Previous surgery" questions ("at same level" and "at same hospital").

Previous surgeries at same level

- no yes partially

Prev. surg. same hospital or surgeon

- no yes partially

Previous treatment for main pathology (by specialist)

- | | |
|--|---|
| <input type="checkbox"/> none | <input type="checkbox"/> 3-6 mon. conservative |
| <input type="checkbox"/> surgical | <input type="checkbox"/> 6-12 mon. conservative |
| <input type="checkbox"/> < 3 mon. conservative | <input type="checkbox"/> > 12 mon. conservative |

Risk factors

- | | | | | | |
|--------------------------|---|--------------------------------|----------------------------------|---------------------------------|----------------------------------|
| BMI | <input type="checkbox"/> < 20 | <input type="checkbox"/> 20-25 | <input type="checkbox"/> 26-30 | <input type="checkbox"/> > 35 | <input type="checkbox"/> unknown |
| Current smoker | <input type="checkbox"/> yes | <input type="checkbox"/> no | <input type="checkbox"/> unknown | | |
| Presence of flags | <input type="checkbox"/> none | <input type="checkbox"/> red | <input type="checkbox"/> yellow | <input type="checkbox"/> orange | <input type="checkbox"/> blue |
| | <input type="checkbox"/> unable to assess | <input type="checkbox"/> black | | | |

Red: Biomedical Factors; serious spinal pathology
 Yellow: Psychosocial or behavioral factors
 Orange: Abnormal psychological processes indicating psychiatric disorders
 Blue: Socioeconomic/work factors
 Black: Occupational and societal factors

Surgery form 2011 draft back side

SPINE TANGO

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SURGERY
Page 2 of 2

Surgeon Assistant

Surgery

Day (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31)

Month (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) Year (1) (2) (3) (4) (5) (6) (7) (8) (9) (00)

<p>Therapeutic goals</p> <p><input type="checkbox"/> axial pain relief <input type="checkbox"/> spinal stabilization</p> <p><input type="checkbox"/> peripheral pain relief <input type="checkbox"/> stop deformity progression</p> <p><input type="checkbox"/> functional improvement <input type="checkbox"/> prophylactic decompression</p> <p><input type="checkbox"/> motor improvement <input type="checkbox"/> cosmetic improvement</p> <p><input type="checkbox"/> sensory improvement <input type="checkbox"/> diagnostic measures</p> <p><input type="checkbox"/> bladder/sex function improv. <input type="checkbox"/> other</p>	<p>Anterior access</p> <p><input type="checkbox"/> no anterior access <input type="checkbox"/> thoracotomy</p> <p><input type="checkbox"/> transoral <input type="checkbox"/> thoracoabdominal</p> <p><input type="checkbox"/> anterolateral <input type="checkbox"/> retroperitoneal</p> <p><input type="checkbox"/> cervicothorac. anterolat. <input type="checkbox"/> transperitoneal</p> <p><input type="checkbox"/> cervicothorac. <input type="checkbox"/> trans-soas (XLIF)</p> <p><input type="checkbox"/> w/sternotomy <input type="checkbox"/> other</p>
--	---

Components Description not needed if SEDICO implant tracking is used.

none **Supplier:**

with description w/o description **Article name:**

For article numbers or multiple implants use form "Implant documentation" @ www.eurospine.org

<p>Surgeon credentials</p> <p><input type="checkbox"/> specialized spine</p> <p><input type="checkbox"/> board certif. orthopaedic</p> <p><input type="checkbox"/> board certified neuro</p> <p><input type="checkbox"/> orthopaedic in training</p> <p><input type="checkbox"/> neuro in training</p> <p><input type="checkbox"/> other</p>	<p>Morbidity state</p> <p><input type="checkbox"/> unknown</p> <p><input type="checkbox"/> ASA1 (no disturbance)</p> <p><input type="checkbox"/> ASA2 (mild/moderate)</p> <p><input type="checkbox"/> ASA3 (severe)</p> <p><input type="checkbox"/> ASA4 (life threatening)</p> <p><input type="checkbox"/> ASA5 (moribund)</p>	<p>Technology</p> <p><input type="checkbox"/> conventional <input type="checkbox"/> CASS</p> <p><input type="checkbox"/> MISS/LISS <input type="checkbox"/> microscope</p> <p><input type="checkbox"/> loops <input type="checkbox"/> neuromonitoring</p> <p><input type="checkbox"/> endoscope <input type="checkbox"/> other</p>	<p>Operation time</p> <p><input type="checkbox"/> unknown <input type="checkbox"/> < 4-5 hrs.</p> <p><input type="checkbox"/> < 1 hr. <input type="checkbox"/> 5-6 hrs.</p> <p><input type="checkbox"/> 1-2 hrs. <input type="checkbox"/> 6-8 hrs.</p> <p><input type="checkbox"/> 2-3 hrs. <input type="checkbox"/> 8-10 hrs.</p> <p><input type="checkbox"/> 3-4 hrs. <input type="checkbox"/> > 10 hrs.</p>
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Prophylaxis

none thrombembolism other

infection ossification

Blood loss

unknown < 100 ml 500 - 1000 ml

< 100 ml 1000 - 2000 ml > 2000 ml

100 - 500 ml > 2000 ml

Blood transfusion

none >=2 units unknown

<2 units cell saver unknown

Surgical Measures Note: "anterior" / "posterior" refers to location of MEASURES in the spine, NOT to access!

Decompression

none disectomy partial/total laminotomy facet joint resection full foraminotomy

anterior vertebrectomy partial hemi-laminectomy sequestrectomy laminoplasty

posterior } specify ... vertebrectomy full laminectomy flavectomy uncoforaminotomy

Location in spine, choose at least one! osteotomy facet joint resec. partial flavotomy other

Fusion promoting measu.

none interbody fusion (ALIF) other interbody fusion none bone subst.

anterior interbody fusion (PLIF) posterolat. fusion autol. bone harvested cement

posterior } specify ... interbody fusion (TLIF) posterior fusion autol. bone locally procured BMP or similar

Location in spine, choose at least one! interbody fusion (XLIF) other

allog. bone other

Stabilization rigid

none interbody stabil. with cage facet screws odontoid screws

anterior interbody stabil. with auto-/allograft transarticular screw C1-C2 laminar screws

posterior } specify ... vertebral body replacement by cage laminar hooks with rod other

Location in spine, choose at least one! plates pedicle hooks with rod

pedicle screws with rod lateral mass screw with rod

Stabil. motion preserving

none disc replacement **Percutan. measures** facet block kyphoplasty **Other surgical measures**

anterior dynamic stabilizat. none root block epidural no yes

posterior } specify ... interspin. spacer < none discography injections no yes

Location in spine, choose at least one! other

Choose one! vertebroplasty other

Specify yes:

Extent of surgery - indicate as: (from cranial to caudal) SA = sacrum / CO = coccyx

segments **from** (0) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)

vertebral bodies **to** (0) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)

Intraop surgical complications

none vascular injury **Surgical measures during index surgery** **Intraop general complications**

nerve root damage fx vertebral structures none none thrombembolism

spinal cord damage other

dura lesion not documented suture/glue anaesthesiological death

other

not documented other

pulmonary cardiovascular other

not documented not documented

Hospital stay

Postop surgic compl. before discharge

none implant malposition **Postop general compl. before discharge**

epidural hematoma implant failure none kidney / urinary other

other hematoma wrong level cardiovascular liver / GI not documented

radiculopathy other

CSF leak / pseudomeningocele not documented pulmonary thrombembolism

motor dysfunction not documented cerebral death

sensory dysfunction not documented

bowel / bladder dysfunction not documented

wound infection superficial not documented

wound infection deep not documented

Re-intervention after index surgery

none hardware other

hematoma evacuation re-implantation not documented

suture / glue abscess drainage

hardware removal (further) decompression

Hospital stay **Status of surg. complications** **Therapeutic goals upon discharge** **FU foreseen**

uneventful extended stay resolved persisting achieved not achieved no

ICU > 2 days improved improved partially achieved partially achieved yes

Day (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31)

Discharge Month (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) Year (1) (2) (3) (4) (5) (6) (7) (8) (9) (00)

Abbreviations:
 MISS = Minimally Invasive Spine Surgery; LISS = Less Invasive Spine Surgery; CASS = Computer-Assisted Spine Surgery

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 01.08.2011

Followup form 2011 draft physician based, single sided

SPINE TANGO



FOLLOW-UP 2011

Directions

- Use a #2 soft pencil for marking.
- Text answers must be entered with the web interface.
- All questions must be answered unless otherwise indicated.
- Completely fill in boxes to record answers.

Question types

- only 1 answer allowed please specify
 multiple answers allowed
 mandatory information

Level of intervention

- | | | | | | |
|---|---|--|---|---------------------------------------|---------------------------------|
| <input type="checkbox"/> upper cervical | <input type="checkbox"/> cervicothoracic | <input type="checkbox"/> thoracic | <input type="checkbox"/> thoraco-lumbo-sacral | <input type="checkbox"/> lumbo-sacral | <input type="checkbox"/> coccyx |
| <input type="checkbox"/> mid lower cervical | <input type="checkbox"/> cervico-thoraco-lumbar | <input type="checkbox"/> thoracolumbar | <input type="checkbox"/> lumbar | <input type="checkbox"/> sacral | |

Internal Use Only
Not read by scanner

Last name	First name	Gender
Street		M.R.N.
Country code	Zip code	City
Social security number		Birthdate (DD.MM.YYYY)

Follow-up

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Month 1 2 3 4 5 6 7 8 9 10 11 12 Year 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Follow up interval

- 6 weeks 1 year
 3 months 2 years
 6 months other (yrs.)
- (Ex. 4 months=0.33 yrs. (4/12))

Work status

- not at work since OP resumed work, different job housewife
 started partially, same job has been dismissed child/student
 fully reintegrated retired since OP other
- resumed work, but quit again retired before OP

Only comment on those goals/measures which were indicated for the "Goal of surgery" question on the "SURGERY" form.

Therapeutic goals/measures achieved

- none
- axial pain relief
- peripheral pain relief
- functional improvement
- motor improvement
- sensory improvement
- bladder/sex function improv.
- spinal stabilization
- stop deformity progression
- prophylactic decompression
- cosmetic improvement
- diagnostic measures
- other

Therap. goals/measures partially achieved

- none
- axial pain relief
- peripheral pain relief
- functional improvement
- motor improvement
- sensory improvement
- bladder/sex function improv.
- spinal stabilization
- stop deformity progression
- prophylactic decompression
- cosmetic improvement
- diagnostic measures
- other

Therapeutic goals/measures not achieved

- none
- axial pain relief
- peripheral pain relief
- functional improvement
- motor improvement
- sensory improvement
- bladder/sex function improv.
- spinal stabilization
- stop deformity progression
- prophylactic decompression
- cosmetic improvement
- diagnostic measures
- other

Medication for spinal surgery/pathology

- | | | |
|---|---|--|
| <input type="checkbox"/> none | <input type="checkbox"/> strong opiates (WHO III) | <input type="checkbox"/> vitamin B complex |
| <input type="checkbox"/> NSAID, Paracetamol (WHO I) | <input type="checkbox"/> steroids | <input type="checkbox"/> antibiotics |
| <input type="checkbox"/> weak opiates (WHO II) | <input type="checkbox"/> antidepressives | <input type="checkbox"/> other |

Overall outcome (examiner)

- not applicable good poor
 excellent fair

Rehabilitation

- none outpatient rehab / physio other
- home-based inpatient rehab / physio

Decision

- no further follow-up revision foreseen
 further follow-up other primary intervention foreseen

Comments regarding follow-up

Complications

Complications

- no (Answer "no" excludes all remaining questions.)
 yes

Time

- early, Op-day - 28 days postop
 sub-acute, 2 - 6 months
 late, > 6 months

Type

- | | | |
|---|---|---|
| <input type="checkbox"/> sensory dysfunction | <input type="checkbox"/> wound infection deep | <input type="checkbox"/> adjac. segment pathology |
| <input type="checkbox"/> motor dysfunction | <input type="checkbox"/> spondylitis | <input type="checkbox"/> recurrent tumor |
| <input type="checkbox"/> bowel / bladder dysfunction | <input type="checkbox"/> discitis | <input type="checkbox"/> decompensation of spine |
| <input type="checkbox"/> non-union | <input type="checkbox"/> wrong level | <input type="checkbox"/> cardiovascular |
| <input type="checkbox"/> implant failure | <input type="checkbox"/> implant malposition | <input type="checkbox"/> gastrointestinal |
| <input type="checkbox"/> instability | <input type="checkbox"/> recurrence of symptoms | <input type="checkbox"/> fx vertebral structures |
| <input type="checkbox"/> CSF leak / pseudomeningocele | <input type="checkbox"/> graft complication | <input type="checkbox"/> thrombembolism |
| <input type="checkbox"/> wound infection superficial | <input type="checkbox"/> sequelae anaesthesia | <input type="checkbox"/> other |

Therapeutic consequences

- none
 non-operative inpatient
 non-operative outpatient
 reintervention
 other

Individual consequences

- none
 increased pain
 prolonged impairment
 reduced social activities
 permanent impairment
 other

Examiner

Comments regarding complications

Surgery staged 2011 draft front and back side

SPINE TANGO



SURGERY Staged

Directions

- Use a #2 soft pencil for marking.
- Text answers must be entered with the web interface.
- All questions must be answered unless otherwise indicated.
- Completely fill in boxes to record answers.

Question types

- only 1 answer allowed
- multiple answers allowed
- mandatory questions
- please specify

- Format**
- minimal
 - complete

Internal Use Only
Do not enter by candidate

Last name		First name		Gender
Street			M.R.N.	
Country code	Zip code	City		
Social security number			Birthdate (DD.MM.YYYY)	

Level of procedure

- upper cervical
- mid lower cervical
- cervicothoracic
- cervico-thoraco-lumbar
- thoracic
- thoracolumbar
- thoraco-lumbo-sacral
- lumbo-sacral
- lumbo
- sacral
- coccyx

Admission

- Day: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31)
- Month: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)
- Year: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

Main pathology

- Answer "same as stage I surgery" excludes questions "Specification of Main Pathology" and "Previous treatment for main pathology"
- same as stage I surgery
 - degenerative disease
 - deformity
 - fracture / trauma
 - pathological fracture
 - inflammation
 - tumor
 - other
 - spondylolisthesis
 - infection
 - repeat surgery

Specification of Main Pathology

Only answer questions related to Main Pathology (Main Pathology "other" requires no specification).

Degen. disease

Type of degeneration

- disc herniat./protrusion
- central stenosis
- lateral stenosis
- foraminal stenosis
- degen. disc disease
- deformity

Specify grade of spondyl. →

- degen. spondylolisthesis
- other instability
- myelopathy
- facet joint arthrosis
- other

Specify type of deformity below

Deformity

Type of deformity

- scoliosis
- kyphosis
- combined
- other

Type of scoliosis

- single curve
- double curve

Predominant etiology

- idiopathic
- congenital
- neuro-muscular
- posttraumatic
- M. Scheuermann
- other

(Pathological) Fracture/Trauma

Additional fractures w/different treatments require separate forms.

Type of (pathological) fracture/trauma

- condylar (C0)
- C0/1 dissoziation
- C1 fracture
- C1/2 instability
- C2 dens fracture
- C2 other fracture
- soft tissue injury neck
- fracture C3-L5/S1
- sacrum fracture
- other

Dens fracture type

- I
- II
- III

C3-L5/S1 AO fracture type

1st digit: A, B, C

2nd digit: 1, 2, 3

3rd digit: 1, 2, 3

Pathological fracture due to ...

- osteoporosis
- tumor
- other

Fracture age

- fresh fracture
- old fracture

In case of tumor, answer questions "Type of tumor" and "Localization" in section "TUMOR"

Comments regarding main pathology:

In segments, mark cranial VB SA = sacrum / CO = coccyx

Most severely affected: () segment () vertebral body

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

Spondylolisthesis

Type of spondylolisthesis

- Type I (congenital, dysplastic)
- Type II (isthmic)
- Type III see type of degen.
- Type IV (traumatic)
- Type V (pathologic)
- Type VI (postsurgical)

Extent of dysplasia

- high
- low
- unknown

Grade of spondylolisthesis

- Grade 0
- Grade I
- Grade II
- Grade III
- Grade IV
- Spondylolysis (V)

Inflammation

Type of inflammation

- inflammatory arthritis (seropos)
- seronegative arthritis
- ankylosing spondylitis (M. Bechterew)
- other

Infection

Infection specification

- pyogenic
- parasitic
- tuberculous
- fungal
- other

Affected structure(s)

- spondylitis
- discitis
- epidural space
- paravertebral infection
- other

Tumor

Type of tumor

- primary malignant
- primary benign
- secondary malignant
- tumor like lesion
- other

Localization

- extraosseous soft tissues
- intraosseous (superficial)
- intraosseous (deep)
- extraosseous (extradural)
- extraosseous (intradural)
- other

Specify type of tumor

Repeat surgery:

Type or reason of repeat surgery

- hardware removal
- non-union
- instability
- failure to reach therapeutic goals
- neurocompression
- postop. infection
- superficial
- postop. infect. deep pathology
- implant failure
- sagittal imbalance
- adjac. segment
- other

Extent of lesion (segments/vertebral bodies)

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

SURGERY

Page 2 of 2

Assistant:

or access

- anterior access
- in-sorolateral
- retrothorac. anterolat.
- retrothorac. sternotomy
- thoracotomy
- thoraco-phrenico-lumbotomy
- retroperitoneal
- transperitoneal
- trans-psoas (XLIF)
- other

or access

- posterior access
- iramedial
- sterolateral
- percutaneous
- para-coccygeal (AxIALIF)
- other

Operation time

- CASS
- microscope
- neuromonitoring
- other
- unknown
- < 4.5 hrs.
- < 1 hr.
- < 1-2 hrs.
- < 2-3 hrs.
- > 3-4 hrs.
- > 4-5 hrs.
- > 5-6 hrs.
- > 6-8 hrs.
- > 8-10 hrs.
- > 10 hrs.

Blood transfusion

- 500 - 1000 ml
- 1000 - 2000 ml
- > 2000 ml
- none
- < 2 units
- > 2 units
- cell saver
- unknown

location of MEASURES in the spine, NOT to access!

- facet joint resection full
- sequestrectomy
- flavectomy
- flavotomy
- foraminotomy
- laminoplasty
- uncoforaminotomy
- other

Fusion material

- none
- autol. bone harvested
- autol. bone locally procured
- allog. bone
- bone subst.
- cement
- BMP or similar
- other

set screws

- insarticular screw C1-C2
- thin rod hooks with rod
- rod hooks with rod
- odontoid screws
- laminar screws
- other

Location in spine, choose at least one!

- pedicle screws with rod
- lateral mass screw with rod
- disc replacement
- dynamic stabilizat.
- interspin. spacer
- other
- facet block
- root block
- discography
- vertebroplasty
- kyphoplasty
- epidural injections
- other

Other surgical measures

- no
- yes

Specify yes:

Extent of surgery - indicate as: (from cranial to caudal)

SA = sacrum / CO = coccyx

segments: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

vertebral bodies: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27)

Intraop surgical complications

- none
- nerve root damage
- spinal cord damage
- dura lesion
- vascular injury
- fx vertebral structures
- other
- not documented

Surgical measures during index surgery

- none
- suture/glue
- other

Intraop general complications

- none
- anaesthesiological
- cardiovascular
- pulmonary
- thrombembolism
- death
- other
- not documented

APPLICATION

Quality control, comparative effectiveness and outcomes research, postmarket surveillance of implants, national and international study network

Internal quality control: assuming that you have a complete data collection Spine Tango enables you to monitor all types of surgery during a specific period, observing the date and duration of operation, patient characteristics and outcomes (patient and physician based).

10

External quality control: Benchmarking, the comparison of own performance with that of the national or international results in the Tango data pool is a powerful management tool because it overcomes “paradigm blindness.” Paradigm blindness can be summed up as the mode of thinking, “The way we do it is the best because this is the way we’ve always done it.” Benchmarking opens organizations to new methods, ideas and tools to improve their effectiveness. It helps overcome resistance to change by presenting successful methods of problem solving that are different to the ones currently employed. Enabling benchmarking possibilities is one of the fundamental goals of the Spine Tango venture.



Outcomes research: this aspect is actually just taking a different view for the same basic activity, i.e. the systematic and prospective collection of key data regarding interventions and outcomes for and of spinal pathologies. While quality assurance is rather used for the purposes of improving ones` own standards of care, outcomes research wants to generate new medical and scientific knowledge and make it available in the peer-reviewed literature.

Postmarket surveillance of implants: implants play a major role in modern spine surgery and just like in the domains of total joint arthroplasty their true performance can only be evaluated by systematically following the devices after implantation and documenting their outcomes in large clinical databases like the Tango.

National and international study network: the Tango is a technology backbone and currently networks about 50 active hospitals in Europe, North and South America, Australia and Asia. This provides a great opportunity for national and international multicenter studies that piggyback on the ongoing routine data collection, add some hypothesis based questions and collect this extra information for the time of primary and followup data collection as specified in the joint study protocol.

DATA ENTRY

There are **4 possible ways** forms and questionnaires can be transferred to the database (figure1)

1. Online data entry via the web-interface (no software to be installed).
2. OMR (Optical Mark Reader) i.e. scanner-assisted entry of paper forms.
3. Paper based data capture with mailing to the IEFM or other partner institutions for OMR scanner-assisted entry of paper forms.
4. Hybrid method of online data entry and OMR scanner-assisted entry of paper forms (not pictured).

In the rectangles multiple methods of gathering patient and physician generated data are shown (by mail, inhouse, outpatient clinics, telephone and new electronic media). The goal to generate a comprehensive database is achieved by collecting data of the patient layer and the clinic/physician layer. Having created a consistent data set the options of analyses are almost unlimited. Outcome evaluation can now be done in particular.

12

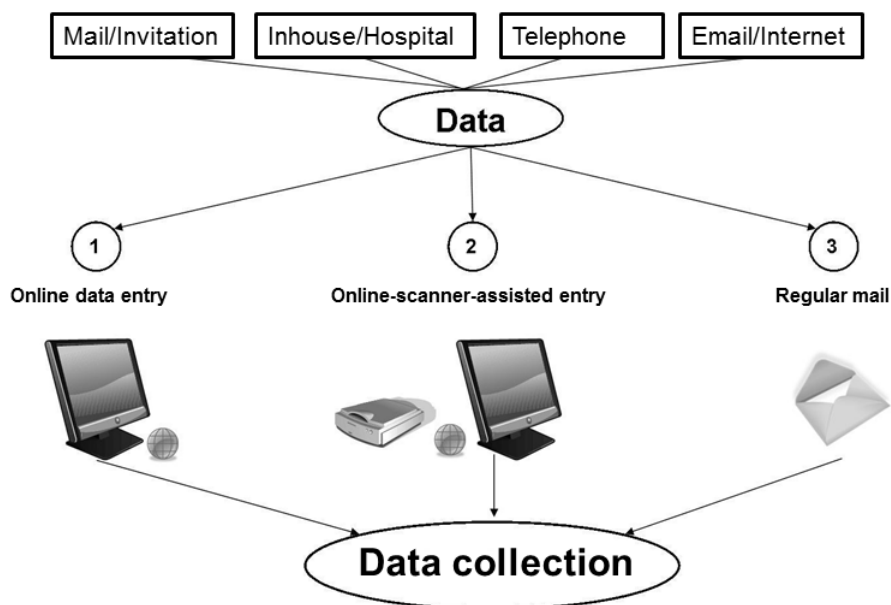


Figure 1: Spine Tango methods of data entry

A COMPLETE CASE

Following Ernest Codman's "end result system" the result of a surgical intervention should be recorded if the outcome can be considered as definitive (2). In most cases of spinal surgery, this can be done after a minimum of 3 months after surgery as demonstrated by Mannion et al (3). In accordance with figure 02. EuroSpine encourages one physician and patient based followup in the first year after surgery, ideally later than 3 months postop, and further, at least patient based followups around year one and two after surgery. The registration of complications at any time during the postoperative period is self understood. Patient based outcome documentation with the COMI (Core Outcome Measure Index) questionnaires for neck and back pain has become an essential part of the Spine Tango documentation (4). Figure 03 on the next page illustrates the ideal case of a completely documented treatment (5).

2. Codman, Ernest A. (1916). A Study in Hospital Efficiency. Boston, Mass., privately printed
3. Mannion AF, Porchet F; Kleinstück FS, Lattig F, Jeszenszky D, bartanusz V, Dvorak J, Grob D. (2009) The quality of spine surgery from the patient's perspective. Part 1: the Core Outcome Measures Index in clinical practice. Eur Spine J. 18 Suppl 3:367-73
4. Mannion AF, Elfering A, Staerkle R, Junge A, Grob D, Semmer NK, Jacobshagen N, Dvorak J, Boos N (2005) Outcome assessment in low back pain: how low can you go? Eur Spine J 14:1014-1026
5. Zweig T, Mannion AF, Grob D, Melloh M, Munting E, Aebi M, Tuschel A, Röder C. (2009) How to Tango – a manual for implementing Spine Tango. Eur Spine J 18 Suppl 3:312-2

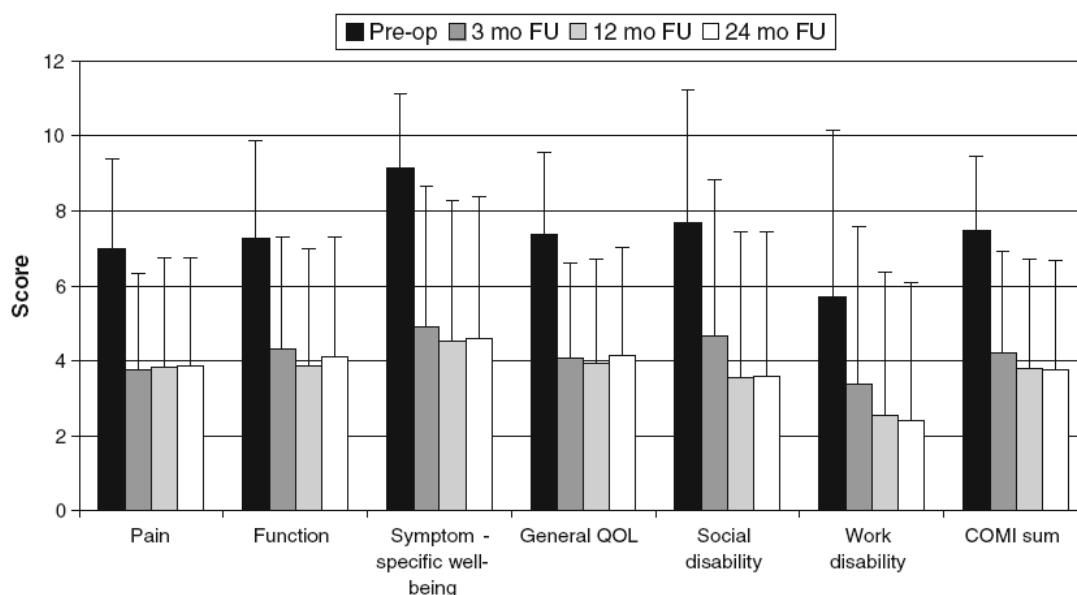


Figure 2: Patient based outcome documentation with the COMI (Core Outcome Measure Index) questionnaires, AF Mannion et al. (2009)(3)

PRE-& POSTOPERATIVE DOCUMENTATION WORKFLOW OF A CASE

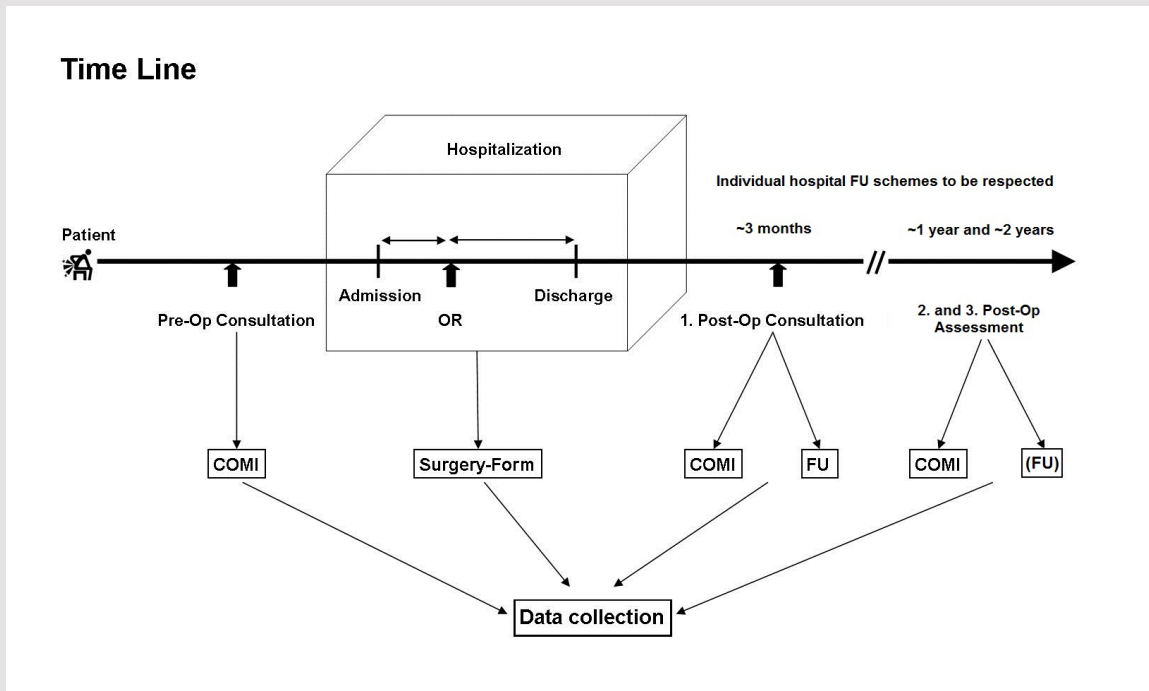


Figure 3: Timetable of data collection

Apart from the preoperative assessment of patients' quality of life and the recording of the surgical intervention, the Spine Tango code of conduct recommends one physician and patient based followup around the 3 months postoperative time interval. In accordance with international standards in the medical literature, an additional and at least patient based followup for the followup intervals 1 year and 2 years is highly desirable. If a surgeon based followup can also be achieved, a perfect outcome documentation is in place.

Surgery form front side

SPINE TANGO



SURGERY 2006

Directions

- Use a #2 soft pencil for marking.
- Text answers must be entered with the web interface.
- All questions must be answered unless otherwise indicated.
- Completely fill in boxes to record answers.

Question types

- only 1 answer allowed multiple answers allowed
 mandatory questions

Level of procedure

- upper cervical cervicothoracic thoracic thoraco-lumbo-sacral lumbo-sacral coccyx
 mid lower cervical cervico-thoraco-lumbar thoracolumbar lumbar sacral

Admission / Pathology

- Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
 Month 1 2 3 4 5 6 7 8 9 10 11 12 Year 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

Main pathology

- degenerative disease fracture/trauma spondylolisthesis infection failed surgery
 deformity pathological fracture inflammation tumor other: specify

Specification of Main Pathology

Only answer questions related to Main Pathology (Main Pathology "other" requires no specification.).

Degenerative Disease	Type of degeneration <input type="checkbox"/> black disc <input type="checkbox"/> spondylarthrosis <input type="checkbox"/> disc degeneration <input type="checkbox"/> spinal stenosis <input type="checkbox"/> disc herniation <input type="checkbox"/> adjacent segment degen. <input type="checkbox"/> spondylolysis <input type="checkbox"/> other	Spondylolisthesis	Type of spondylolisthesis <input type="checkbox"/> Type I (congenital, dysplastic) <input type="checkbox"/> Type II (isthmic) <input type="checkbox"/> Type III (degenerative) <input type="checkbox"/> Type IV (traumatic) <input type="checkbox"/> Type V (pathologic) <input type="checkbox"/> Type VI (postsurgical)
Deformity	Type of deformity <input type="checkbox"/> scoliosis <input type="checkbox"/> combined <input type="checkbox"/> kyphosis <input type="checkbox"/> other Type of scoliosis <input type="checkbox"/> single curve <input type="checkbox"/> double curve Predominant etiology <input type="checkbox"/> idiopathic <input type="checkbox"/> posttraumatic <input type="checkbox"/> congenital <input type="checkbox"/> M. Scheuermann <input type="checkbox"/> neuromuscular <input type="checkbox"/> other <input type="checkbox"/> degenerative	Inflammation	Type of inflammation <input type="checkbox"/> inflammatory arthritis (seropos) <input type="checkbox"/> seronegative arthritis <input type="checkbox"/> ankylosing spondylitis (M. Bechterew) <input type="checkbox"/> other
(Pathological) Fracture/Trauma	<small>Additional fractures w/different treatments require separate forms.</small> Type of (pathological) fracture/trauma <input type="checkbox"/> condylar (C0) <input type="checkbox"/> C2 other fracture <input type="checkbox"/> C0/1 dislocation <input type="checkbox"/> soft tissue injury neck <input type="checkbox"/> C1 fracture <input type="checkbox"/> fracture C3-L5/S1 <input type="checkbox"/> C1/2 instability <input type="checkbox"/> sacrum fracture <input type="checkbox"/> C2 dens fracture <input type="checkbox"/> other Dens fracture type <input type="checkbox"/> I <input type="checkbox"/> A1 <input type="checkbox"/> B1 <input type="checkbox"/> C1 <input type="checkbox"/> II <input type="checkbox"/> A2 <input type="checkbox"/> B2 <input type="checkbox"/> C2 <input type="checkbox"/> III <input type="checkbox"/> A3 <input type="checkbox"/> B3 <input type="checkbox"/> C3 Pathological fracture due to ... <input type="checkbox"/> osteoporosis <input type="checkbox"/> fresh fracture <input type="checkbox"/> tumor <input type="checkbox"/> old fracture <input type="checkbox"/> other <small>(In case of tumor, answer questions "Type of tumor" and "Localization" in section "TUMOR")</small>	Infection	Infection specification <input type="checkbox"/> pyogenic <input type="checkbox"/> fungal <input type="checkbox"/> spondylitis <input type="checkbox"/> parasitic <input type="checkbox"/> other <input type="checkbox"/> discitis <input type="checkbox"/> tuberculous <input type="checkbox"/> spondylodiscitis
(Pathological) Fracture/Trauma	Fracture age <input type="checkbox"/> fresh fracture <input type="checkbox"/> old fracture	Tumor	Type of tumor <input type="checkbox"/> primary malignant <input type="checkbox"/> vertebral body <input type="checkbox"/> primary benign <input type="checkbox"/> posterior bony elements <input type="checkbox"/> secondary malignant <input type="checkbox"/> extradural <input type="checkbox"/> tumor like lesion <input type="checkbox"/> intradural extramedullary <input type="checkbox"/> other <input type="checkbox"/> intradural intramedullary <input type="checkbox"/> other
		Failed surg.	Type of failed surgery <input type="checkbox"/> non-union <input type="checkbox"/> postop. infection <input type="checkbox"/> frontal imbalance <input type="checkbox"/> instability <input type="checkbox"/> implant failure <input type="checkbox"/> other <input type="checkbox"/> neurocompression <input type="checkbox"/> sagittal imbalance

Comments regarding main pathology:

Most severely affected segment/vertebral body

- | | | | | | | |
|--|---------------------------------|-----------------------------------|----------------------------------|------------------------------------|------------------------------------|--|
| <input type="checkbox"/> not applicable/assessable | <input type="checkbox"/> C3 | <input type="checkbox"/> C7 | <input type="checkbox"/> Th4 | <input type="checkbox"/> Th8 | <input type="checkbox"/> Th12 | <input type="checkbox"/> L4 |
| <input type="checkbox"/> unknown | <input type="checkbox"/> C3 / 4 | <input type="checkbox"/> C7 / Th1 | <input type="checkbox"/> Th4 / 5 | <input type="checkbox"/> Th8 / 9 | <input type="checkbox"/> Th12 / L1 | <input type="checkbox"/> L4 / 5 |
| <input type="checkbox"/> C0 | <input type="checkbox"/> C4 | <input type="checkbox"/> Th1 | <input type="checkbox"/> Th5 | <input type="checkbox"/> Th9 | <input type="checkbox"/> L1 | <input type="checkbox"/> L5 |
| <input type="checkbox"/> C0 / 1 | <input type="checkbox"/> C4 / 5 | <input type="checkbox"/> Th1 / 2 | <input type="checkbox"/> Th5 / 6 | <input type="checkbox"/> Th9 / 10 | <input type="checkbox"/> L1 / 2 | <input type="checkbox"/> L5 / S1 |
| <input type="checkbox"/> C1 | <input type="checkbox"/> C5 | <input type="checkbox"/> Th2 | <input type="checkbox"/> Th6 | <input type="checkbox"/> Th10 | <input type="checkbox"/> L2 | <input type="checkbox"/> S1 |
| <input type="checkbox"/> C1 / 2 | <input type="checkbox"/> C5 / 6 | <input type="checkbox"/> Th2 / 3 | <input type="checkbox"/> Th6 / 7 | <input type="checkbox"/> Th10 / 11 | <input type="checkbox"/> L2 / 3 | <input type="checkbox"/> sacrum (S2-5) |
| <input type="checkbox"/> C2 | <input type="checkbox"/> C6 | <input type="checkbox"/> Th3 | <input type="checkbox"/> Th7 | <input type="checkbox"/> Th11 | <input type="checkbox"/> L3 | <input type="checkbox"/> coccyx |
| <input type="checkbox"/> C2 / 3 | <input type="checkbox"/> C6 / 7 | <input type="checkbox"/> Th3 / 4 | <input type="checkbox"/> Th7 / 8 | <input type="checkbox"/> Th11 / 12 | <input type="checkbox"/> L3 / 4 | |

Extent of lesion

- < 1 segment/vertebral body 2-3 segments/vertebral bodies 4-5 segments/vertebral bodies >5 segments/vertebral bodies

Additional pathology

(Answer to question "Main pathology" is excluded.)

- none deformity pathological fracture inflammation tumor
 degenerative disease fracture/trauma spondylolisthesis infection failed surgery
 other: specify

Number of previous spine surgeries

- 0 1 2 3 4 5 6

Answer "0" excludes both "Previous surgery" questions ("at same level" and "at same hospital").

Previous surgeries at same level

- no yes partially
Previous surgeries at same hospital
 no yes partially

Previous treatment for main pathology

- none 3-6 mon. conservative
 surgical 6-12 mon. conservative
 < 3 mon. conservative > 12 mon. conservative

Surgery form back side

SPINE TANGO

SURGERY

Page 2 of 2

Internal Use Only - Not read by scanner

Surgeon Assistant

Surgery

Day (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31)
 Month (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) Year (00) (01) (02) (03) (04) (05) (06) (07) (08) (09) (10) (11) (12) (13) (14) (15) (16)

SURGICAL PROCEDURE	Surgeon credentials <input type="checkbox"/> specialized spine <input type="checkbox"/> board certif. orthopaedic <input type="checkbox"/> board certified neuro		<input type="checkbox"/> orthopaedic in training <input type="checkbox"/> neuro in training <input type="checkbox"/> other		Goal of surgery <input type="checkbox"/> pain relief <input type="checkbox"/> functional improvement <input type="checkbox"/> neurological improvement		<input type="checkbox"/> cosmetic improvement <input type="checkbox"/> diagnostic measures <input type="checkbox"/> other			
	Morbidity state <input type="checkbox"/> unknown <input type="checkbox"/> ASA1 (no disturbance) <input type="checkbox"/> ASA2 (mild/moderate) <input type="checkbox"/> ASA3 (severe) <input type="checkbox"/> ASA4 (life threatening) <input type="checkbox"/> ASA5 (moribund)		Anterior access <input type="checkbox"/> no anterior access <input type="checkbox"/> transoral <input type="checkbox"/> anterior <input type="checkbox"/> anterolateral <input type="checkbox"/> cervicothorac. anterolat. <input type="checkbox"/> cervicothorac. a.lat. w/sternotomy		<input type="checkbox"/> cervicothor. a.lat. w/ thoracot. <input type="checkbox"/> thoracotomy <input type="checkbox"/> thoraco-phrenico-lumbotomy <input type="checkbox"/> retroperitoneal <input type="checkbox"/> transperitoneal <input type="checkbox"/> other		Posterior access <input type="checkbox"/> no posterior access <input type="checkbox"/> midline <input type="checkbox"/> paramedian <input type="checkbox"/> posterolateral <input type="checkbox"/> other			
	Technology <input type="checkbox"/> conventional <input type="checkbox"/> MISS/LISS <input type="checkbox"/> loops <input type="checkbox"/> microscope		Blood loss <input type="checkbox"/> endoscope <input type="checkbox"/> CASS <input type="checkbox"/> other		<input type="checkbox"/> unknown <input type="checkbox"/> none <input type="checkbox"/> > 500 ml <input type="checkbox"/> 500 - 1000 ml <input type="checkbox"/> 1000 - 2000 ml <input type="checkbox"/> > 2000 ml		Operation time <input type="checkbox"/> unknown <input type="checkbox"/> < 1 hr. <input type="checkbox"/> 1-2 hrs. <input type="checkbox"/> 2-3 hrs.		<input type="checkbox"/> 3-4 hrs. <input type="checkbox"/> 4-5 hrs. <input type="checkbox"/> 5-6 hrs. <input type="checkbox"/> 6-8 hrs. <input type="checkbox"/> 8-10 hrs. <input type="checkbox"/> > 10 hrs.	
	Components <input type="checkbox"/> yes <input type="checkbox"/> no		Supplier: Article No: Article name:		Not needed if SEDICO implant tracking is used.					

Surgical Measures

Note: "anterior" / "posterior" refers to location of MEASURES in the spine, NOT to access!

Decompression <input type="checkbox"/> none <input type="checkbox"/> anterior } specify ... <input type="checkbox"/> posterior }		<input type="checkbox"/> discectomy <input type="checkbox"/> vertebrectomy partial <input type="checkbox"/> vertebrectomy full <input type="checkbox"/> other		<input type="checkbox"/> osteotomy <input type="checkbox"/> laminotomy <input type="checkbox"/> hemi-laminectomy		<input type="checkbox"/> laminectomy <input type="checkbox"/> facet joint resection partial <input type="checkbox"/> facet joint resection full		<input type="checkbox"/> flavectomy <input type="checkbox"/> foraminotomy <input type="checkbox"/> sequestrectomy	
Fusion <input type="checkbox"/> none <input type="checkbox"/> anterior } specify ... <input type="checkbox"/> posterior }		<input type="checkbox"/> interbody fusion between adjct. vertebrae (ant. appr.) <input type="checkbox"/> interbody fusion between adjct. vertebrae (post. appr.) <input type="checkbox"/> interbody fusion between dist. vertebrae (ant. appr.) <input type="checkbox"/> interbody fusion between dist. vertebrae (post. appr.)		<input type="checkbox"/> posterolat. fusion <input type="checkbox"/> posterior fusion <input type="checkbox"/> other		Fusion material <input type="checkbox"/> none <input type="checkbox"/> autol. bone <input type="checkbox"/> allog. bone <input type="checkbox"/> bone subst. <input type="checkbox"/> cement <input type="checkbox"/> other			
Stabilization rigid <input type="checkbox"/> none <input type="checkbox"/> anterior } specify ... <input type="checkbox"/> posterior }		<input type="checkbox"/> interbody stabil. with cage (ant. approach) <input type="checkbox"/> interbody stabil. with cage (post. approach) <input type="checkbox"/> vertebral body replacement by cage <input type="checkbox"/> plates <input type="checkbox"/> pedicle screws with rod		<input type="checkbox"/> pedicle screws with plate <input type="checkbox"/> facet screws <input type="checkbox"/> transarticular screw <input type="checkbox"/> laminar hooks with rod <input type="checkbox"/> pedicle hooks with rod		<input type="checkbox"/> lateral mass screw with rod <input type="checkbox"/> lateral mass screw with plate <input type="checkbox"/> odontoid screws <input type="checkbox"/> other			
Stabil. motion preserving <input type="checkbox"/> none <input type="checkbox"/> anterior } specify ... <input type="checkbox"/> posterior }		<input type="checkbox"/> disc replacement <input type="checkbox"/> dynamic stabilizat. <input type="checkbox"/> other		Percutan. measures <input type="checkbox"/> none <input type="checkbox"/> post. } specify ... Choose one!		<input type="checkbox"/> facet block <input type="checkbox"/> root block <input type="checkbox"/> discography <input type="checkbox"/> vertebroplasty		<input type="checkbox"/> kyphoplasty <input type="checkbox"/> other	
Other surgical measures <input type="checkbox"/> no <input type="checkbox"/> yes } specify ... Choose one!		Surgical notes							

Discharge

Day (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31)
 Month (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) Year (00) (01) (02) (03) (04) (05) (06) (07) (08) (09) (10) (11) (12) (13) (14) (15) (16)

(Answer "none" in both "Surgical" and "General complications" excludes all remaining questions.)

Surgical complications <input type="checkbox"/> none <input type="checkbox"/> wrong level <input type="checkbox"/> nerve root damage <input type="checkbox"/> cauda equina damage <input type="checkbox"/> spinal cord damage		<input type="checkbox"/> bleeding in spinal canal <input type="checkbox"/> bleeding outside spinal canal <input type="checkbox"/> malposition of implant <input type="checkbox"/> dural lesion <input type="checkbox"/> wound infection		<input type="checkbox"/> implant failure <input type="checkbox"/> other		General complications <input type="checkbox"/> none <input type="checkbox"/> anaesthesiological <input type="checkbox"/> cardiovascular <input type="checkbox"/> pulmonary		<input type="checkbox"/> cerebral <input type="checkbox"/> kidney/urinary <input type="checkbox"/> liver/GI <input type="checkbox"/> death <input type="checkbox"/> other	
Measures taken <input type="checkbox"/> none <input type="checkbox"/> intervention during surgery <input type="checkbox"/> re-intervention after surgery <input type="checkbox"/> conservative medical		<input type="checkbox"/> conservative functional <input type="checkbox"/> extended hospital stay <input type="checkbox"/> other		Surgical intervention/re-intervention <input type="checkbox"/> none <input type="checkbox"/> hematoma evacuation <input type="checkbox"/> abscess drainage <input type="checkbox"/> metal removal <input type="checkbox"/> re-implantation <input type="checkbox"/> refusion		<input type="checkbox"/> suture <input type="checkbox"/> other			
Status of Complications Surgical <input type="checkbox"/> resolved <input type="checkbox"/> improved <input type="checkbox"/> persisting General <input type="checkbox"/> resolved <input type="checkbox"/> improved <input type="checkbox"/> persisting		Comments regarding discharge							

COMI (low back)
patient based assessment, front side

Spine Tango COMI
Patient self-assessment



Low Back
2008

Compatible with SGS SWISSpine register

Internal Use Only
Not read by scanner

Last name		First name		Gender
Street			M.R.N.	
Country Code	Zip Code	City		
Social security number (ADI no.)			Birthdate (DD.MM.YYYY)	

Directions

- Use a #2 soft pencil for marking.
- Only one answer per question allowed
- Completely fill in boxes to record answers.
- Mandatory informations

Examination interval

- | | | | |
|---|-----------------------------------|---|----------------------|
| <input type="checkbox"/> before surgery | <input type="checkbox"/> 3 months | <input type="checkbox"/> 2 years | |
| <input type="checkbox"/> 4 weeks | <input type="checkbox"/> 6 months | <input type="checkbox"/> 3 years | |
| <input type="checkbox"/> 6 weeks | <input type="checkbox"/> 9 months | <input type="checkbox"/> 4 years | e.g. 4 months |
| <input type="checkbox"/> 2 months | <input type="checkbox"/> 1 year | <input type="checkbox"/> 5 years | = 4 months/12 months |
| | | <input type="checkbox"/> other: years | = 0.33 year |

Back problems can lead to back pain and/or pain in the legs/buttocks, as well as to sensory disturbances such as tingling, 'pins and needles' or numbness in any of these regions.

1 Which of the following problems troubles you **the most**? Please tick **ONE BOX only**.

- back pain
- leg/buttock pain
- sensory disturbances in the back/leg/buttocks, e.g. tingling, 'pins and needles', numbness
- none of the above

2 For the following 2 questions (2a and 2b) we would like you to indicate the severity of your pain, by ticking the appropriate box (where "0" = no pain, "10" = worst pain you can imagine). There are separate questions for **back pain** and for **leg pain (sciatica)/buttock pain**.

2a How severe was your **back pain** in the last week?

- | | | | | | | | | | | | | |
|---------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|
| no pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | worst pain that I can imagine |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

2b How severe was your **leg pain (sciatica)/buttock pain** in the last week?

- | | | | | | | | | | | | | |
|---------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|
| no pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | worst pain that I can imagine |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

3 During the **past week**, how much did your back problem **interfere with your normal work** (including both work outside the home and housework)?

- not at all
- a little bit
- moderately
- quite a bit
- extremely

4 If you had to spend **the rest of your life with the symptoms you have right now**, how would you feel about it?

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

5 Please reflect **on the last week**. How would you rate your quality of life?

- very good
- good
- moderate
- bad
- very bad

Please go to the next page...

COMI (low back)
patient based assessment, back side

Spine Tango COMI

Patient self-assessment
Low back

page 2 of 2

6 During the past 4 weeks, how many days did you **cut down on the things you usually do** (work, housework, school, recreational activities) because of your back problem?

- none
- between 1 and 7 days
- between 8 and 14 days
- between 15 and 21 days
- more than 22 days

7 During the past 4 weeks, how many days did your back problem **keep you from going to work** (job, school, housework)?

- none
- between 1 and 7 days
- between 8 and 14 days
- between 15 and 21 days
- more than 22 days

Answer the following questions only if you are completing this questionnaire AFTER the operation

8a Did any **complications** arise as a consequence of your operation **in our hospital** (e.g. problems with wound healing, paralysis, sensory disturbances)?

- no
- yes → please describe these:

8b How bothersome were these complications?

- not at all bothersome
- slightly bothersome
- moderately bothersome
- very bothersome
- extremely bothersome

9 Since the operation in our hospital, have you had any **further operation(s)** on your lumbar spine (back) **in our or in other hospitals?**

- no
- yes, but at a different level of the spine.
- yes, at the same level of the spine (same segment)

10 Over the course of treatment for your back problem, how satisfied were you with your overall medical care **in our hospital?**

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

11 Overall, how much did the **operation in our hospital** help your back problem?

- helped a lot
- helped
- helped only little
- didn't help
- made things worse

Date Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
 Month 1 2 3 4 5 6 7 8 9 10 11 12 Year 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19

Signature:

Follow-up physician based, single sided

SPINE TANGO



FOLLOW-UP 2006

- Directions**
- Use a #2 soft pencil for marking.
 - Text answers must be entered with the web interface.
 - All questions must be answered unless otherwise indicated.
 - Completely fill in boxes to record answers.

- Question types**
- only 1 answer allowed
 - multiple answers allowed
 - mandatory information

- Level of procedure**
- | | | | | | |
|---|---|--|---|---------------------------------------|---------------------------------|
| <input type="checkbox"/> upper cervical | <input type="checkbox"/> cervicothoracic | <input type="checkbox"/> thoracic | <input type="checkbox"/> thoraco-lumbo-sacral | <input type="checkbox"/> lumbo-sacral | <input type="checkbox"/> coccyx |
| <input type="checkbox"/> mid lower cervical | <input type="checkbox"/> cervico-thoraco-lumbar | <input type="checkbox"/> thoracolumbar | <input type="checkbox"/> lumbar | <input type="checkbox"/> sacral | |

Internal Use Only
Not read by scanner

Last name		First name		Gender
Street			M.R.N.	
Country code	Zip code	City		
Occupation	Birthdate (DD.MM.YYYY)	Telephone		

Follow-up

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Month 1 2 3 4 5 6 7 8 9 10 11 12 **Year** 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

<p>Follow up interval</p> <p><input type="checkbox"/> 6 weeks <input type="checkbox"/> 1 year</p> <p><input type="checkbox"/> 3 months <input type="checkbox"/> 2 years</p> <p><input type="checkbox"/> 6 months <input type="checkbox"/> other (yrs.)</p> <p style="font-size: small;">(Ex. 4 months=0.33 yrs. (4/12))</p>	<p>Work status</p> <p><input type="checkbox"/> not at work since OP <input type="checkbox"/> resumed work, different job <input type="checkbox"/> housewife</p> <p><input type="checkbox"/> started partially, same job <input type="checkbox"/> has been dismissed <input type="checkbox"/> child/student</p> <p><input type="checkbox"/> fully reintegrated <input type="checkbox"/> retired since OP <input type="checkbox"/> other</p> <p><input type="checkbox"/> resumed work, but quit again <input type="checkbox"/> retired before OP</p>
---	--

Only comment on those goals/measures which were indicated for the "Goal of surgery" question on the "SURGERY" form.

<p>Surgical goals/measures achieved</p> <p><input type="checkbox"/> none</p> <p><input type="checkbox"/> pain relief</p> <p><input type="checkbox"/> functional improvement</p> <p><input type="checkbox"/> neurological improvement</p> <p><input type="checkbox"/> cosmetic improvement</p> <p><input type="checkbox"/> diagnostic measures</p> <p><input type="checkbox"/> other</p>	<p>Surgical goals/measures partially achieved</p> <p><input type="checkbox"/> none</p> <p><input type="checkbox"/> pain relief</p> <p><input type="checkbox"/> functional improvement</p> <p><input type="checkbox"/> neurological improvement</p> <p><input type="checkbox"/> cosmetic improvement</p> <p><input type="checkbox"/> diagnostic measures</p> <p><input type="checkbox"/> other</p>	<p>Surgical goals/measures not achieved</p> <p><input type="checkbox"/> none</p> <p><input type="checkbox"/> pain relief</p> <p><input type="checkbox"/> functional improvement</p> <p><input type="checkbox"/> neurological improvement</p> <p><input type="checkbox"/> cosmetic improvement</p> <p><input type="checkbox"/> diagnostic measures</p> <p><input type="checkbox"/> other</p>
--	--	--

<p>Medication</p> <p><input type="checkbox"/> none <input type="checkbox"/> steroids <input type="checkbox"/> antibiotics</p> <p><input type="checkbox"/> NSAIDs <input type="checkbox"/> antidepressives <input type="checkbox"/> other</p> <p><input type="checkbox"/> opiates <input type="checkbox"/> vitamin B complex</p>	<p>Overall outcome (examiner)</p> <p><input type="checkbox"/> not applicable <input type="checkbox"/> good <input type="checkbox"/> poor</p> <p><input type="checkbox"/> excellent <input type="checkbox"/> fair</p>
---	--

<p>Rehabilitation</p> <p><input type="checkbox"/> none <input type="checkbox"/> outpatient rehab / physio <input type="checkbox"/> other</p> <p><input type="checkbox"/> home-based <input type="checkbox"/> inpatient rehab / physio</p>	<p>Decision</p> <p><input type="checkbox"/> no further follow-up <input type="checkbox"/> revision foreseen</p> <p><input type="checkbox"/> further follow-up <input type="checkbox"/> other primary intervention foreseen</p>
---	---

Comments regarding follow-up

Complications

Complications

no (Answer "no" excludes all remaining questions.)

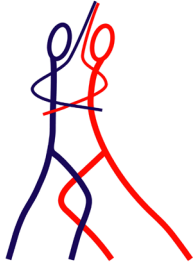
yes

<p>Time</p> <p><input type="checkbox"/> early, Op-day - 28 days postop</p> <p><input type="checkbox"/> sub-acute, 2 - 6 months</p> <p><input type="checkbox"/> late, > 6 months</p>	<p>Type</p> <p><input type="checkbox"/> sensory disturbance <input type="checkbox"/> liquor fistula <input type="checkbox"/> malposition of implant</p> <p><input type="checkbox"/> motor disturbance <input type="checkbox"/> superficial wound infection <input type="checkbox"/> recurrence of symptoms</p> <p><input type="checkbox"/> sphincter disturbance <input type="checkbox"/> deep subfascial wound infection <input type="checkbox"/> graft complication</p> <p><input type="checkbox"/> non-union <input type="checkbox"/> spondylitis <input type="checkbox"/> sequelae anaesthesia</p> <p><input type="checkbox"/> implant failure <input type="checkbox"/> discitis <input type="checkbox"/> internal medicine</p> <p><input type="checkbox"/> instability <input type="checkbox"/> wrong segment <input type="checkbox"/> other</p>	
---	--	--

<p>Therapeutic consequences</p> <p><input type="checkbox"/> none</p> <p><input type="checkbox"/> non-operative inpatient</p> <p><input type="checkbox"/> non-operative outpatient</p> <p><input type="checkbox"/> reintervention</p> <p><input type="checkbox"/> other</p>	<p>Individual consequences</p> <p><input type="checkbox"/> none</p> <p><input type="checkbox"/> increased pain</p> <p><input type="checkbox"/> prolonged impairment</p> <p><input type="checkbox"/> reduced social activities</p> <p><input type="checkbox"/> permanent impairment</p> <p><input type="checkbox"/> other</p>
---	---

Examiner

Comments regarding complications



EPITOME OF AVAILABLE DATA

Overview (Pool)

Benchmarking: USA vs. German speaking countries vs. Benelux & Scandinavia vs. "Others"

Data from the

Surgery form: demographic data, distribution and specification of diagnosis, different details related to main pathology, complications

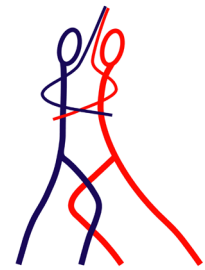
Followup form: followup interval, overall outcome, achievement of surgical goals

20

Short exemplary analysis: **Spondylolisthesis** (Pool):

Demographic data

Group specification related to surgery



STATISTICS AND COMMENTS

A study of the weighting and frequency of statistical reports was published by Windish in JAMA in 2007 (6). This work comprises the study of 239 original articles in 6 journals (American Journal of Medicine, Annals of Internal Medicine, BMJ, JAMA, Lancet, New England Journal of Medicine) with regard to statistical evaluation. 91.6% of the articles included descriptive statistics and 50.2% were compiled from simple statistical methods. Multivariate analyses were used for 68.6% of the cases. All the above mentioned methodologies can be used in Spine Tango. The Spine Tango international pool offers close to 40.000 eligible cases. The number of entries increases constantly. Below you will find a short summary of all the documented surgeries in Spine Tango followed by a detailed assessment of the patient subgroup with various types of spondylolisthesis.

21

6. Windish D, Huot SJ, Green ML (2007).
Medicine Residents' Understanding of the Biostatistics and Results in the Medical Literature;
JAMA. 2007;298(9):1010-1022.

Spine Tango growth curves

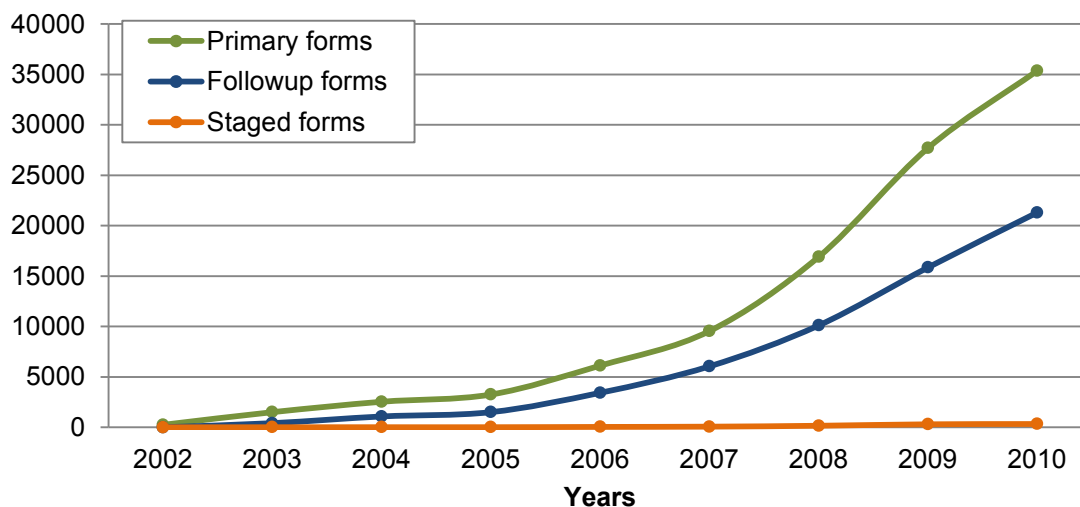


Figure 4: Growth curves of implemented forms (primary and staged surgery and followup) over the years.

Overview of the pool Group description for benchmarking

The following analyses are based on the international Spine Tango data pool using all submitted and completed forms until the end of the year 2010 (form versions 2005/06 only). For the descriptive statistics we divided the data into 4 groups for benchmarking without case-mix adjustment.

German speaking countries, USA, Scandinavia-Benelux and "Others"

The German speaking group consists of 29 hospitals, 11 from Switzerland, 16 from Germany and 2 from Austria. In the US-group we have 3 centers. In the Scandinavia/Benelux group we combined 4 Belgian hospitals 2 Finnish and 1 hospital from the Netherlands. The other 12 hospitals are located in Italy (3), Australia (2), UK (2); Mexico, Poland, Singapore, Brazil and Slovenia.

German speaking group (29 hospitals)

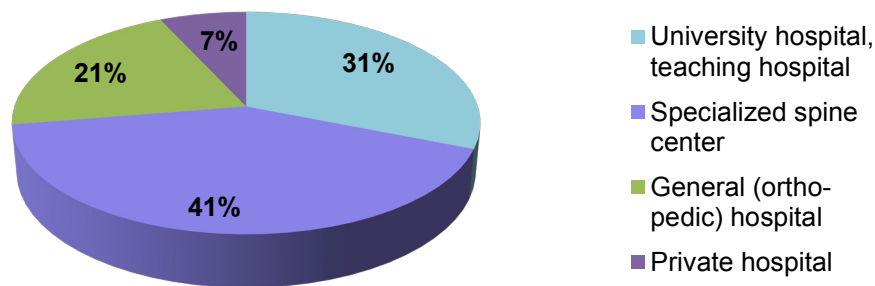


Figure 5: Hospital classification, German speaking group, (29 hospitals)

US group (3 hospitals)

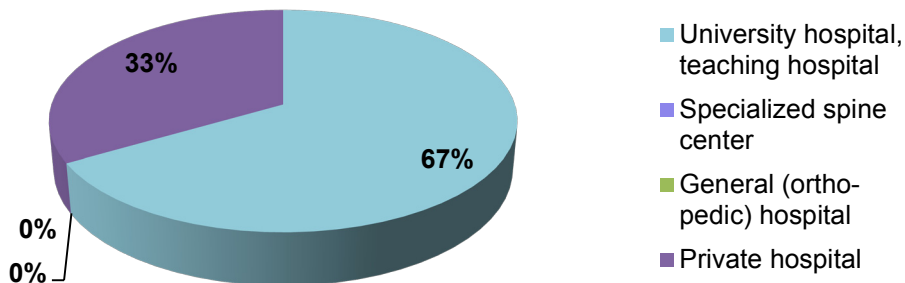


Figure 6: Hospital classification, US group, (3 hospitals)

Scandinavia and Benelux group (7 hospitals)

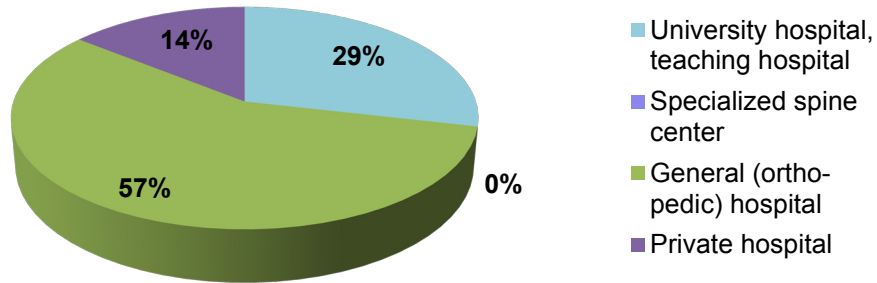


Figure 7: Hospital classification, Scandinavia and Benelux group, (7 hospitals)

"Others" group (12 hospitals)

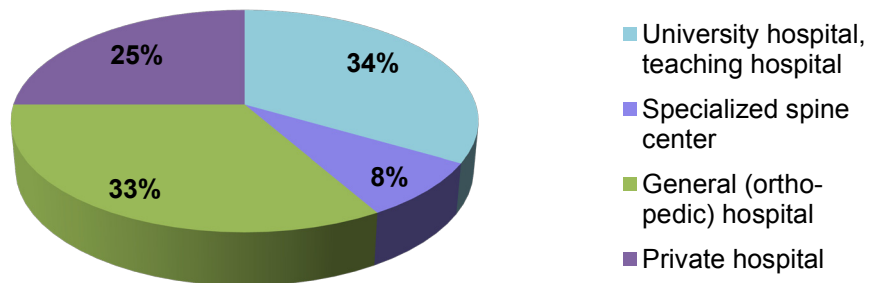


Figure 8: Hospital classification, "Other" group (12 hospitals)

For the hospital classification we graded the centers in each group into one of the following categories: university hospital or teaching hospital, specialized spine center, general or orthopedic hospital and private hospital. Among the four groups you can find various distributions as the figure 5-8 show. These differences may also be caused by different health care systems and nomenclatures. In the German speaking group the specialized spine centers dominate with 41%. Two of the three US hospitals are university hospitals. Scandinavia and Benelux have mostly general or orthopedic hospitals (4 of 7 hospitals) participating. In the "Others" group we can find 4 university hospitals and only one specialized spine center.

Demographic data Comparison of the four patient groups

To compare the four groups we give an overview of the demographic data for each group. For the following graphs we determined the age and gender distribution at the time of surgery. In total we could find 34382 surgeries in the database.

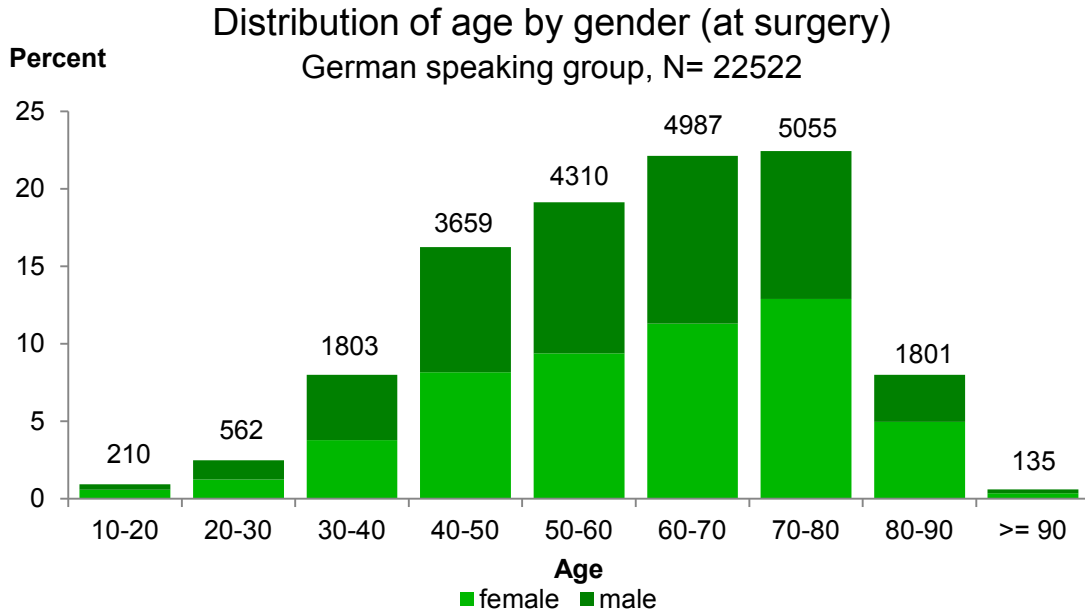


Figure 9: Distribution of age by gender (at surgery), German speaking group, (N= 22522)

For all 4 groups the majority of spinal interventions happen in the four life decades between an age of 40 and 80 years. In the Scandinavia and Benelux group there is one exception with a second prominent group with patients at an age between 10 and 20 (10.3%). This is caused by one participating center performing a lot deformity surgeries in younger patients.

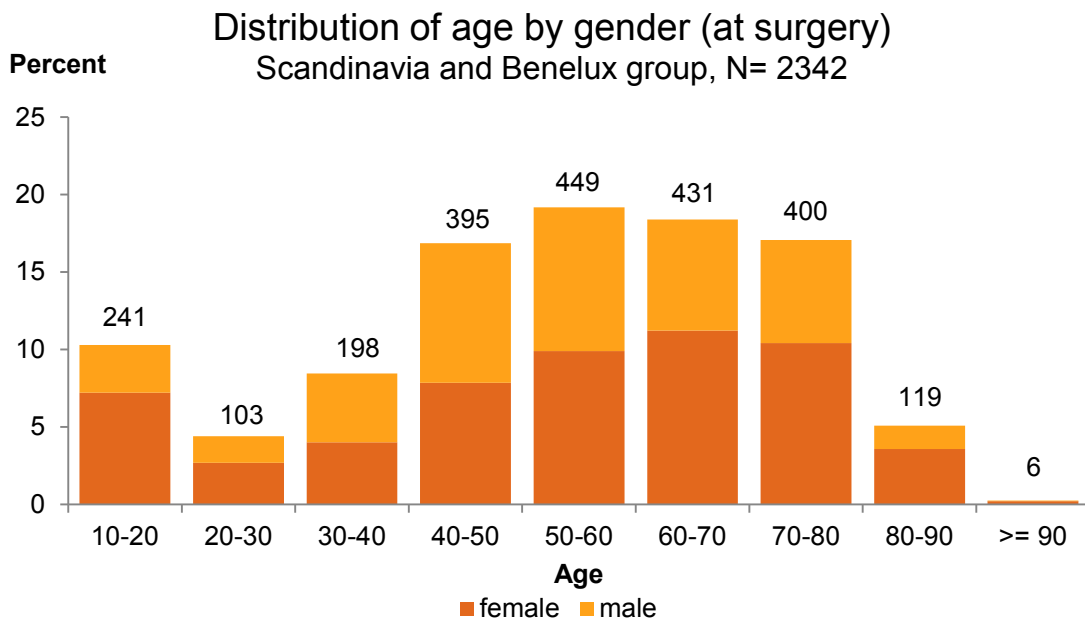


Figure 10: Distribution of age by gender (at surgery), Scandinavia and Benelux group, (N=2342)

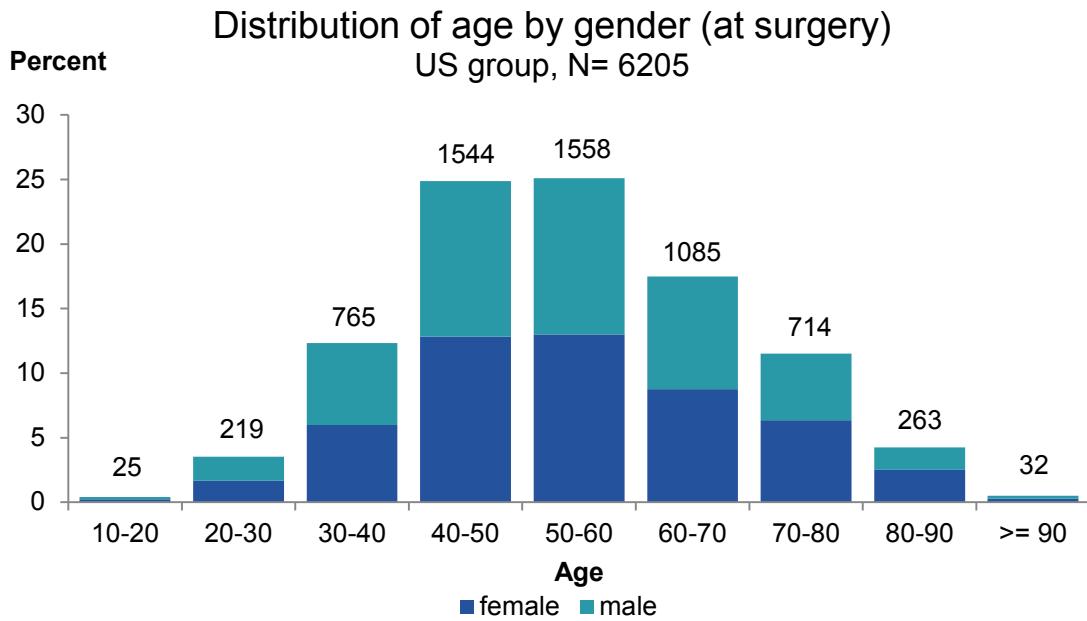


Figure 11: Distribution of age by gender (at surgery), US group, (N= 6205)

Comparing the US and the “Others” with the German speaking patients it seems that they have a slightly younger clientele. For the US half of the patients (50%) have an age between 40 and 60 years at surgery. Also, in the “Others” group most patients (39.9%) have their surgery between an age of 40 and 60 years. The decade with the highest value is the 5th (N=697; 21.0%). In the German speaking countries the trend shows older patients presenting for surgery. The decade with the most frequent surgeries is the 8th. The peak level is for patients with an age between 60 and 80 years at the time of surgery (44.6%).

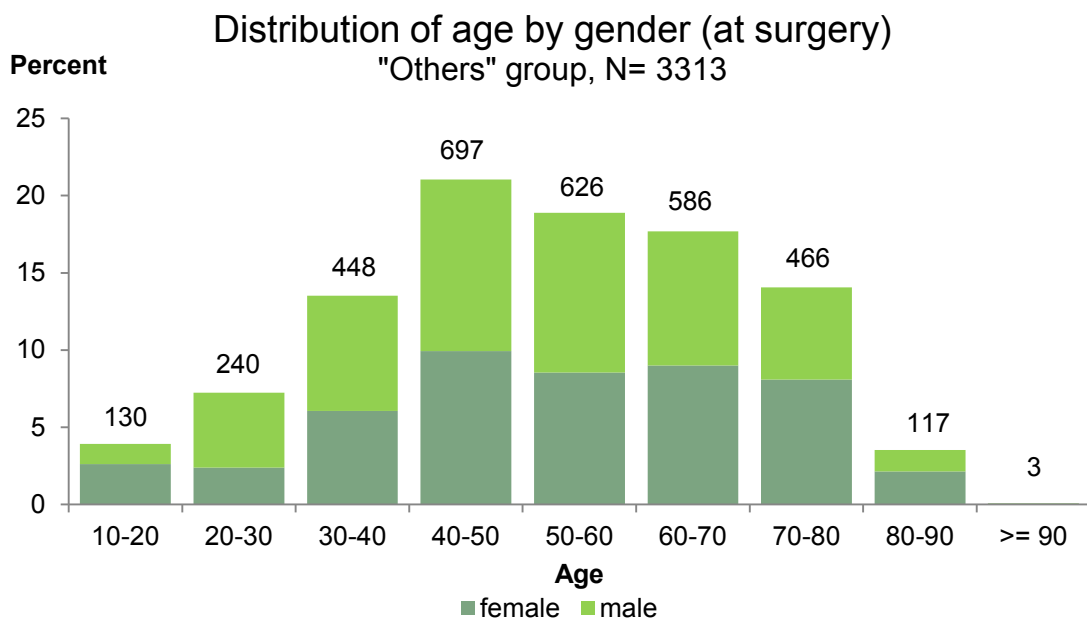


Figure 12: Distribution of age by gender (at surgery), “Others” group, (N=3313)

Distribution of main pathology (surgery form)

The distribution of main pathology among the four groups shows a relatively equal domination of degenerative diseases as main pathology.

Noticeable is a higher percentage of deformities as main pathology in the Scandinavia and Benelux countries. We can verify a deformity center in the Scandinavia and Benelux group with a higher amount of younger patients as seen before in the age distribution.

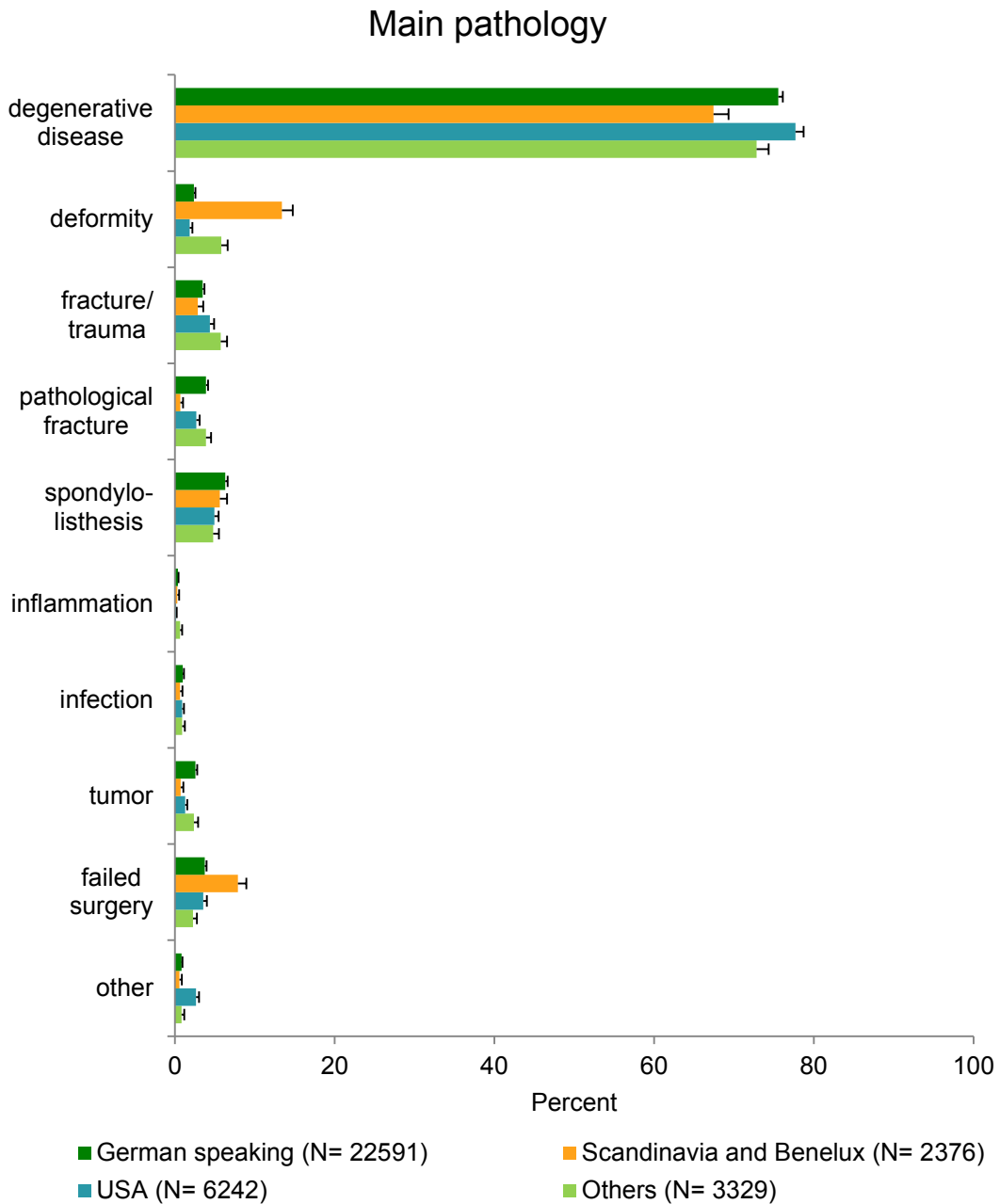


Figure 13: Distribution of the main pathology for the four groups (surgery form)

Specification of degenerative disease (surgery form)

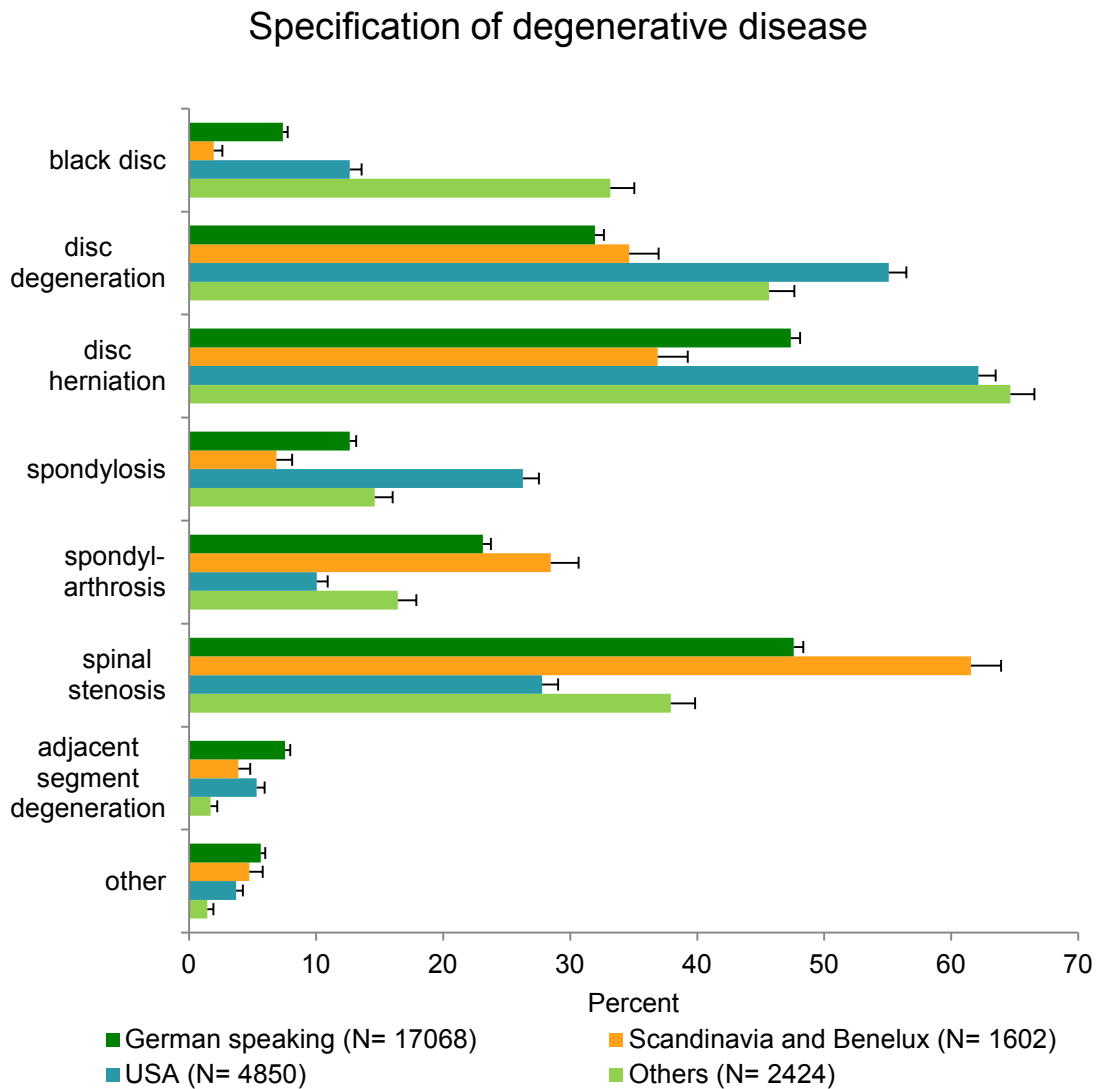


Figure 14: Specification of degenerative disease for the four groups (surgery form)

Figure 14 shows the distribution of degenerative disease as most common main pathology. In the German speaking group the most frequent specifications were disc herniation and spinal stenosis with about 47% each. Scandinavia and Benelux show a clear domination of spinal stenosis (61.5%). Disc degeneration and disc herniation and spondylarthrosis are similarly frequent (~ 34-36%). They show less black discs with 1.9% compared to 33.2% in the “Others” group or 12.6% in the US group which may also be caused by different definitions. In the US the most frequent specifications are disc degeneration and disc herniation with over 50% each. In contrast, we found the lowest percentage of spinal stenosis in the US. In the “Others” group the disc herniation reaches the highest value (64.6%).

Different details related to main pathology
(surgery form)

Surgical measures for degenerative disease

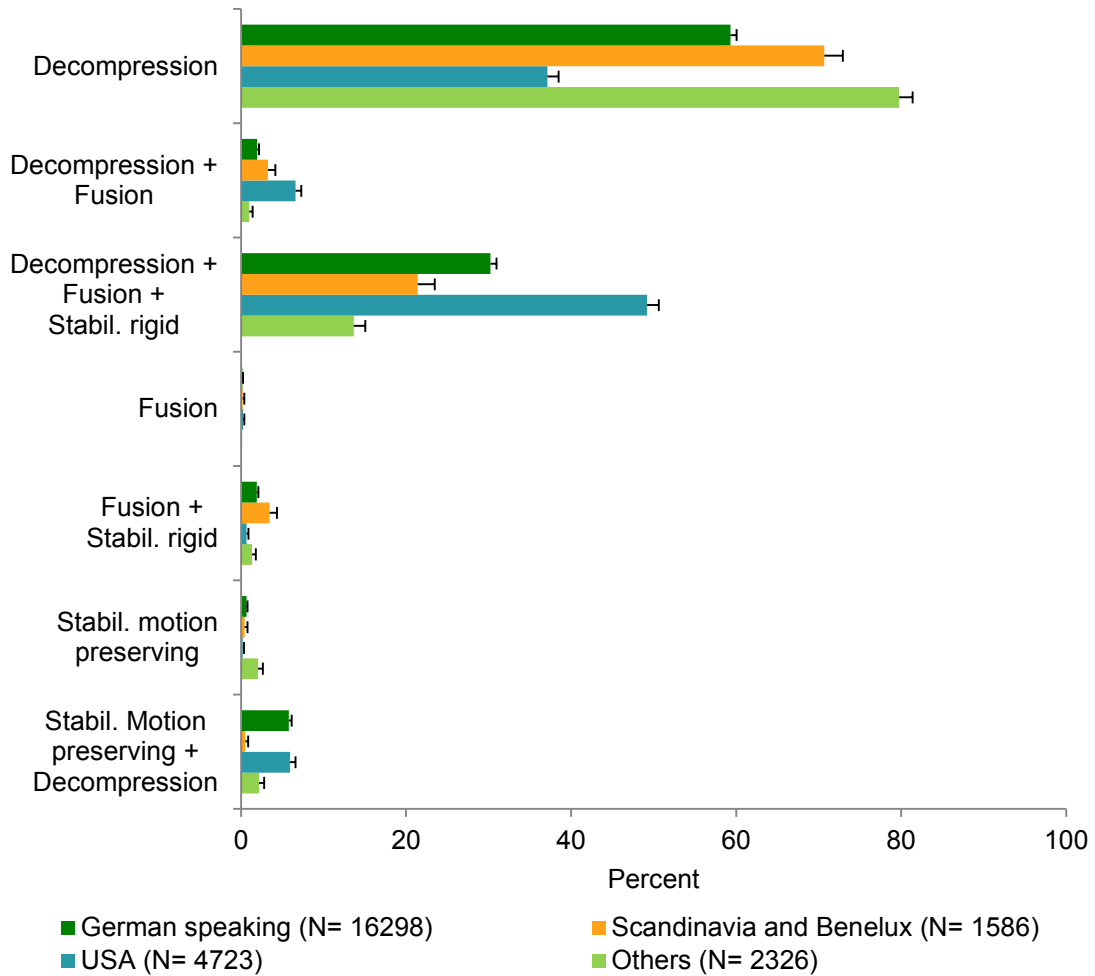


Figure 15: Surgical measures performed for degenerative disease as main pathology, for the four groups (surgery form)

Decompression alone was the most frequently performed surgery for degenerative disease in the German speaking, the Scandinavia and Benelux and the “Others” group.

In the US the most frequently performed surgery was decompression combined with fusion and rigid stabilisation (49.2%). Differences between health care systems in treatment strategies for degenerative diseases may become apparent here. The analysis is, however, not adjusted for case mix.

C3-L5/S1 AO fracture type

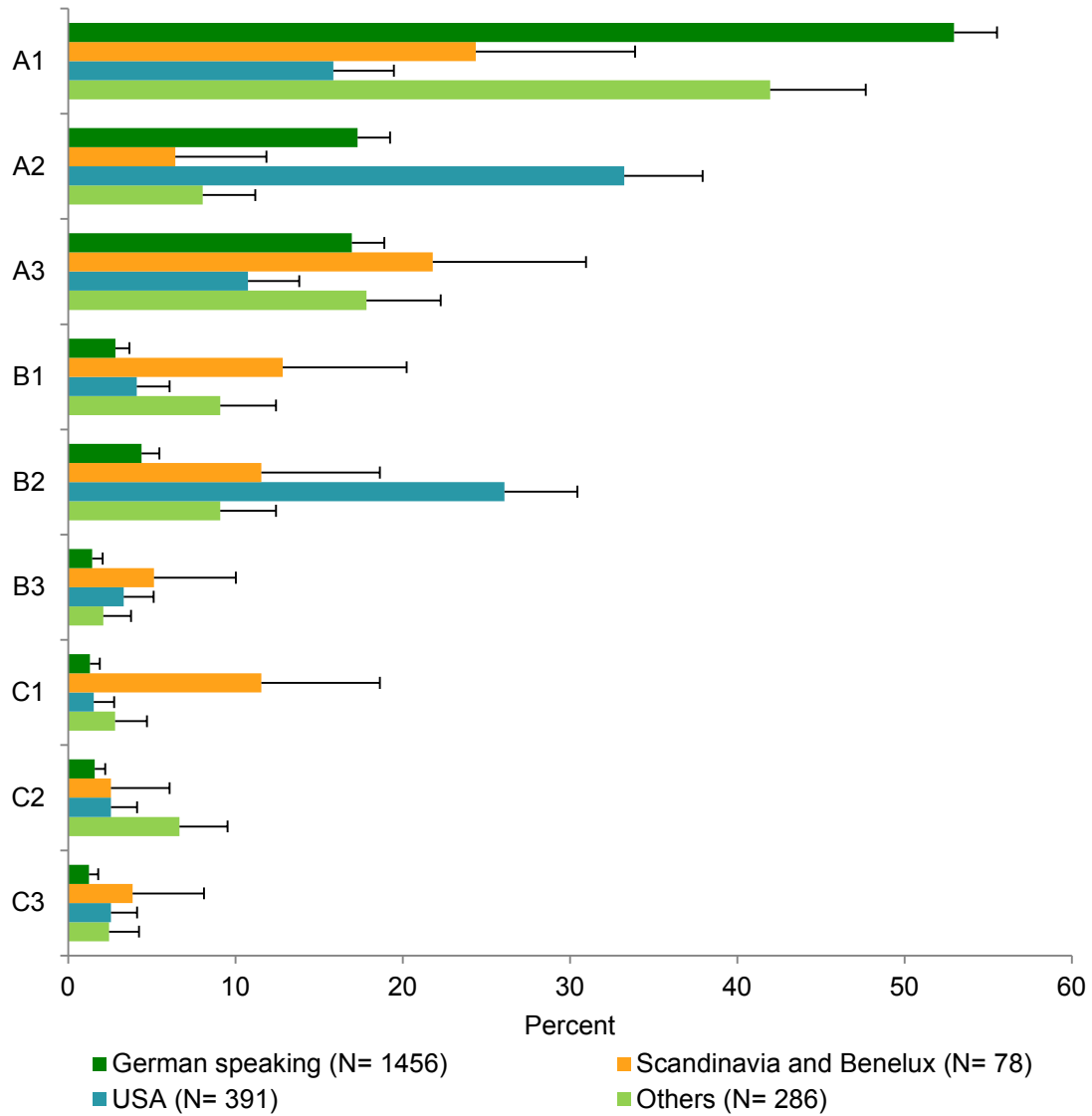


Figure 16: AO fracture types in patients with C3-L5/S1 fracture, for the four groups (surgery form)

Figure 16 shows the distribution of fracture types according to the AO-classification. Type A1 dominates in the German speaking (53.0%) and in the “Others” group (42.0%). For the Scandinavia and Benelux group the fracture types are more evenly distributed. The most frequent types are also A1 (24.4%) and A3 (21.8%). In the US the most frequent fracture types are A2 with 33.2% and B2 with 26.1%.

Different details related to main pathology
(surgery form)

Predominant etiology of deformity

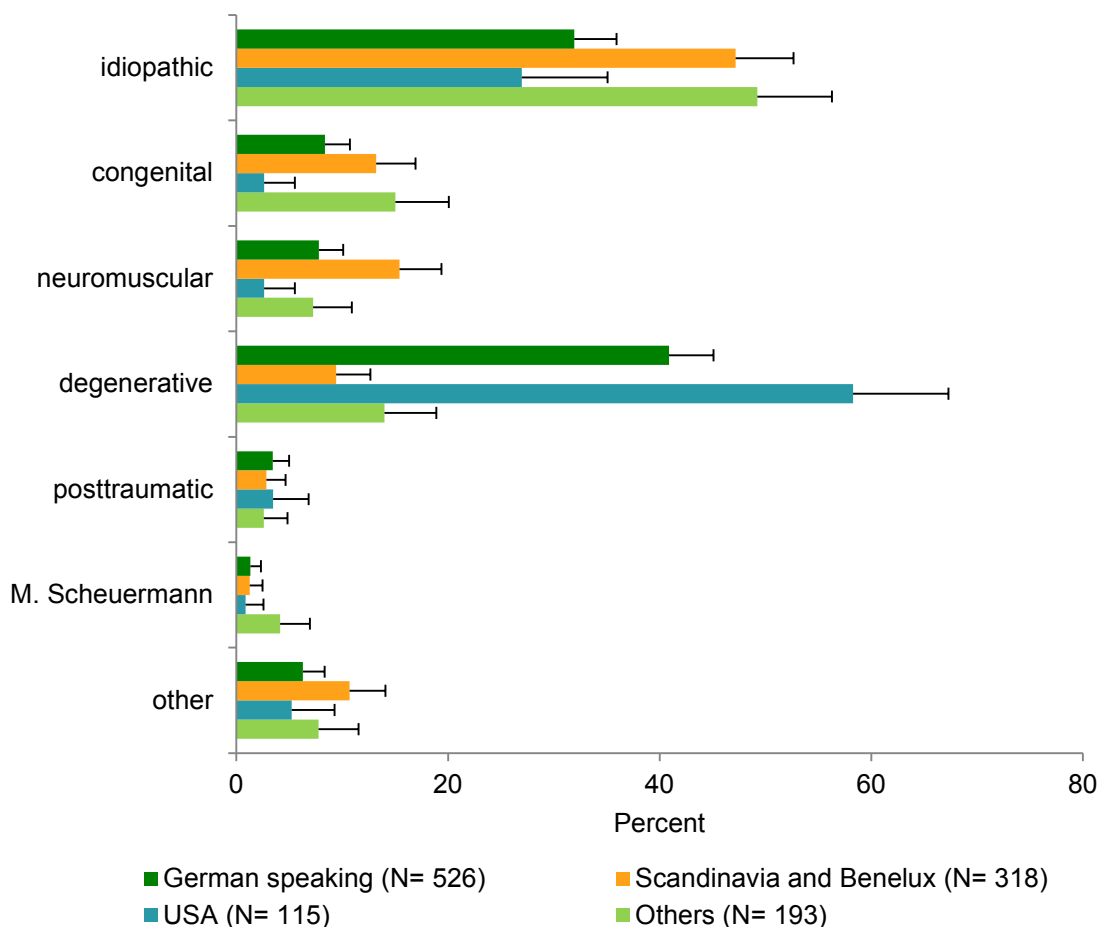


Figure 17: Predominant etiology of deformity, for the four groups (surgery form)

Degeneration as predominant etiology of deformity is most frequent in the US (58.3%) and the German speaking group (40.9%).

Scandinavia and Benelux and the “Others” group have a different main etiology for deformities with nearly 50% idiopathic etiologies each.

These numbers have to be interpreted with care, however, since non representative hospital samples and mixed hospital profiles must be considered.

Type of Spondylolisthesis

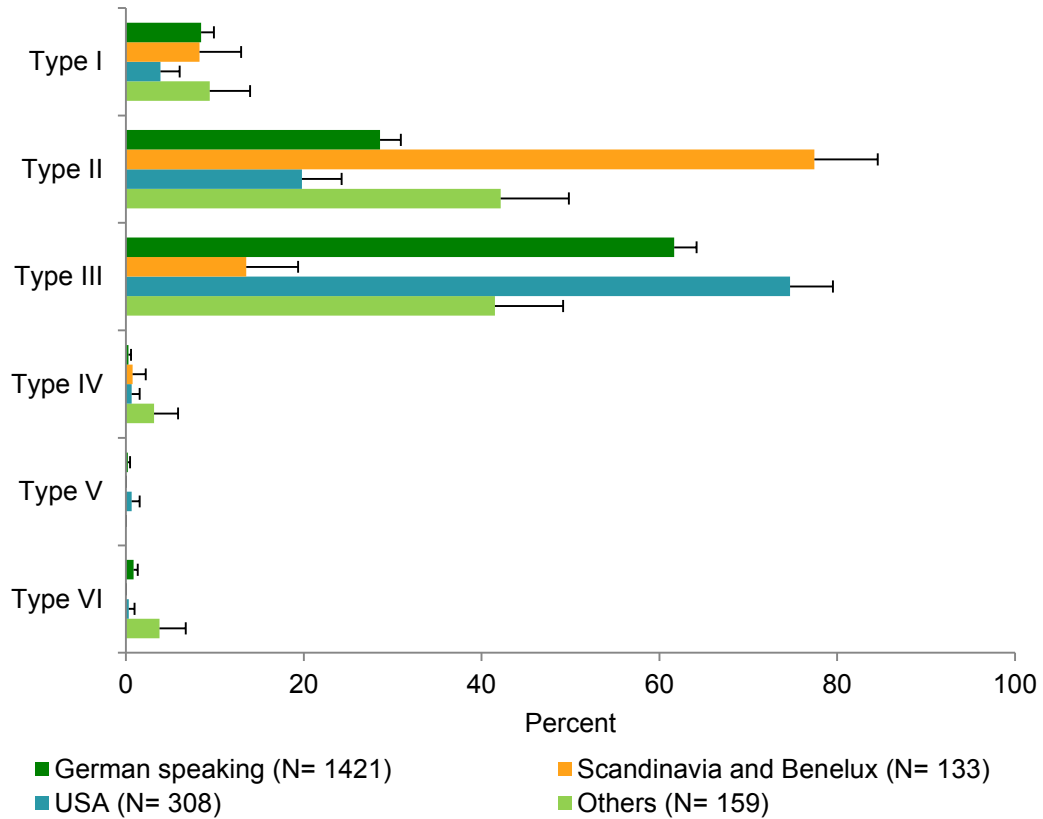


Figure 18: Type of spondylolisthesis , for the four groups (surgery form)

There are different distributions for the four types of spondylolisthesis.

In Scandinavia and Benelux the most commonly treated form is Type II (isthmic spondylolisthesis) with 77.4%. In the US- and the German speaking group the most frequently operated spondylolisthesis is of Type III (degenerative) with 74.7% and 61.6%. In the “Others”-group Types II and III are equally distributed with around 41% each.

Types IV, V and VI are barely found in any of the country groups.

Further analysis of the most common groups (Types II and III) according to surgical measures are presented below.

Tab 1: Classification of the various types of spondylolisthesis of Neugebauer & Newman, adapted by Wiltse et al.

Type I	congenital, dysplastic	Type IV	traumatic
Type II	isthmic	Type V	pathological
Type III	degenerative	Type VI	postsurgical

Different details related to main pathology (surgery form)

Figures 19-21 show the distribution of the spondylolisthesis grades for the three most frequent types. Congenital spondylolisthesis does only show a sufficient sample size in the German speaking group. Error bars are hence large and interpretations must be carefully made. The degenerative form shows more stable estimates and clearer patterns with grade I being the predominant extent of the slip in about 60% of cases followed by grade II in about 20-30%.

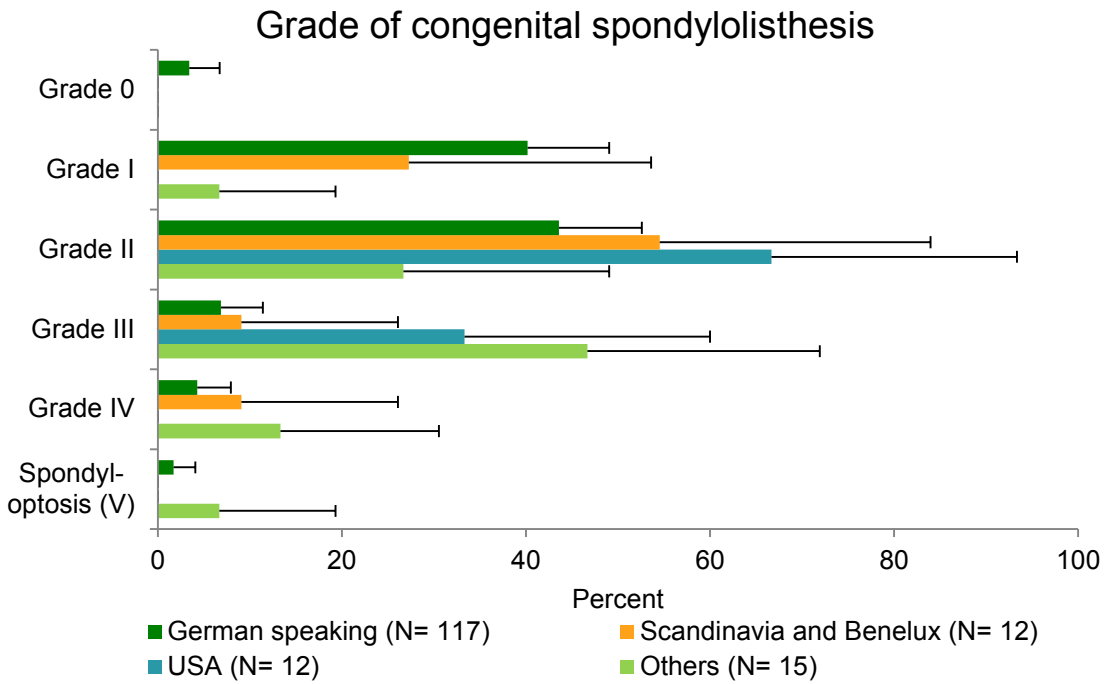


Figure 19: Grade of congenital spondylolisthesis, for the four groups, (surgery form)

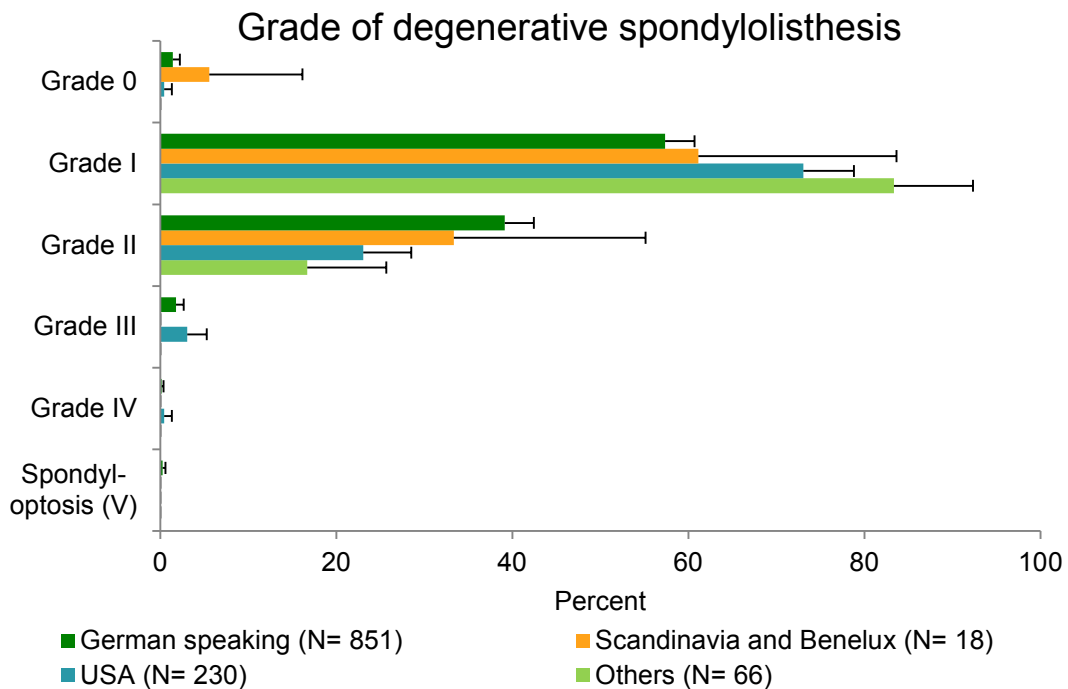


Figure 20: Grade of degenerative spondylolisthesis, for the four groups, (surgery form)

The grades of the surgically treated isthmic spondylolistheses show an almost equal distribution between grade I and II with a slight dominance for grade I. All other grades are significantly less frequently represented.

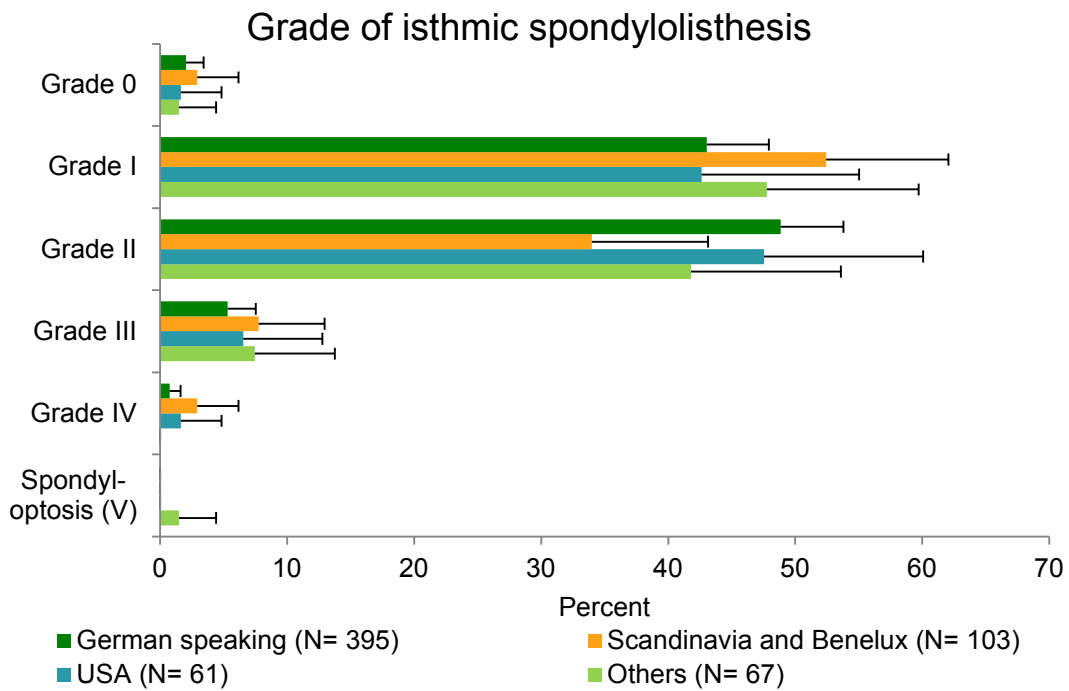
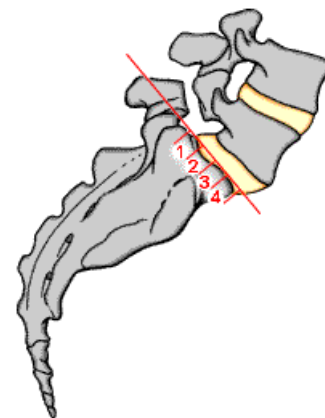


Figure 21: Grade of isthmic spondylolisthesis, for the four groups, (surgery form)

Tab. 2: Classification of spondylolisthesis according to Meyerding:

Grade 0	Lysis of pars without slip
Grade I	0-25% slip
Grade II	25-50% slip
Grade III	50-75% slip
Grade IV	> 75% slip
Grade V	spondyloptosis



Meyerding classification: also shown in the Spine Tango “Dictionary of Terms” on the Spine Tango web page.

Different details related to main pathology
(surgery form)

Type of failed surgery

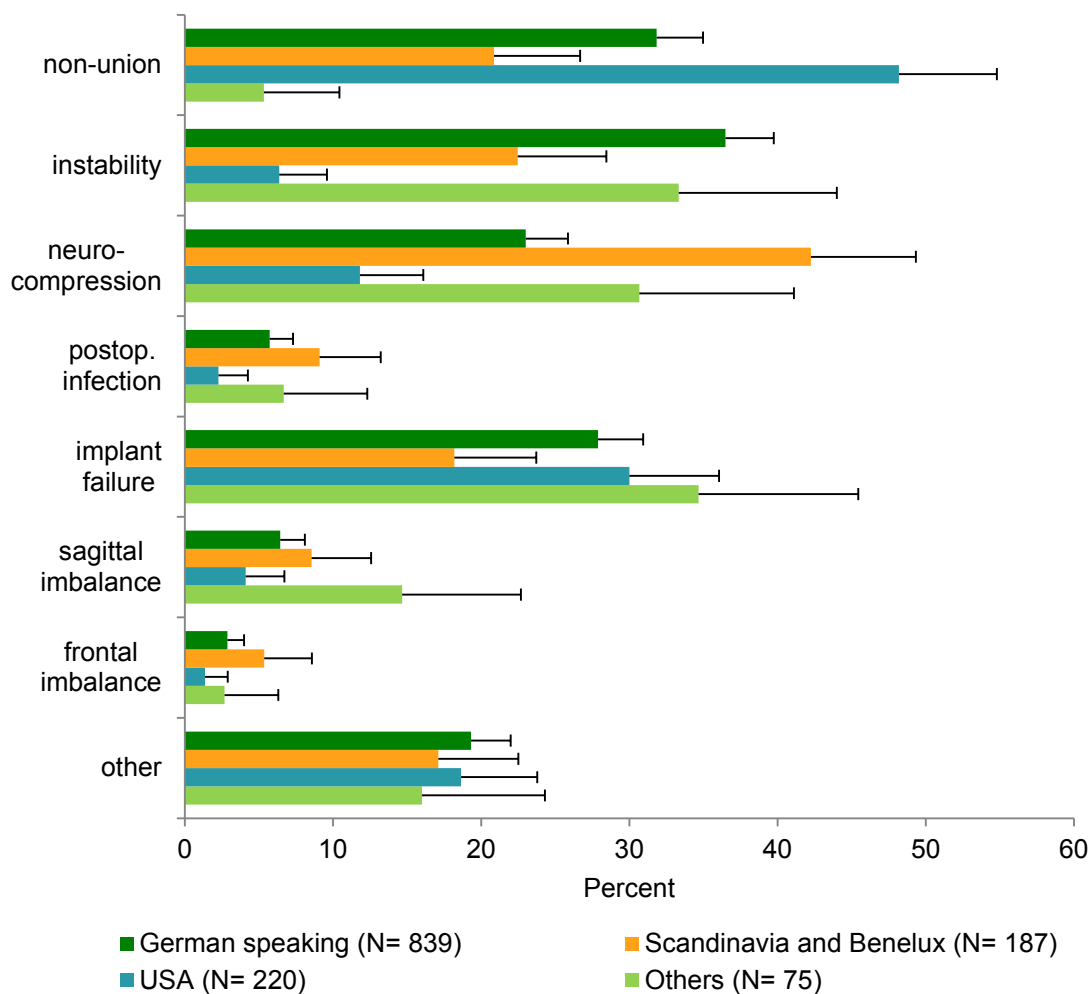


Figure 22: Type of failed surgery, for the four groups, (surgery form)

In the Spine Tango pool 1321 failed surgeries were available for analysis. The different language groups seem to each have a predominant reason for repeat or revision surgeries. While “non-union” dominates in the US group, the “instability” is most frequent in the German speaking group and “neurocompression” in the Scandinavia/Benelux countries. Infections and postural imbalances are the least frequent reasons for reinterventions in all groups.

The percentages add-up to over 100% since this question has a multiple choice format.

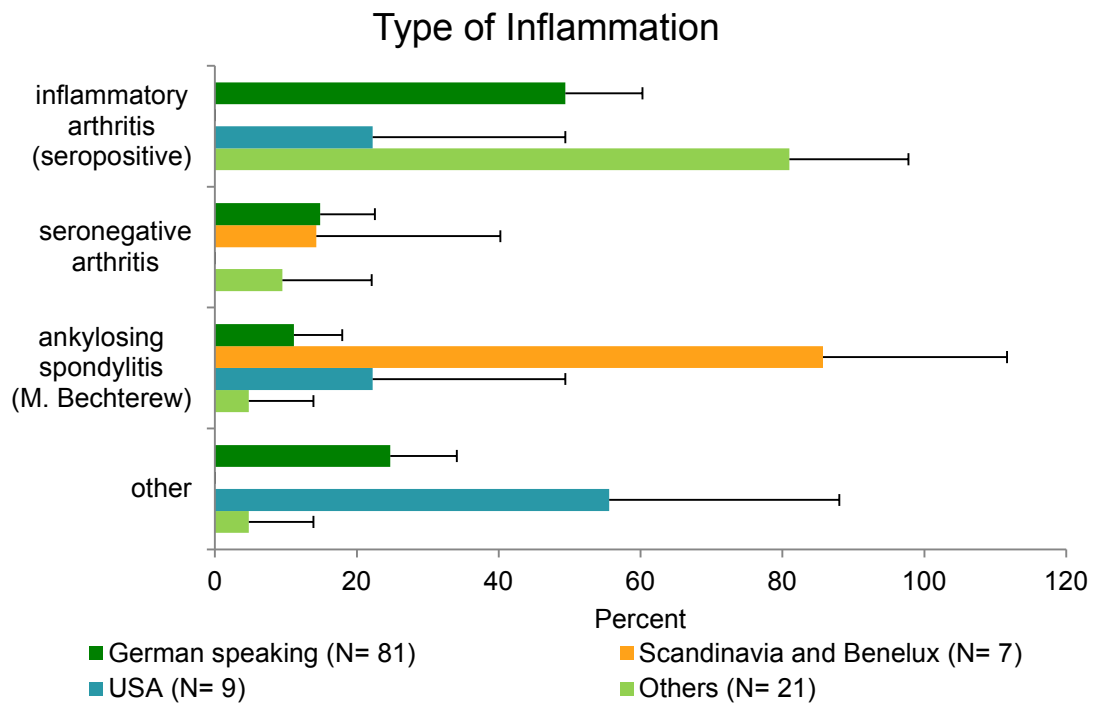


Figure 23: Type of inflammation/infection, for the four groups, (surgery form)

Sample sizes of the patient group with inflammation as main pathology are too small for any conclusive observations. It becomes, however, obvious that very few cases with inflammatory spinal or general muskelskeletal diseases undergo a surgical intervention.

Complications (surgery form)

The distribution of surgical and general complications is shown without the answer “none”. For surgical complications this answer “none” was most frequent in the US (98.5%), followed by the German speaking group (95.8%) and the “Others” group (93.5%). The highest rate of surgical complications was documented in the Scandinavia and Belenux group (88.7% had no surgical complication). Here the most frequent complication was the dural lesion with 7.3%.

Distribution of surgical complications

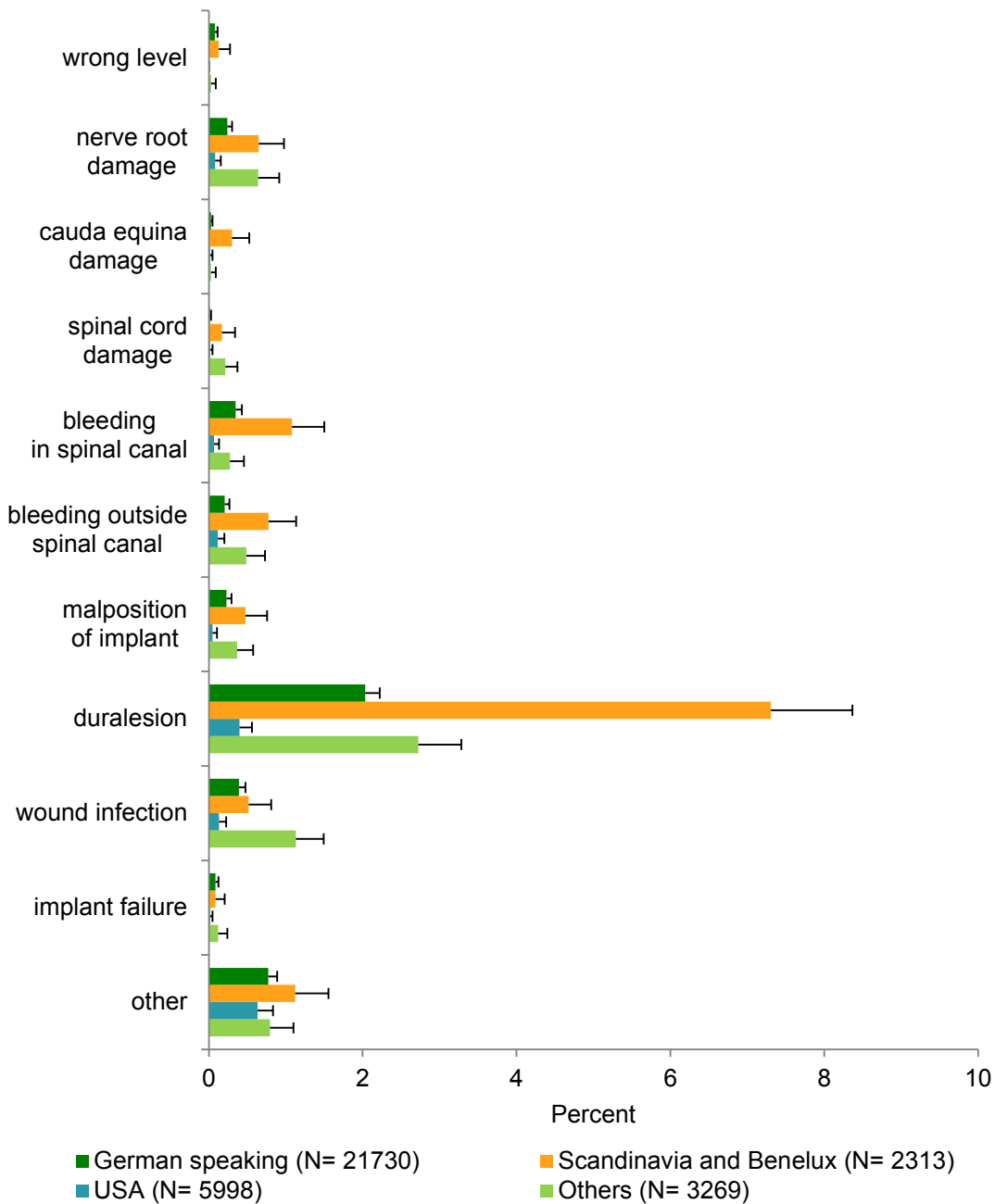


Figure 24: Surgical complications for the four groups, excluded was the answer “none” (surgery form)

Complication reporting is the weakest point of any data collection without written adherence to a code of conduct or monitoring mechanisms. These concepts will soon be introduced and offered to the Spine Tango community. Moreover, the different dura lesion rates are most probably explained by strict or less strict interpretations of a dura lesion. Anything from a superficial dural lesion, to a tear, up to a leakage or a revision procedure for a leakage can be deemed a “duralesion” that is worth being recorded. The Spine Tango dictionary of terms proposes definitions for all items and helps to harmonize the understanding, interpretation and capture of such events.

Distribution of general complications

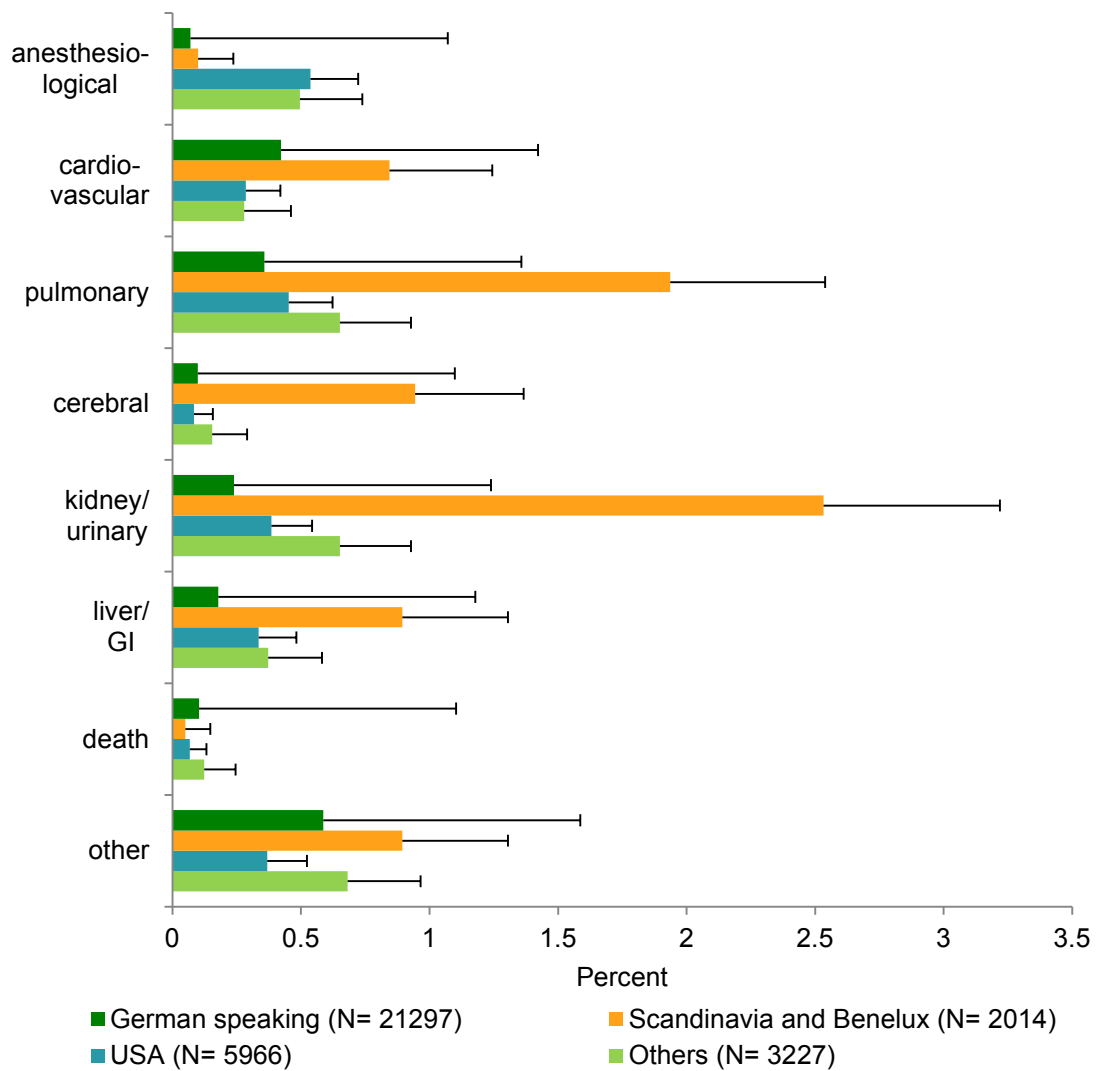


Figure 25: General complications for the four groups, excluded was answer “none” (surgery form)

Also, for general complications Scandinavia and Belenux had the highest rate (92.8% answers “none”). In the German speaking-, the “Others”- and the US group similar patterns of general complications occurred (about 97-98% each). Reporting discipline and case mix must be carefully considered when interpreting these figures.

Data from the followup form
Distribution of followup interval / overall outcome

The distribution of followup intervals (figure 26) shows a time dependend decrease of documented followups for all groups, most distinct in the US group with 61.5% of all followups being recorded at 6 weeks and only 0.1% at 1 year after surgery. The most frequent long term followups are documented in Scandinavia and Benelux with 23.4% after 6 months and 16.1% at 1 year postoperative.

Distribution of followup interval

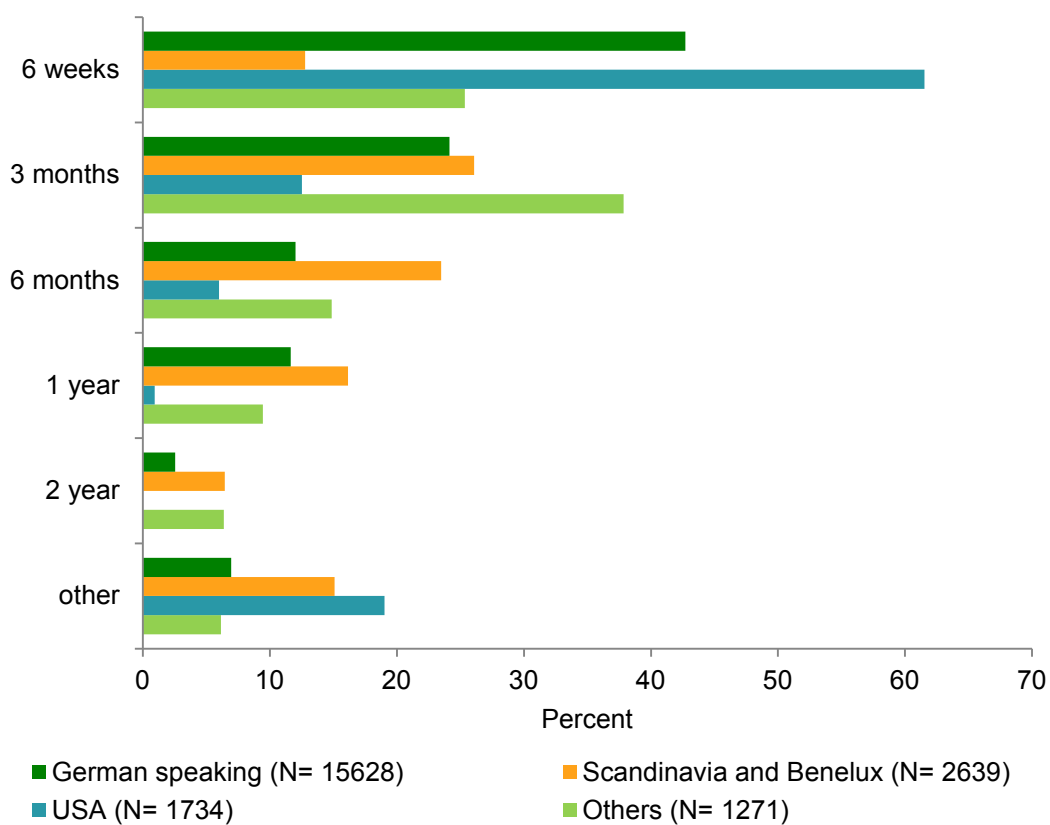


Figure 26: Distribution of followup interval (followup form)

On the next page the overall outcome from the surgeon`s point of view is shown across the followup intervals <3 months, 6 months and 1 year. The 3 and 6 month followup groups show decent sample sizes and allow the conclusion that the majority of outcomes are rated as excellent or good in the eyes of the surgeons.

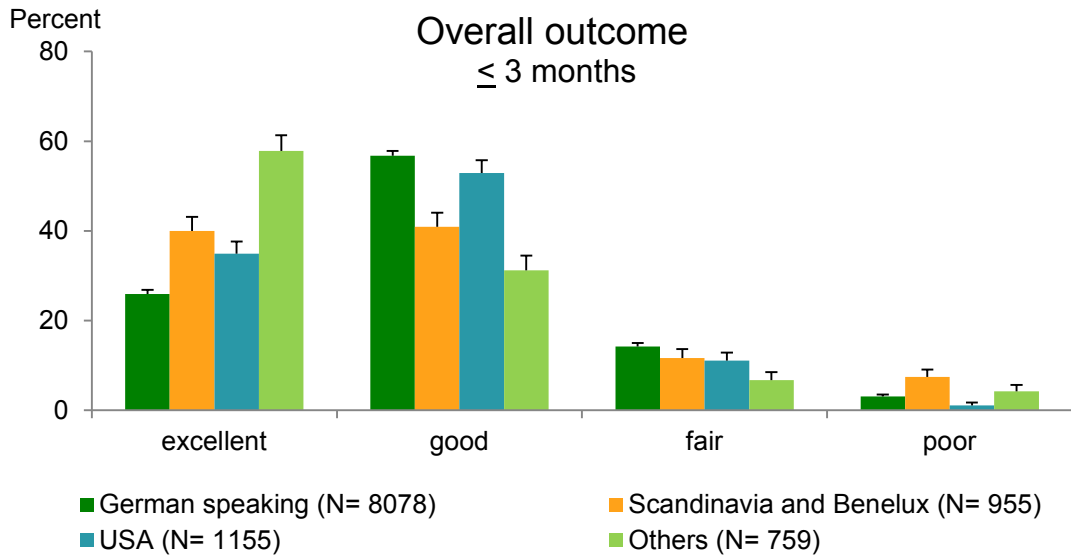


Figure 27: Overall outcome (surgeon) for all four groups at a followup <math>< 3</math> months (followup form)

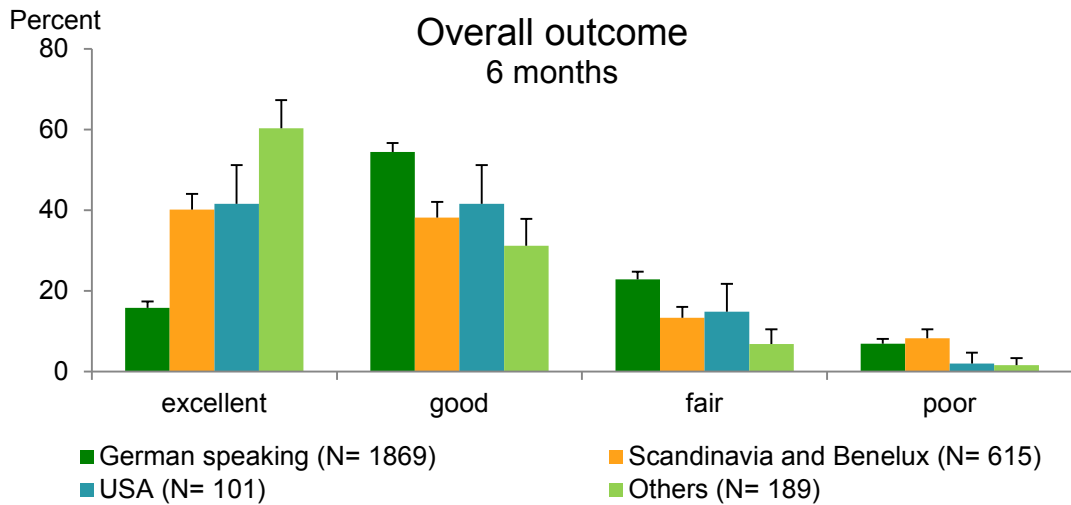


Figure 28: Overall outcome (surgeon) for all four groups at a followup of 6 months (followup form)

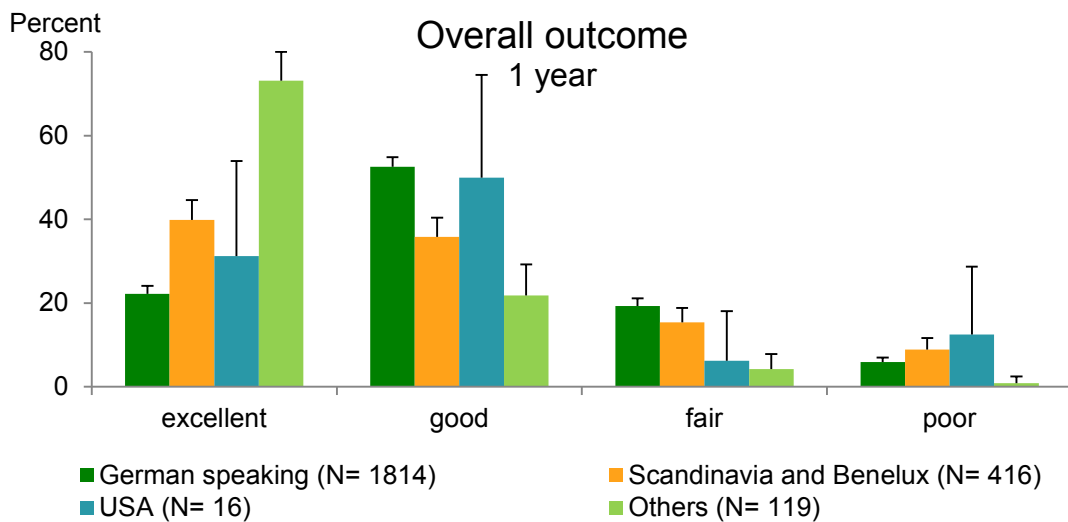


Figure 29: Overall outcome (surgeon) for all four groups at 1 year followup (followup form)

Surgical goals – pain relief (followup form)

Figures 30-32 show the achievement of the surgical goal “pain relief” according to followup interval. In accordance with the very positive surgeon based outcome ratings, the “Others” group has the highest percentage of achievement in all followup intervals. For the German speaking, the Scandinavia and Benelux and the US group the percentage of achievement of pain relief slightly decreases with time. The 1 year patient sample in the US group is too small for any conclusion.

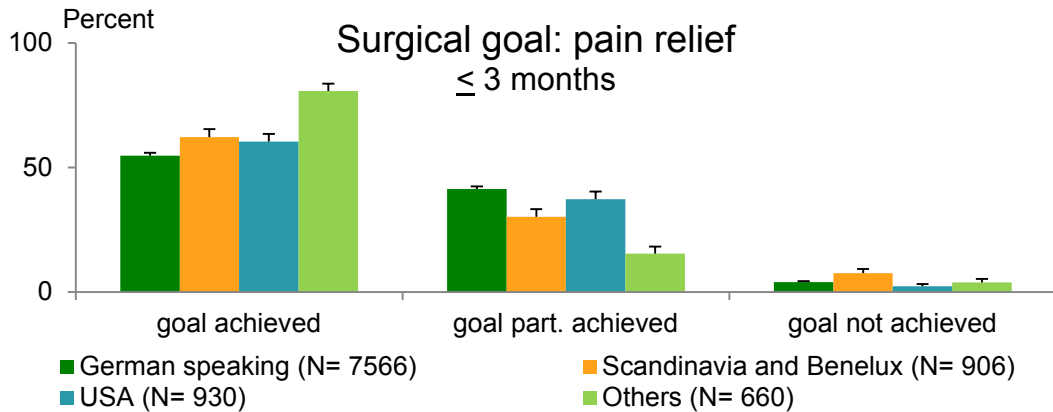


Figure 30: Surgical goal: pain relief for all four groups at a followup < 3 months (followup form)

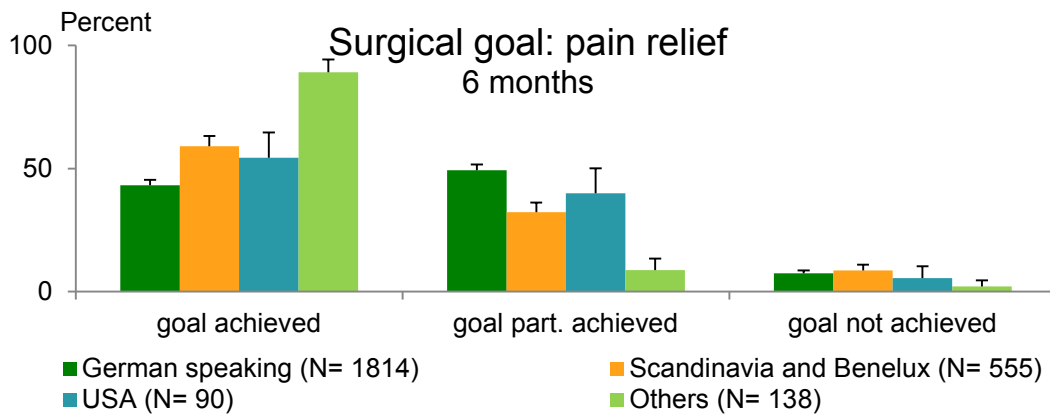


Figure 31: Surgical goal: pain relief for all four groups at a followup of 6 months (followup form)

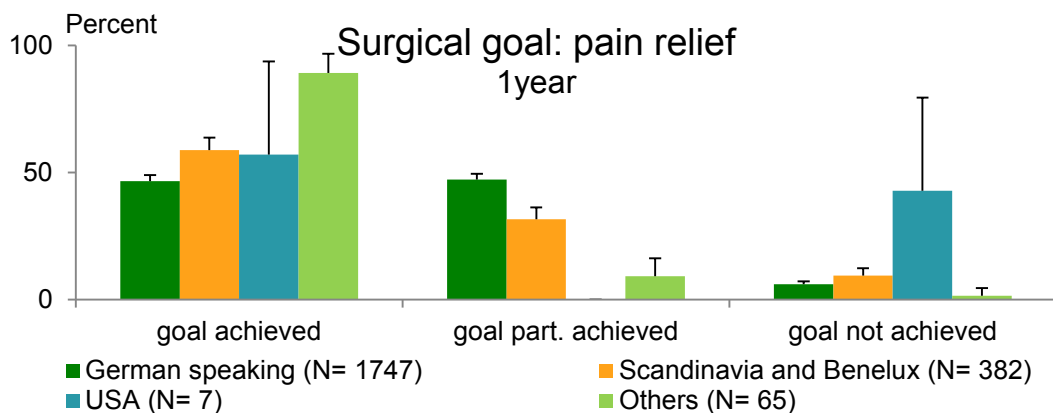


Figure 32: Surgical goal: pain relief for all four groups at a followup of 1 year (followup form)

**Surgical goals – functional improvement
(followup form)**

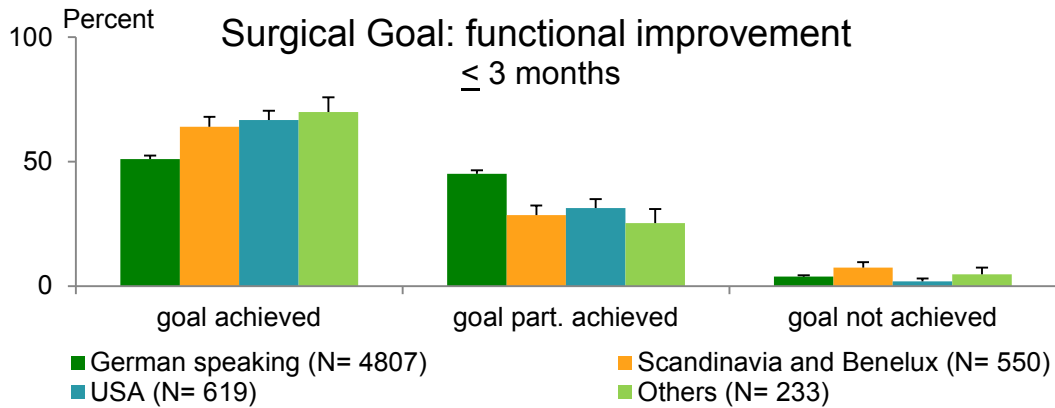


Figure 33: Surgical goal: functional improvement for all four groups at a followup <3 months (followup form)

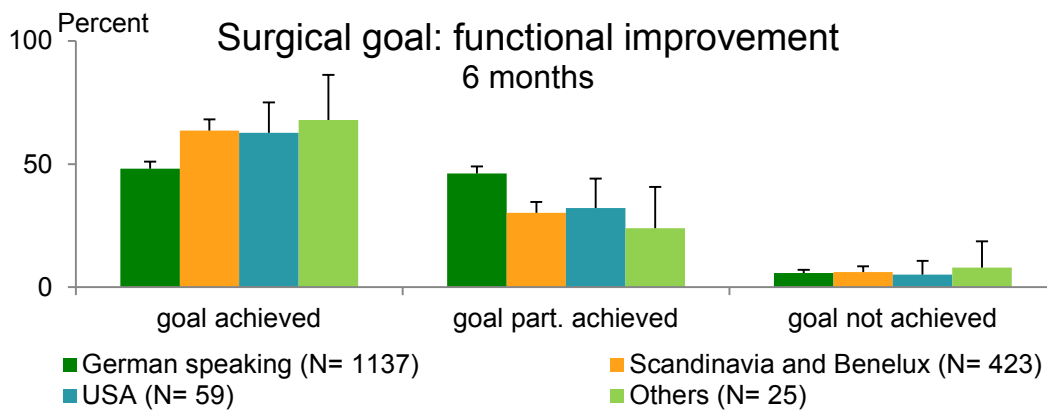


Figure 34: Surgical goal: functional improvement for all four groups at a followup of 6 months (followup form)

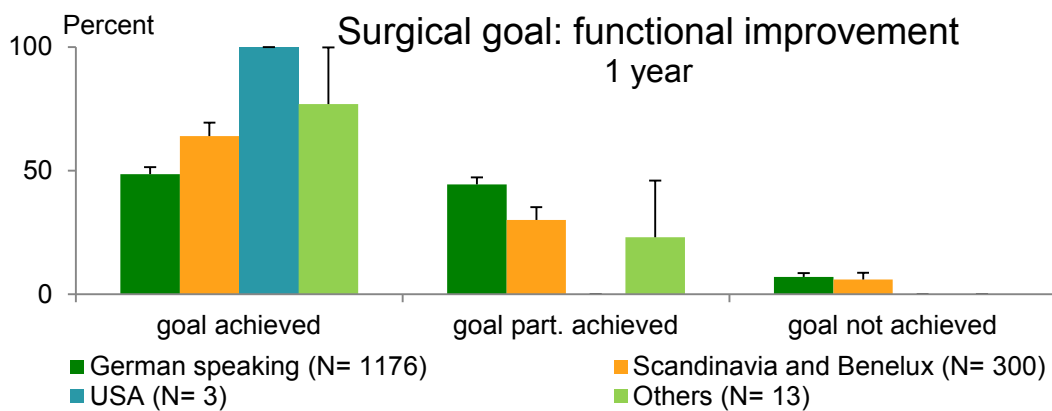


Figure 35: Surgical goal: functional improvement for all four groups at a followup of 1 year (followup form)

The functional improvement is quite equally distributed. Except for the German speaking group, the achievement reaches around 60% in all followups. In the German speaking group the achievement of functional improvement is slightly lower, but the fraction of partially achieved functional improvement is larger compared with the other groups. Because of the low case number the US and “Others” group are not interpretable at the 1 year followup.

Different details related to main pathology
(surgery form)

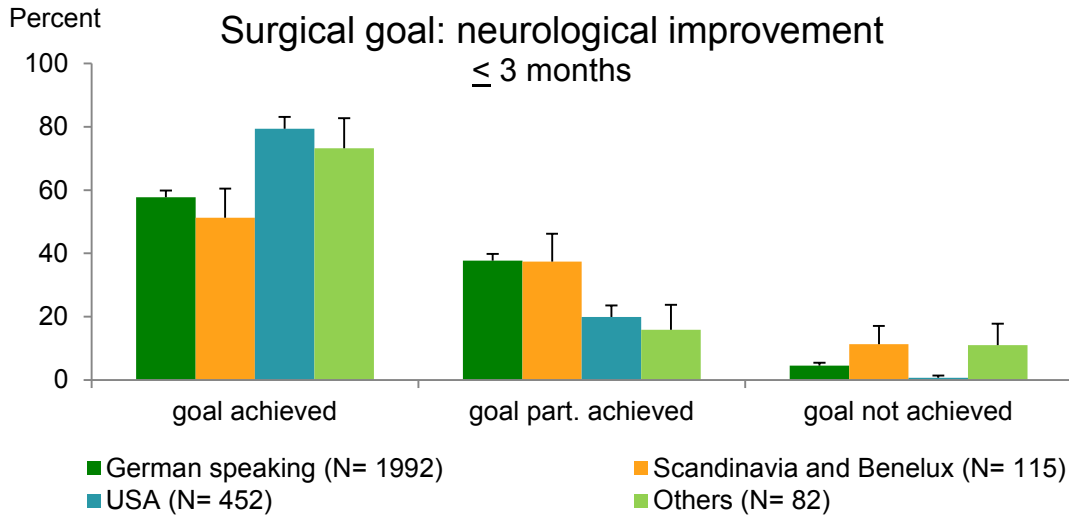


Figure 36: Surgical goal: neurological improvement for all four groups at a followup < 3 months (followup form)

Distributions of rates of achievement, partial achievement and non-achievement of neurological improvement were similar to pain relief and functional improvement.

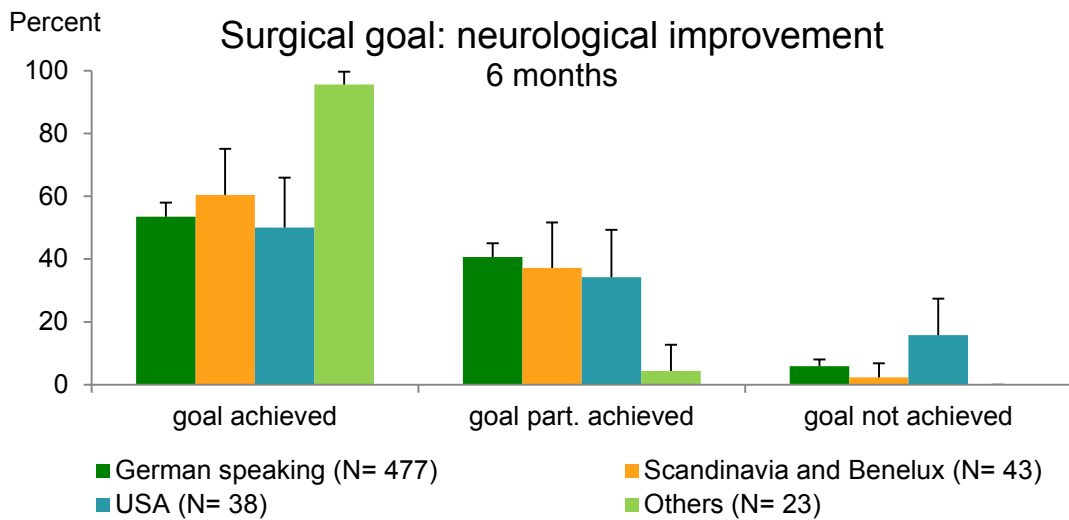


Figure 37: Surgical goal: neurological improvement for all four groups at a followup of 6 months (followup form)

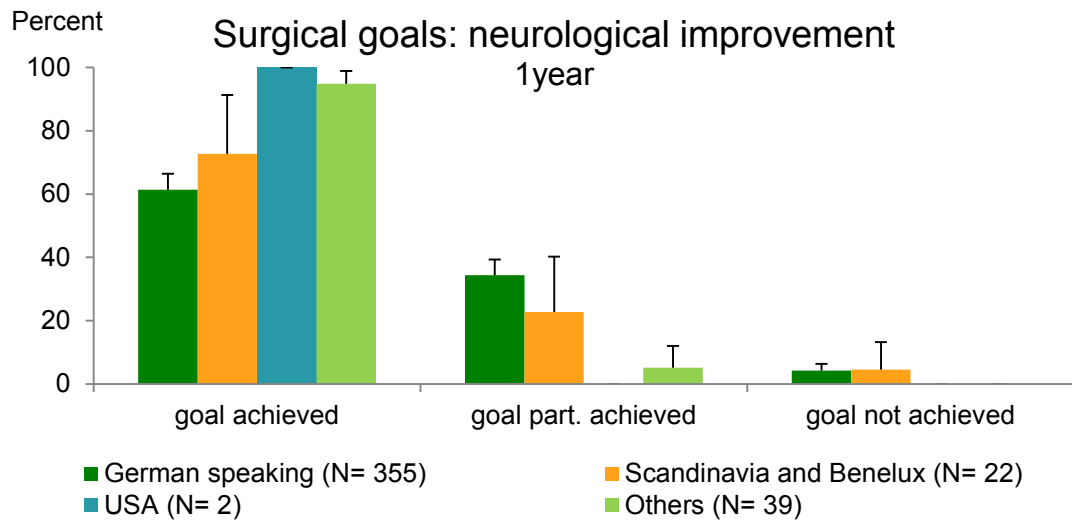


Figure 38: Surgical goal: neurological improvement for all four groups at a followup of 1 year (followup form)

An exemplary analysis of Spondylolisthesis using the Spine Tango data pool

On the following pages we show an exemplary analysis based on the Spine Tango data pool. To display the possibilities of data analysis we defined three patient groups based on the etiology of spondylolisthesis and analysed different surgical procedures for the patients groups benchmarked within the four country-groups which were used before.

The patient groups were mainly defined based on diagnosis. We focused on isthmic and degenerative spondylolisthesis as the most frequent types of spondylolisthesis. In addition we generated a third group - degenerative disease with spondylolisthesis as spinal comorbidity. To construct more homogeneous groups the inclusion criteria for all patients were a single segment lumbar or lumbosacral surgery.

Mining data from the surgery forms 2005 and 2006 we found 2096 patients with the following distribution across groups:

Group 1: main pathology - isthmic spondylolisthesis, N= 453

Group 2: main pathology - degenerative spondylolisthesis, N= 713

Group 3: main pathology - degenerative disease with additional pathology spondylolisthesis, N= 930

By comparing these groups we have to consider that we do not have information if the spinal comorbidity spondylolisthesis was exactly located at the level of surgery.

Demographic data

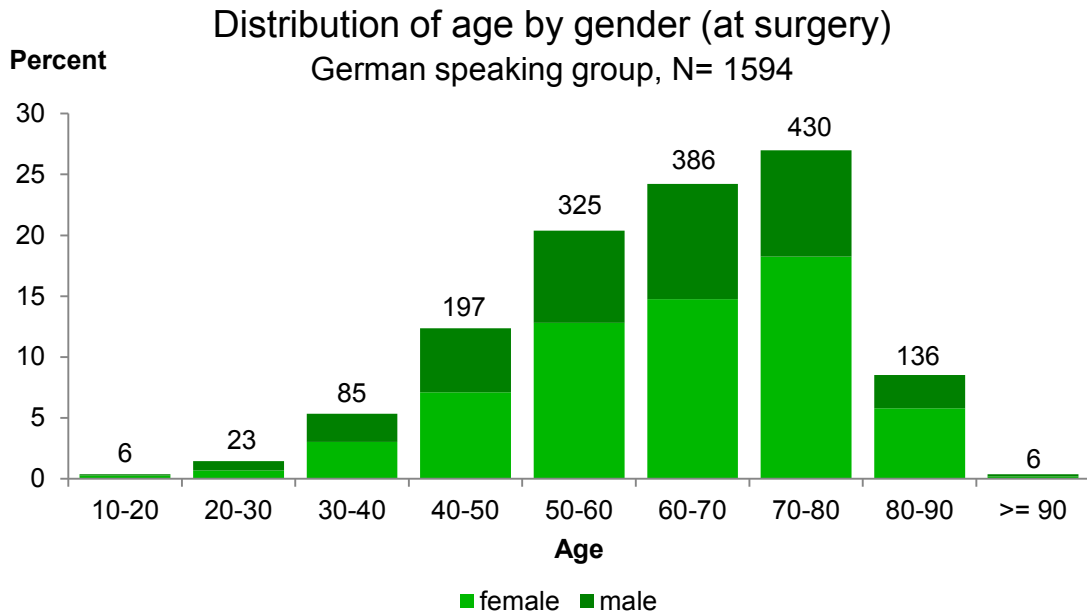


Figure 39: Distribution of age by gender in the German speaking group (N= 1594)

To compare demographic data among the patients, age and sex distribution for each country group are plotted. The German speaking group shows a slightly skewed distribution towards the older age groups and has a relatively higher percentage of female patients than the other country groups.

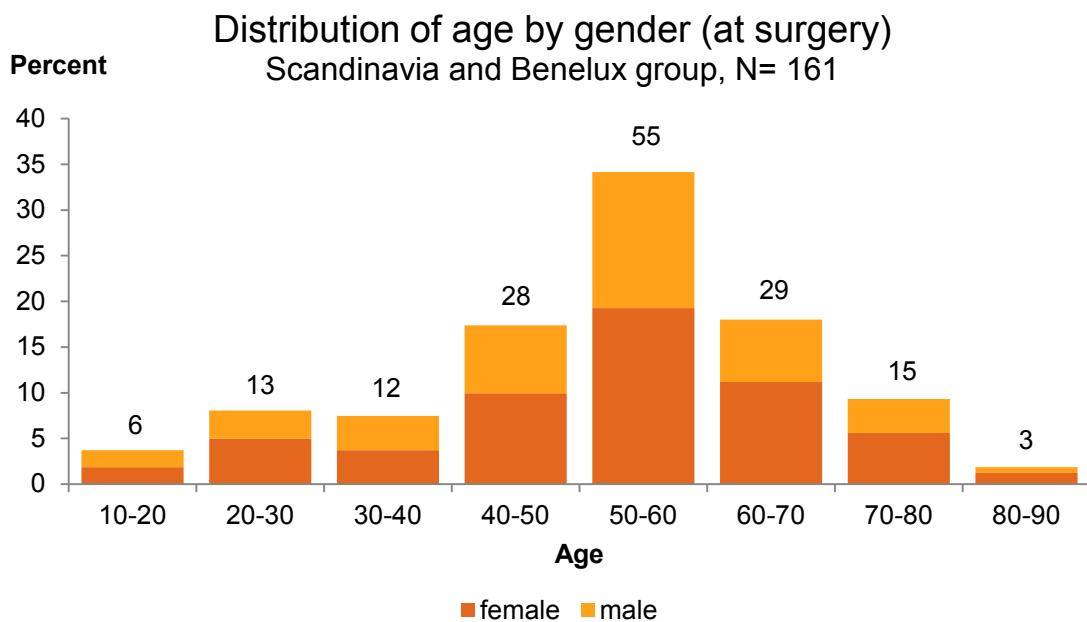


Figure 40: Distribution of age by gender in the Scandinavia and Benelux group (N= 161)

Different details related to main pathology
(surgery form)

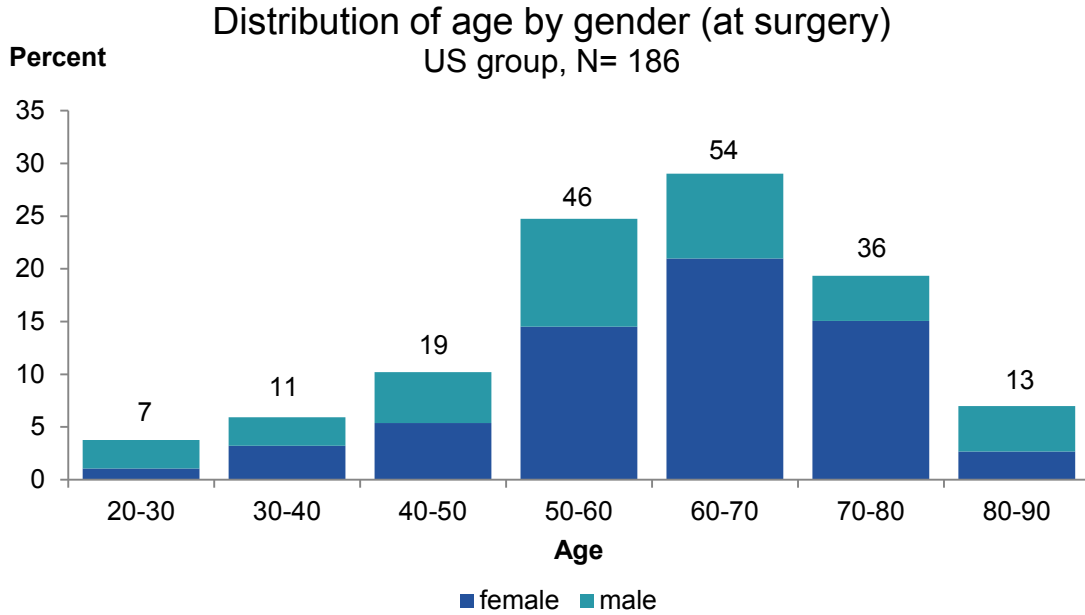


Figure 41: Distribution of age by gender in the US group (N= 186)

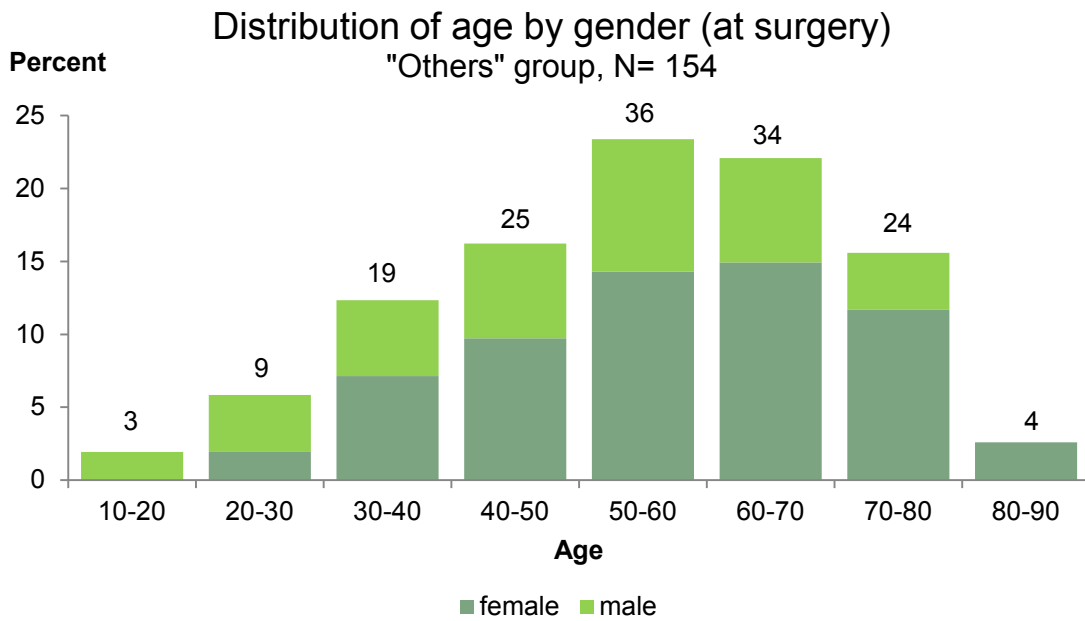


Figure 42: Distribution of age by gender in the "Others" group (N= 154)

Definition of the surgical procedures

We defined 5 types of surgical procedures:

- Posterolateral fusion with rigid stabilization (pedicle screws and rod)
- 360° Fusion: Posterolateral Lumbar Interbody Fusion (PLIF), with pedicle screws and rod
- 360° Fusion: Transforaminal Lumbar Interbody Fusion (TLIF), with pedicle screws and rod
- Anterior Lumbar Interbody Fusion (ALIF) with or without posterior stabilization
- Decompression only (without fusion or rigid stabilization)

All non-matching procedures are combined in a sixth group as “other surgical procedure”.

For more details figure 43 shows all inclusion and exclusion criteria we applied.

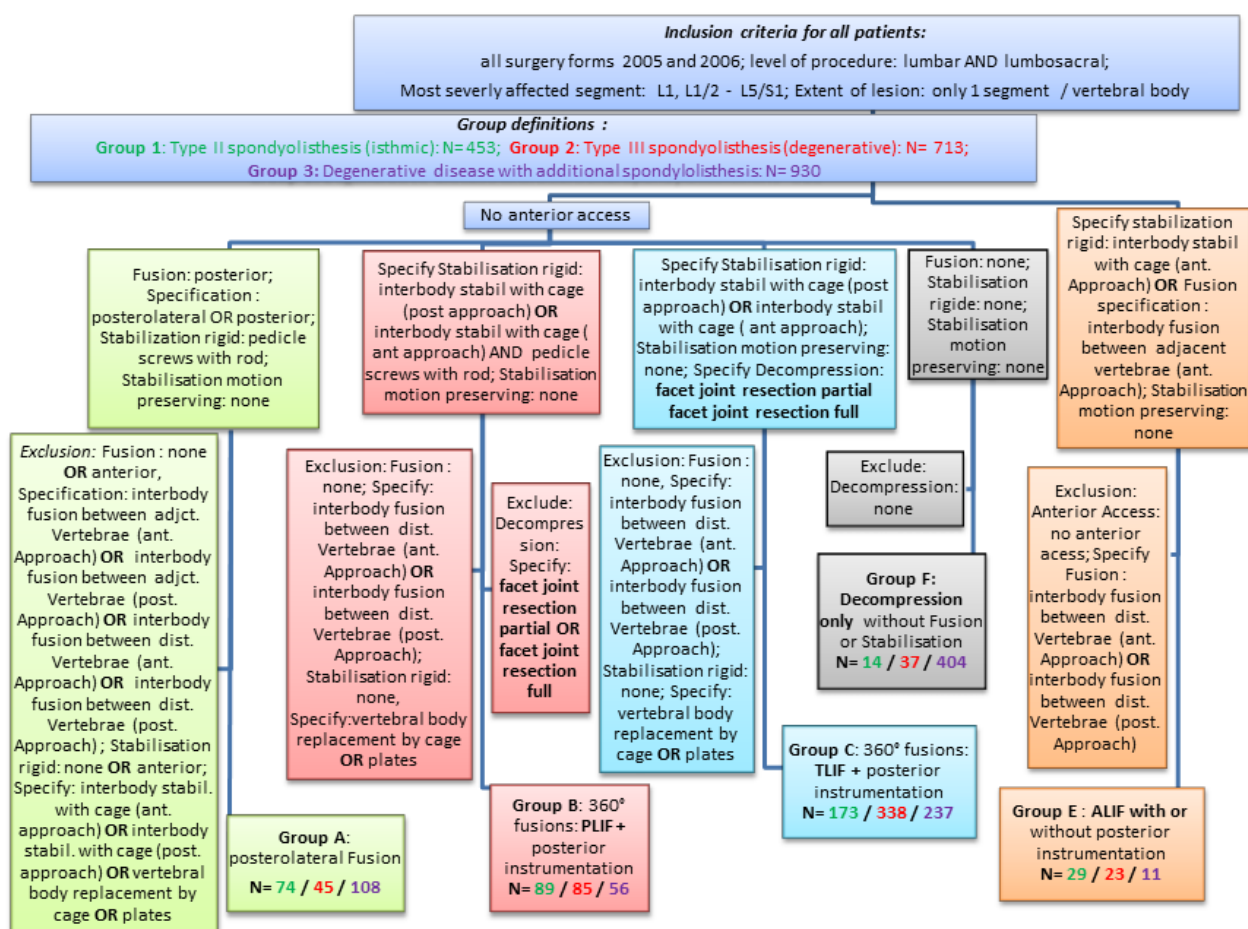


Figure 43: Inclusion/exclusion criteria of the surgical procedure for treatment of spondylolisthesis

The definitions of the surgical procedures were specified based on the surgery form. It became obvious that the current terminology used in Spine Tano does not always guarantee an exact “construction” of a specific surgical procedure. These insights helped us in refining terminology and definitions for the new surgery forms 2011.

Analysis of surgical procedures

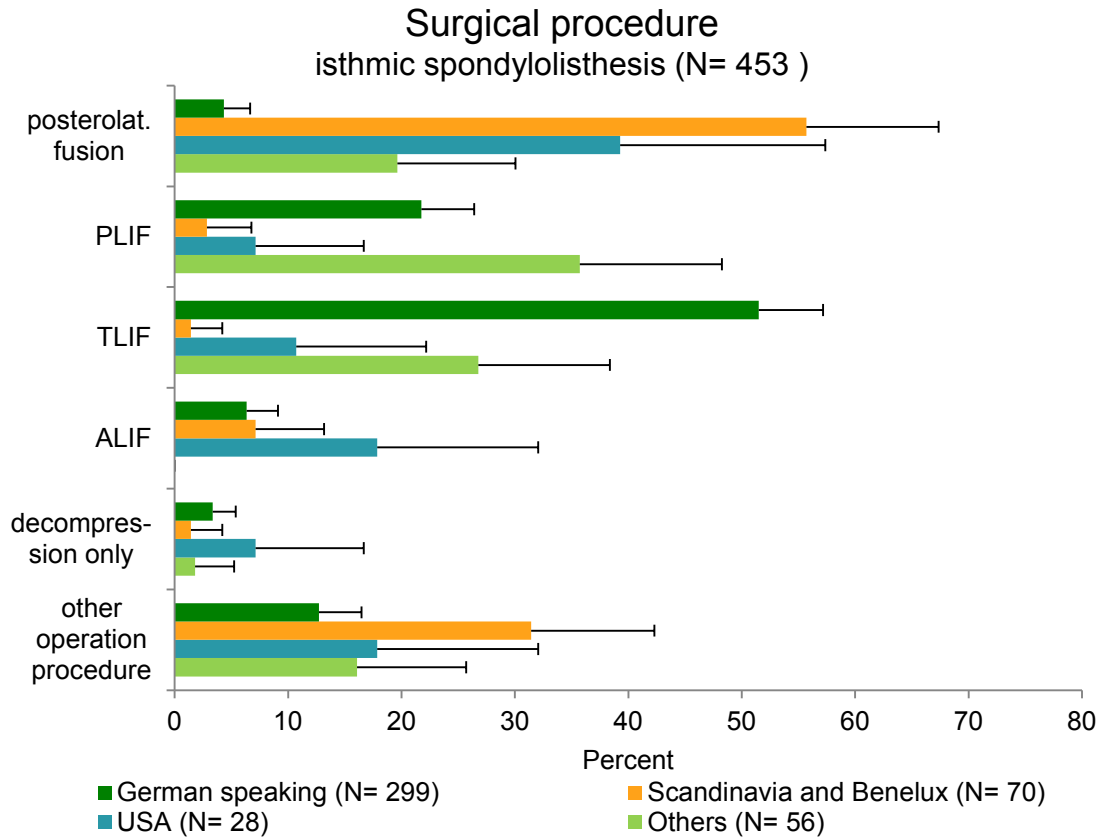


Figure 44: Distribution of surgical procedures for patients with isthmic spondylolisthesis (N= 453), for all four groups

Figures 44-46 show the distribution of the surgical procedures for the three main pathologies (isthmic and degenerative spondylolisthesis, and degenerative disease with spondylolisthesis as spinal comorbidity). Differences between the country groups in surgical approaches for similar diseases (all single level surgeries, same types of spondylolistheses within groups) become apparent. For example for the isthmic spondylolisthesis and degenerative diseases with additional spondylolisthesis the Scandinavia and Benelux group most often performed a posterolateral fusion. For degenerative spondylolisthesis the German speaking group mainly applied a TLIF procedure whereas in Scandinavia and Benelux TLIF and PLIF were most frequently performed. In the US, ALIF was quite frequently performed compared with the other groups which did not perform any ALIF for this pathology. The US sample was, however rather small.

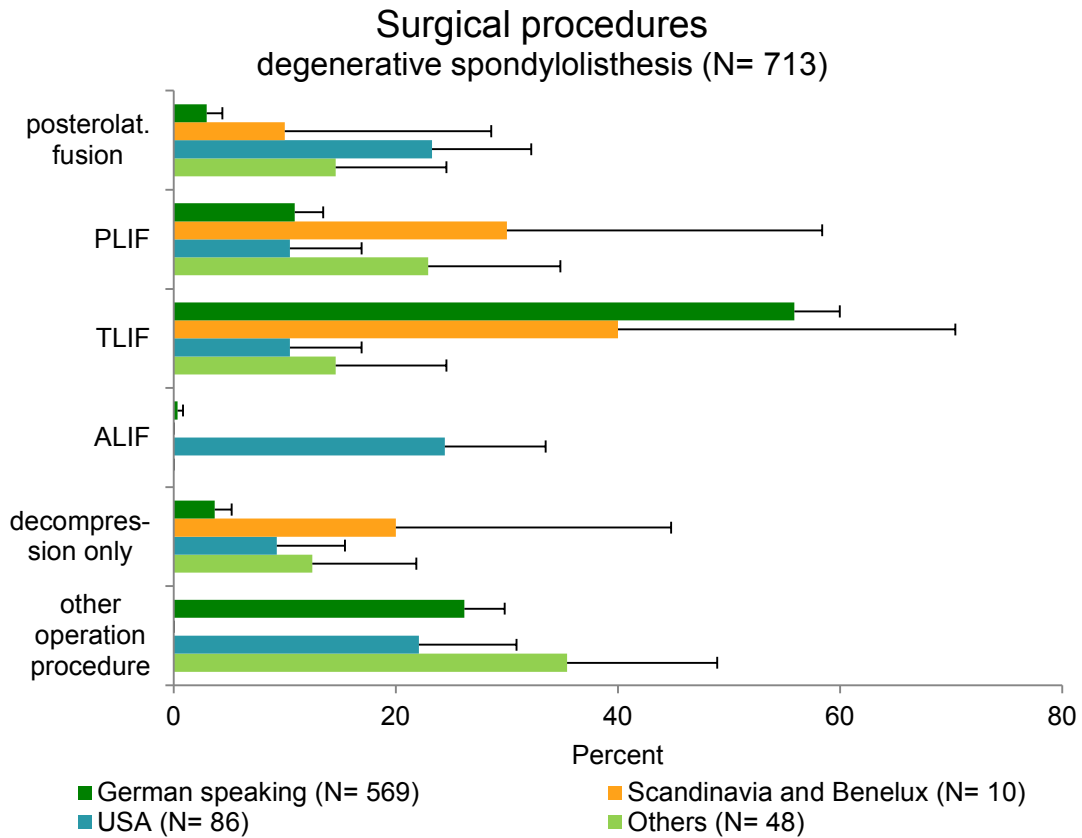


Figure 45: Distribution of surgical procedures for patients with degenerative spondylolisthesis (N= 713), for all four groups

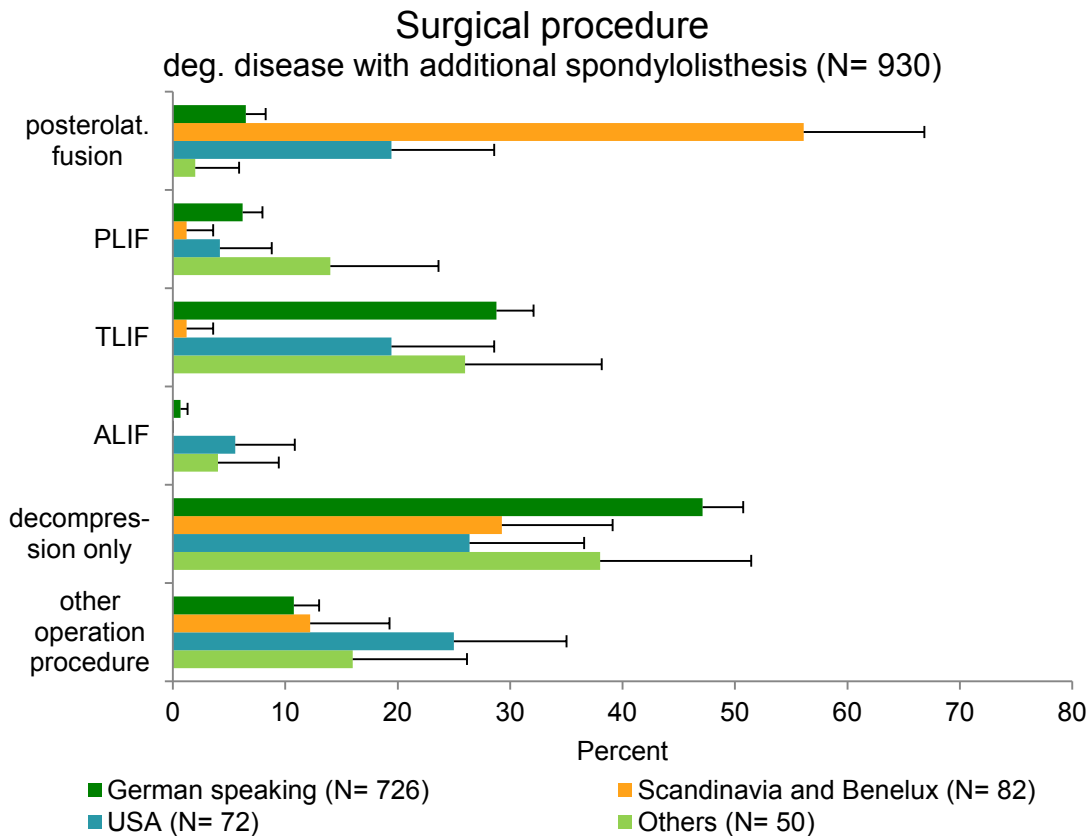
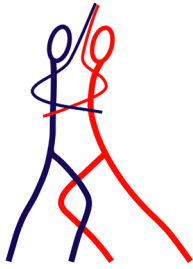


Figure 46: Distribution of surgical procedures for patients with degenerative disease and additional spondylolisthesis (N= 930), for all four groups



PARTICIPANTS/ MODULE ANALYSIS

Figure 47 displays the cumulative growth curves of the various national modules. The different starting dates of the modules need to be considered (Swiss/International 2005, Austria 2005; Germany 2006; North America 2007; Brazil/South America 2008; Italy 2008; Mexico 2008; Great Britain 2010; Australia 2010).

The Australian and British modules are both not available via www.eurospine.org because of national data privacy regulations, but the contact persons for these modules are displayed on the Spine Tango web page.

50

Figure 48 shows an overview of the Spine Tango participating hospitals and their country of origin until the end of 2010. We divided their total case load into primary forms and followup forms.

Compared to the previous year the following countries showed an increase in their participant numbers: Australia (2 centers), Belgium (4 centers), Finland (2 centers), Germany (16 centers), Italy (3 centers), Poland (1 center), Switzerland (11 centers), UK (2 centers).

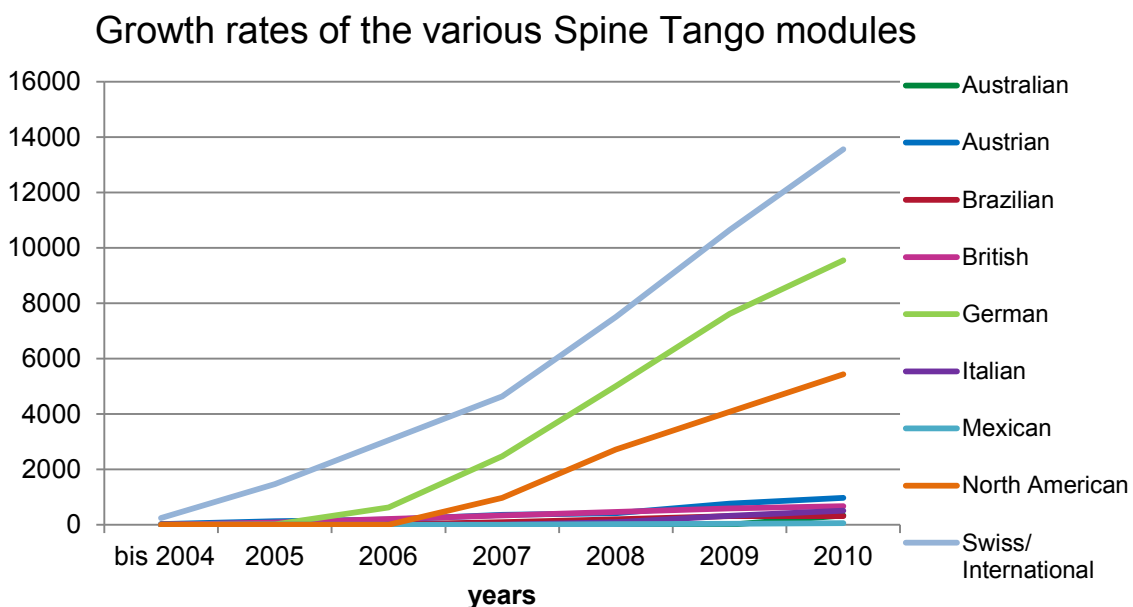


Figure 47: Growth curves (number of cases of the single Spine Tango modules over the years)

Spine Tango forms per participating country (active hospitals)

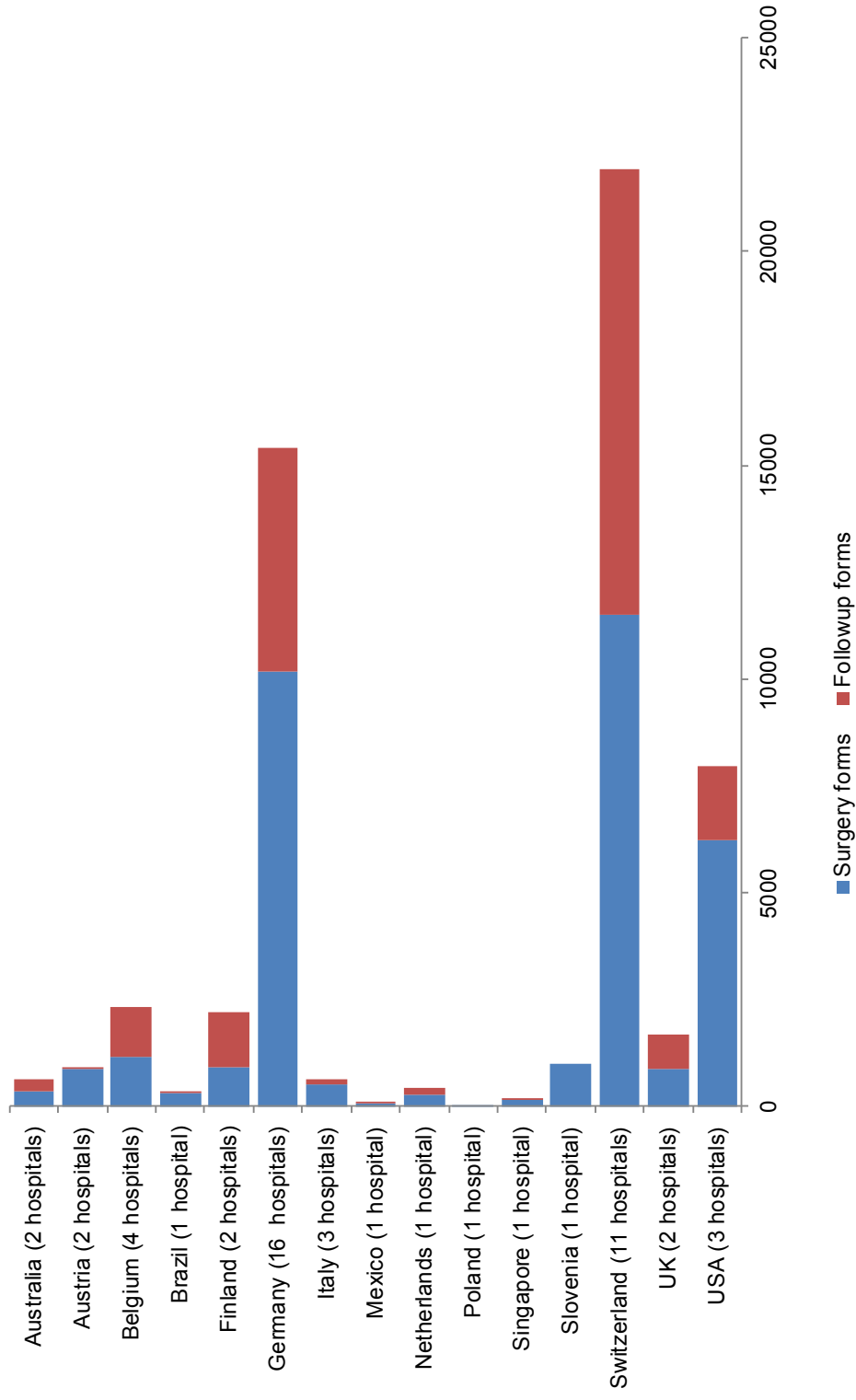


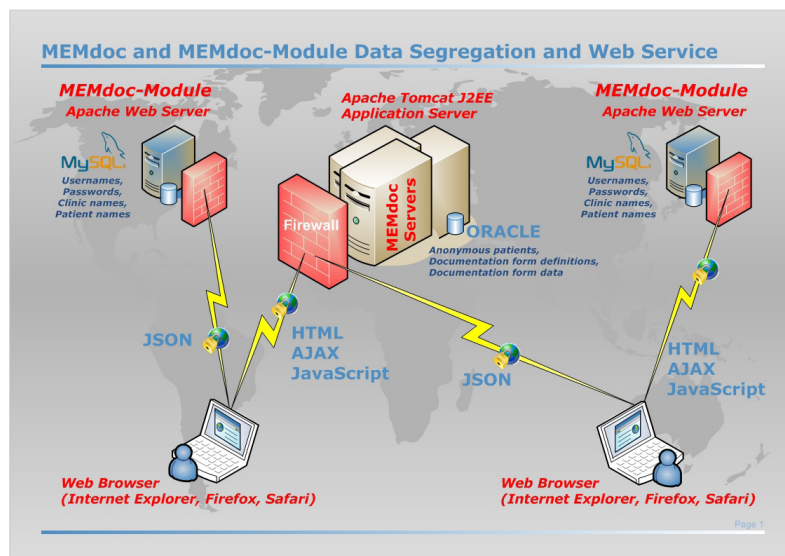
Figure 48: Overview of the Spine Tango participating hospitals according to their country of origin with case load divided into primary forms and followup forms until the end of 2010.

SECURITY

52

The model of the MEMdoc and MEMdoc-Module system is designed around the principle of data separation. The MEMdoc central server, housed at the MEM Research Center (MEMcenter) in Bern, hosts the main application and the central database containing all study definitions and clinical study data. Satellite MEMdoc-Module servers located throughout the world store all personal data about users, institutions and patients. At the core of the system is an innovative and patent-pending architecture in which the web browser of the client is used as a hub to seamlessly segregate and integrate the data between the MEMdoc-Module and the MEMdoc central server. This design provides tightly integrated communication between the servers while increasing the security and privacy of both systems. This has been accomplished using a light weight JSON server and incorporation of SSL encryption on each module. Flexible data sharing options have been designed to restrict or expand data access to suit individual needs. Finally, data consistency is controlled through systematic validation of received data and a rollback in case of errors.

Each module server contains a local MySQL database, an Apache web server and the custom MEMdoc-Module application. This server can sit within the same clinic as the user or in some remote location depending on the needs of the group hosting the module. The physical and network security of this server is left up to the hosting entity. Some groups choose to restrict access to the module to users within the local subnet while others allow open access from anywhere. The module database contains all user and clinic information as well as the basic demographic data of patients. No medical data is stored on the module server.



All users from every MEMdoc-Module make their initial connection to the MEMdoc central server that houses the core MEMdoc application as well as all clinical study definitions. The MEMdoc application then recognizes the URL of the connection to determine which MEMdoc-Module to utilize and delivers the appropriate custom module application to the user's web browser. Each time a user requests data the application contacts both the local MEMdoc-Module and MEMdoc central database (Oracle) to seamlessly integrate the data from each for display. Newly entered data is likewise split so that only internal numeric identifiers for the user, patient, clinic, department and module are stored on the MEMdoc central database. All medical data is retrieved from and stored directly to the MEMdoc central server and linked to the module by these internal identifiers. Medical data never passes through the MEMdoc-Module server and is never stored on the MEMdoc-Module server. The birth year and gender of each patient are the only pieces of personal information stored on the MEMdoc central database for performing pooled statistics.

The physical and network security of all the MEMdoc servers is maintained by IEFM (Institute for Evaluative Research in Medicine) at the MEM Research Center. This includes the MEMdoc central (web) server, the MEMdoc database server and the MEMdoc statistics (SAS) server. All servers are physically housed at the MEMcenter in a dedicated, locked, climate controlled and monitored server room. The network is protected by a Sonicwall NSA 3500 firewall with real-time gateway anti-virus, anti-spyware, anti-spam and intrusion prevention. The firewall only allows access to the servers from the outside via port 443. Additional access is restricted to connections from within the MEMcenter. Web security is controlled by a DigiCert certified SSL web server certificate with 256-bit encryption on the MEMdoc central server and on each satellite module. Each server is continuously monitored to log all connections and to detect any suspicious activity. Additionally, any modules that are hosted at the MEMcenter fall within the same security parameters.

The following hardware is recommended for a MEMdoc-Module:

- Midrange Tower- or 19" Rack server
- CPU Intel Quad Core, Xeon or AMD Opteron
- RAM > 2 GB
- Hardware RAID 1 or 5
- Linux (Debian 5)



b
UNIVERSITÄT
BERN

AVAILABLE QUESTIONNAIRES

Table 3: Available questionnaires in the SSE Spine Tango registry (01.01.2011)

Forms	used in the SSE Spine Tango registry 01.01.2011						online available					OMR paper forms								
		implemented	in process	mandatory	multilingual	english	german	french	italian	spanish	english	german	french	italian	spanish	danish	portugese	turkish	polish	russian
SSE SPINE TANGO	Surgery 2006	✓			✓	✓					✓	✓	✓	✓						
SSE SPINE TANGO	Surgery staged 2006	✓			✓	✓					✓	✓	✓	✓						
SSE SPINE TANGO	Follow-up 2006	✓			✓	✓					✓	✓	✓	✓						
SSE SPINE TANGO	Surgery 2011		✓		IP	IP	IP	IP	IP	IP	✓	✓	✓	✓				IP	IP	IP
SSE SPINE TANGO	Surgery staged 2011		✓		IP	IP	IP	IP	IP	IP	✓	✓	✓	✓				IP	IP	IP
SSE SPINE TANGO	Follow-up 2011		✓		IP	IP	IP	IP	IP	IP	✓	✓	✓	✓				IP	IP	IP
SSE SPINE TANGO	Conservative 2011		✓		IP						✓	IP								
SSE SPINE TANGO	COMI patient assessment neck	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					IP	IP
SSE SPINE TANGO	COMI patient assessment back	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					IP	IP
SSE SPINE TANGO	Oswestry 2.1	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					IP	
SSE SPINE TANGO	SRS-22 Scoliosis Patient Questionnaire	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
SSE SPINE TANGO	EuroQol EQ-5D	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
SSE SPINE TANGO	COSS (cervical spine)	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
SSE SPINE TANGO	NASS (lumbar spine)	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						

IP = in process

PUBLICATIONS

PAPERS IN PEER REVIEWED JOURNALS

Kessler TJ *, Melloh M *, Zweig T, Aghayev E, Röder C.
Development of a documentation instrument for the conservative treatment of spinal disorders in the international spine registry Spine Tango.
Eur Spine J. 2011 Mar;20(3):369-79. Epub 2010 Jun 9.
* contributed equally

Porchet F, Lattig F, Grob D, Kleinstueck FS, Jeszenszky D, Paus C, O’Riordan D, Mannion AF.
Comparison of patient and surgeon ratings of outcome 12 months after spine surgery: presented at the 2009 Joint Spine Section Meeting.
J Neurosurg Spine. 2010 May;12(5):447-55

ABSTRACTS IN PEER-REVIEWED JOURNALS

Melloh M, Staub L, Aghayev E, Barz T, Theis J, Roeder C.
Co-variates of length of hospital stay in posterior spinal fusion.
JBJS Br Proceedings. 2010 May;92-B: 345.

Melloh M, Aghayev E, Zweig T, Barz T, Theis JC.
Predictive factors of physician-based outcomes after posterior lumbar fusion.
JBJS Br Proceedings. 2010 Mar;92-B: 218.

Melloh M, Roeder C, Zweig T, Barz T, Theis JC.
Benchmarking in spinal surgery – an analysis from the international spine registry Spine Tango.
JBJS Br Proceedings. 2010 Mar;92-B: 219.

Zweig T, Aebi M, Aghayev E, Melloh M, Röder C, Sobottke R, Staub L.
Evaluative comparison of patient based versus physician based outcome in posterior lumbar fusion – an analysis based on the ‘Spine Tango’ registry.
JBJS Br Proceedings. 2010 Oct;92-B: 613.

Zweig T, Aebi M, Aghayev E, Domanja S, Melloh M, Röder C, Staub L.
Predictors of dural tears in posterior spinal fusion in the lumbar spine – an analysis based on data of Spine Tango.
JBJS Br Proceedings. 2010 Oct;92-B: 501.

ORAL PRESENTATIONS

April 2010

Melloh M, Zweig T, Aghayev E, Röder C, Theis JC.

Evaluative comparison of physician-determined vs. patient-determined outcomes in posterior lumbar fusion.

Spine Society of Australia Annual Scientific Meeting, Christchurch,
9th – 11th April 2010

Melloh M, Kessler JT, Zweig T, Aghayev E, Theis JC, Röder C.

Development of a documentation instrument for the conservative treatment of spinal disorders within the framework of an international spine registry.

Spine Society of Australia Annual Scientific Meeting, Christchurch,
9th – 11th April 2010

Grob D, Lattig F, Porchet F, Kleinstueck F, Fekete T, Mutter U, Jeszenszky D and Mannion AF.

Comparison of patient and surgeon ratings of pain and function 12 months after spinal surgery for degenerative disorders.

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Kleinstueck F, Fekete T, Jeszenszky D, Mannion AF, Grob D, Lattig F, Mutter U and Porchet F.

The outcome of discectomy for lumbar herniated disc is influenced by the level of concomitant pre-operative low back pain.

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Lattig F, Fekete T, Grob D, Jeszenszky D, Kleinstueck F, Mutter U, Porchet F and Mannion AF.

Does the fusion level influence the outcome of single-level posterior lumbar fusion for degenerative disease?

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Luca A, Grob D, Jeszenszky D, Kleinstueck F, Fekete T, Lattig F, Porchet F, Mutter U and Mannion AF.

Does smoking habit influence the outcome of lumbar discectomy?

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Mannion AF, Fekete T, Lattig F, Porchet F, Kleinstueck F, Jeszenszky D and Grob D.

Patient-rated outcomes of fusion in the older patient with degenerative disc disease.

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Porchet F, Lattig F, Grob D, Kleinstueck F, Jeszenszky D, Paus C, O’Riordan D and Mannion AF.

Comparison of patient and surgeon ratings of global outcome 12 months after spinal surgery.

International Society for the Study of the Lumbar Spine, Auckland, New Zealand,
14th-17th April 2010

Röder C.
Spine Tango, proposal for a collaboration with SAS
SAS board meeting , New Orleans
26th April 2010 (invited lecture)

Röder C.
The European spine registry Spine Tango
National symposium for quality management and health care system, Bern
29th April 2010 (invited lecture)

May 2010

Mannion A, Aghayev E, Mutter U, Grob D
Validity and responsiveness of the Core Outcome Measures Index (COMI) in patients with neck pain undergoing cervical disc arthroplasty.
Cervical Spine Research Society Meeting on Corfu, Greece
Abstraktenbuch: S. 45

Zweig T
How to Tango – more than an instruction.
Annual Congress of VSOU (Vereinigung Süddeutscher Orthopäden und Unfallchirurgen e.V.), Baden-Baden, Germany
2nd May 2010 (invited lecture)

Grob D, Luca A and Mannion AF.
Decompression for multisegmental spondylotic stenosis of the cervical spine: anterior or posterior approach?
Cervical Spine Research Society (European Section), Corfu, Greece,
26th-29th May 2010

June 2010

R. Sobottke, E. Aghayev, C. Röder, P. Eysel, S. Delank, T. Zweig
Risk for surgical, general and follow-up complications in lumbar spinal stenosis relative to patient age.
11th Congress EFFORT (European Federation of National Associations of Orthopaedics and Traumatology), Madrid, Spain
2nd-5th June 2010 (podium presentation)

Kleinstueck FS, Fekete T, Jeszenszky D, Mannion AF, Grob D, Lattig F, Mutter U, Porchet F.
Influence of low back pain on the outcome of discectomy for lumbar herniated disc.
Swiss Society of Orthopaedics, St Gallen, Switzerland,
30th June -2nd July 2010

September 2010

Kleinstueck FS, Fekete T, Jeszenszky D, Grob D, Porchet F, Lattig F, Mutter U, Mannion AF.
To fuse or not to fuse in lumbar degenerative spondylolisthesis: do baseline symptoms help provide the answer?
Eurospine, the Spine Society of Europe, Vienna, Austria,
15th-17th September 2010

Lattig F, Grob D, Kleinstueck F, Fekete T, Porchet F, Mannion AF.
Lumbar facet joint effusion on MRI: a sign of instability in degenerative spondylolisthesis? Eurospine, the Spine Society of Europe, Vienna, Austria,
15th-17th September 2010

Lattig F, Fekete T, Grob D, Mannion AF.
Lumbar facet joint effusion sign on MRI in degenerative spondylolisthesis: should it influence the treatment decision?
Eurospine, the Spine Society of Europe, Vienna, Austria,
15th-17th September 2010

POSTER PRESENTATIONS

March 2010

Zweig T, Aghayev E, Melloh M, Aebi M, Röder C.
Comparison of physician-based vs. patient-based outcome after posterior lumbar fusion.
American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans.
9th – 13th March 2010

April 2010

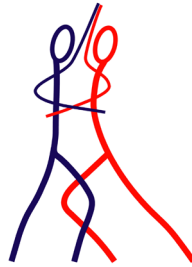
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