No differences in post-operative rehabilitation across municipalities in patients with lumbar disc herniation

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ABSTRACT

INTRODUCTION: Following the municipal reform in Denmark in January 2007, the municipalities gained responsibility for post-operative rehabilitation. In the Region of Southern Denmark, this task was decentralised to 22 municipalities, which implied a possible risk for considerable variation. This study examined rehabilitation in the 22 municipalities of the Region of Southern Denmark for patients with lumbar disk herniation.

METHODS: A total of 22 physiotherapists answered a questionnaire regarding their rehabilitation programmes. The municipalities of 789 patients who had undergone decompressive surgery for lumbar disc herniation were identified. Changes in Oswestry disability index (ODI), EuroQol-5D (EQ-5D) and duration of sick leave were compared among the municipalities.

RESULTS: Patient-reported outcome measures showed no statistical difference in ODI, EQ-5D or sick leave at the one-year follow-up across the 22 municipalities. There was a correlation between sick leave and outcome as a longer sick leave was associated with less improvement in EQ-5D and ODI. Rehabilitation programmes across the region were comparable with respect to several factors. The questionnaire revealed a potential for enhanced cooperation between hospitals and rehabilitation centres.

CONCLUSION: Rehabilitation was broadly similar, and patient outcome after one year did not differ significantly across the 22 municipalities or between the five largest samples. In general, all municipalities request enhanced cooperation between hospital and rehabilitation unit to ensure the best possible patient treatment. Further studies should focus on the effect of rehabilitation.

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TRIAL REGISTRATION: not relevant.

Patients with lumbar disk herniation are a common and financially important group of patients. It is estimated that around 1-3% of all patients visiting general practitioners suffer from disc herniation [1] Many of these patients are 30-50 years old and are productive members of society. According to the national Danish surgical spine database, DaneSpine [2], a total of 6,450 patients with disc herniation were operated in Denmark in the 2009-2013 period. Patients with lumbar disc herniation improve significantly after surgery. The number of patients on full-time sick leave decreases from 52% to 14% one year after surgery and the self-reported leg-pain intensity is significantly reduced. The literature provides evidence for the acute efficiency of surgery on patients suffering from lumbar disk herniation and concomitant sciatica [3].

In this study, rehabilitation is defined as post-operative exercise. Rehabilitation of these patients is a controversial topic as conclusive evidence of treatment efficacy is lacking. A systematic Cochrane review from 2014 [4] suggested that rehabilitation exercises initiated 4-6 weeks after surgery seem to be effective for pain relief and for improving patients' functional status. Furthermore, the study shows that there is no increased risk of re-herniation due to rehabilitation. However, a more recent randomised controlled trial (RCT) from 2014 [5] suggested that, in the long term, participating in a comprehensive physiotherapy programme following lumbar disc surgery may not be superior to sham therapy. The Cochrane review [4] was also unable to find any significant difference in performance between supervised exercise and home training after instruction. A previous RCT from 2011 [6] showed no significant difference between long-term outcome when patients given an information brochure were compared with patients receiving extensive rehabilitation.

Prior to 2007, hospitals in Denmark were assigned the task of rehabilitation after surgery. Following a local government reform in January 2007, the responsibility for post-operative rehabilitation was transferred to the municipalities. The Region of Southern Denmark decentralised rehabilitation after surgery to a total of 22 municipalities. This carried a risk for considerable variation in rehabilitation within the legal framework. Rehabilitation is now managed by municipal rehabilitation centres, primarily by physiotherapists instructing teams of patients. In an attempt to minimise information loss in the process of transferring patients from the hospital system to the local rehabilitation facilities, the municipal reform placed the hospitals under an obligation to create individual rehabilitation plans for their patients.

ORIGINAL ARTICLE

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TABLE 1

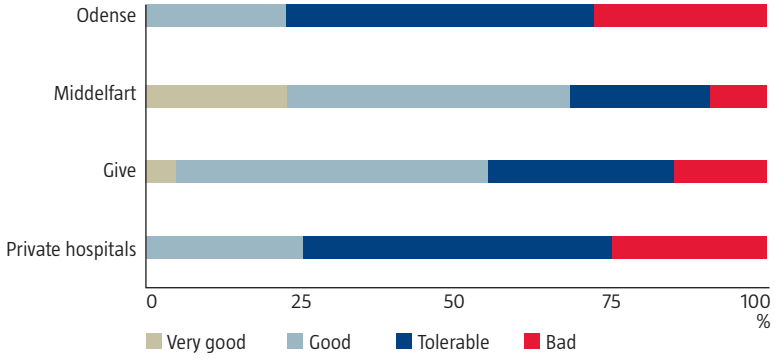
Questions from the questionnaire. Answers were given in form of multiple choices with the possibility of providing an explanation[a].

No.	Question	Answer
1	How many prolapse patients did your unit rehabilitate during 2013?	Number
2	How do you use the rehabilitation plans?	Visitation, training, not in use, other
3	How do you screen your patients?	Age, geography, sex, ability to work, rehabilitation plan, functional status, operation method, interview, pain, other
4	Do you have a standardised programme for all herniated patients?	Yes, no, other
5	What type of rehabilitation do you provide for the patients?	Individual, group, café model, home training after instruction, brochure, no rehabilitation, other
6	Who is responsible for the rehabilitation?	Municipal, private, other
7	Is it the same physiotherapists who rehabilitate all prolapse patients?	Yes, no, other
8	Are other professionals in charge of training?	Yes, no
9	When does the rehabilitation of your patients start?	1-2 weeks, 2-4 weeks, 4-6 weeks, 6-8 weeks, > 8 weeks after surgery
10	Is there waiting time before initiation of rehabilitation?	Yes, no
11	What form does the exercise instruction have?	Practical, oral, visual, written, other
12	What type of training is conducted?	Cardio, functional, flexibility, balance, McKenzie/back bends, cognitive, massage/acupuncture, other
13	Generally, about the exercises	Dynamic, static, mixed, other
14	Training is primarily conducted with?	Own body weight, free weights, machines, other
15	How many times a week are the patients offered training?	1, 2, 3, > 3 times
16	How many therapists are involved in the training?	1, 2, different number
17	When is the rehabilitation concluded?	Individual assessment, timed, times, other
18	Is there any follow-up on patients after rehabilitation is concluded?	Yes, no, other
19	Is there cooperation between the rehabilitation centre and the social services regarding the patient's return to work?	Yes, no
20	How is this cooperation effected?	Status report, dialogue, other, no
21	How is the cooperation between hospital and municipality?	Rating between very good, good, tolerable, bad[b]
22	How could the cooperation between hospital and municipal be improved?	Explain

a) 1 question was deleted, as the municipalities were unable to answer it.
b) See **Figure 1**.

FIGURE 1

Distribution for the question "How do you experience the cooperation between hospital and municipality?"



The aims of this study were

1: To determine if there are differences in the post-surgical rehabilitation programmes in the various municipalities for patients with lumbar disk herniation in the Region of Southern Denmark.

2: To determine if there are differences in effectiveness in patient-reported outcome measures among the municipalities one year after surgery.

3: To evaluate the cooperation between hospitals and rehabilitation units across the Region of Southern Denmark.

METHODS

This is an observational and cross-sectional study. Data were obtained using both a questionnaire and an analysis of the one-year follow-up results of 789 consecutive patients operated due to herniated lumbar disc between June 2010 and April 2013 at the Centre for Spine Surgery and Research, Middelfart Hospital. The study was conducted as a collaborative effort between the University of Southern Denmark and the research unit at Middelfart Hospital.

Survey of post-surgical rehabilitation programmes

The survey was developed as a cooperative effort counting the Centre for Spine Surgery and Research surgeons and physiotherapists. The survey contained items re-

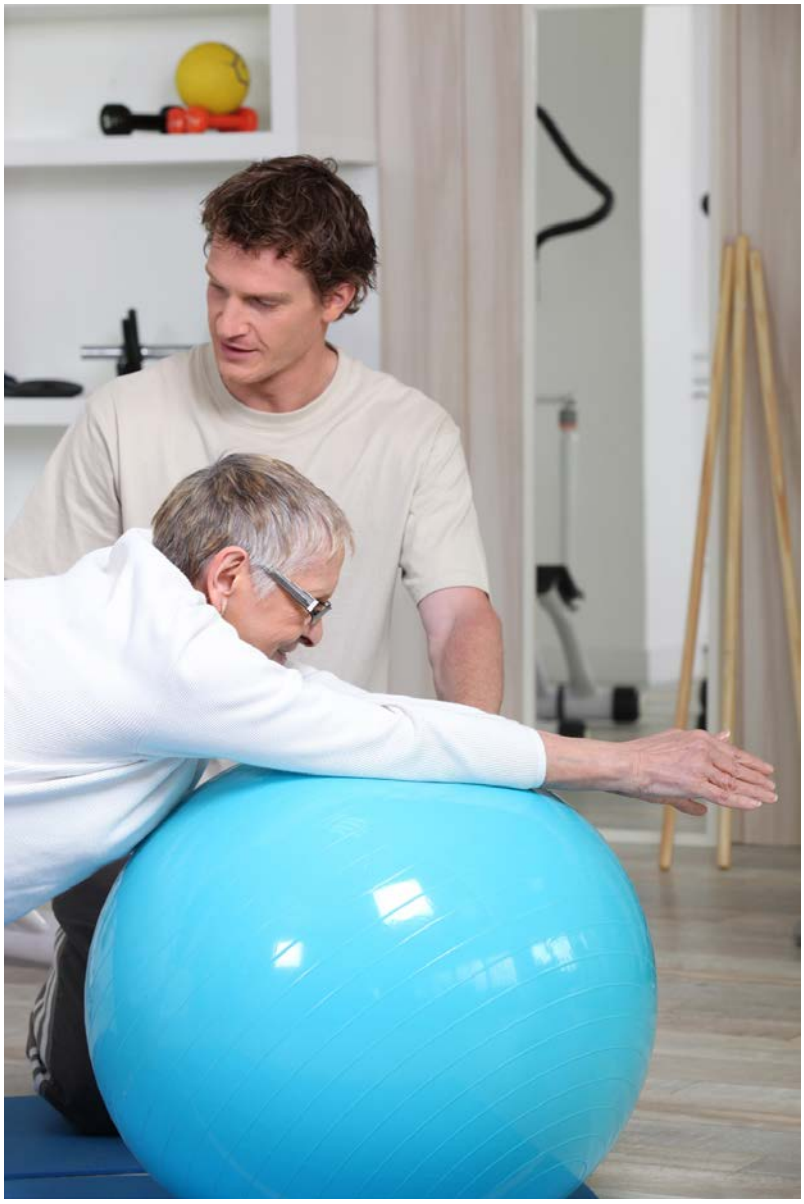
garding visitation, methods of training and general rehabilitation programmes being offered (**Table 1**). Prior to sending the surveys out to all physiotherapists in the municipalities, a mini pilot project was performed. This involved a visit to Middelfart rehabilitation centre and observation of physiatrists and patient groups during their training. The questionnaire was then administered to an associated physiotherapist. Feedback from this session led to reformulation of questions for a better understanding.

The questionnaire and project information was sent by email to the responsible physiotherapists in the 22 municipalities. The respective physiotherapists were subsequently contacted by telephone to follow up on their completion of the questionnaire.

Analysis of DaneSpine Registry Data

To investigate possible differences in patient outcomes after rehabilitation across the 22 municipalities, we analysed data from the local branch of the national Danish surgical spine database, DaneSpine on patients operated for lumbar disc herniation. All patients completed the one-year follow-up questionnaire. The outcomes analysis include the Oswestry Disability index (ODI) [7], the EuroQol (EQ-5D) [8] and the duration of sick leave. Improvements in ODI and EQ-5D among the different municipalities were compared using one-way analysis of variance (ANOVA). The Mann-Whitney test was used to compare the length of sick leave among the municipalities as these data were collected as ordinal values. Due to small sample sizes in some municipalities, a subgroup analysis including only the five municipalities with the largest sample sizes was performed. All analyses were performed using PASW 17.0 (IBM, Somes, New York). A conservative p value threshold of $p < 0.01$ was selected due to the multiple concurrent analyses.

Trial registration: not relevant.



Rehabilitation.

RESULTS

Municipality programmes

All 22 municipalities were contacted and all responded to our questionnaire. The key results are summarised below. The visitation, programmes offered, training and follow-up were similar among the 22 municipalities.

Visitation

To ensure that patients were referred to the right rehabilitation pathway within the municipality, different visitation factors were used. The three most frequently used visitation factors were the rehabilitation plans made by the hospitals (77%), knowledge of patient disability (77%) and individual patient interviews prior to the initiation of the rehabilitation programme (86%).

Programmes offered

All municipalities offer both individual and group training. Most municipalities also offer home-training after instruction (86%). This is typically used in addition to group or individual training, but can also be a stand-alone measure if the patient is performing very well. Typically, 6-8 patients participate in group training sessions. Two municipalities reported use of co-training, in which patients exercise in teams, but with individual programmes.

Individual supervised training is typically offered to patients with special needs. In 21 of the 22 municipalities, rehabilitation is performed by the municipal sector, while a single municipality outsources the task to a private clin-

TABLE 2

One-way ANOVA comparing change in EuroQol-5D and Oswestry Disability Index including all municipalities.

		ΔEQ-5D			ΔODI		
Municipality	**n**	**mean**	**SD**	**p-value**	**mean**	**SD**	**p-value**
Assens	24	0.37	0.32	–	26.25	22.18	–
Billund	24	0.39	0.33	–	29.83	19.60	–
Esbjerg[a]	103	0.29	0.41	–	23.59	21.55	–
Fanø	4	0.50	0.34	–	29.50	22.47	–
Fredericia	39	0.36	0.51	–	26.36	21.22	–
Faaborg Midtfyn	31	0.41	0.39	–	26.52	20.91	–
Haderslev	45	0.32	0.42	–	15.29	20.75	–
Kerteminde	10	0.40	0.38	–	32.20	20.23	–
Kolding[a]	67	0.32	0.42	–	28.39	22.64	–
Langeland	13	0.39	0.44	–	21.23	21.13	–
Middelfart	47	0.46	0.42	–	28.09	26.14	–
Nordfyns Kommune	17	0.40	0.43	–	30.35	25.93	–
Nyborg	15	0.28	0.34	–	25.20	22.65	–
Odense[a]	68	0.42	0.41	–	27.12	23.41	–
Svendborg	17	0.36	0.54	–	19.88	29.60	–
Sønderborg[a]	63	0.38	0.48	–	28.70	22.16	–
Tønder	31	0.39	0.37	–	28.97	20.18	–
Varde	28	0.32	0.38	–	25.07	18.99	–
Vejen	31	0.35	0.42	–	30.06	26.17	–
Vejle[a]	67	0.49	0.41	–	32.15	21.43	–
Ærø	3	0.14	0.12	–	12.00	19.08	–
Aabenraa	42	0.33	0.46	–	26.24	25.19	–
Total							
5 municipalities[a]	368	0.37	0.43	0.025	27.55	22.26	0.171
All municipalities	789	0.37	0.42	0.669	26.57	22.64	0.261

ANOVA = analysis of variance.
ΔEQ-5D = change in mean EuroQol-5D value in patients before surgery and after 1-year follow-up.
ΔODI = change in mean Oswestry Disability Index value in patients before surgery and after 1-year follow-up.
SD = standard deviation.
a) With largest sample size.

ic. Six municipalities on occasion have patients on waiting lists, with a maximum two-week waiting period.

Training

Rehabilitation typically starts 2-6 weeks after surgery, depending on recommendations from the hospital, which vary among the referring hospitals. Typically, training is offered twice a week under the supervision of 1-2 physiotherapists. A typical rehabilitation programme lasts approximately 8-10 weeks. In all municipalities, the rehabilitation programmes are organised by physiotherapists, who mainly deal with back pain patients. Two municipalities use additional occupational therapists to supplement such training as necessary.

The practical exercise instructions given to the patients are both oral and in writing. Two municipalities also use virtual exercise instruction. The training includes both static and dynamic exercises, primarily employing the patient's own body weight. The use of equipment such as fitness balls and rubber bands is common.

Several rehabilitation sites also train with free weights and machines. The exercises performed vary widely, ranging from cardio training to balance training. All municipalities use stability training of the spine as a key feature in their programmes.

Follow-up

Basically there is no follow-up on patients after rehabilitation. In some rehabilitation sites, follow-up is implemented if deemed appropriate. In such cases, the rehabilitation plan is revisited or follow-up calls/meetings are arranged. Follow-up to the municipality is often implemented by as a status report or dialogue meetings, if requested.

Patient-reported outcomes from the DaneSpine registry

There was no statistically significant difference in improvements in ODI and EQ-5D among the 22 municipalities (**Table 2**). Even when only the five municipalities with the largest sample size were included, no statistically significant difference in improvements in ODI and EQ-5D was seen. In our analysis outcomes based on the length of sick leave, the data showed that patients on longer sick leave had inferior outcomes than patients with a shorter sick leave. This result was observed regardless of whether the analysis included all the 22 municipalities or only the five municipalities with the largest sample sizes (**Table 3**).

DISCUSSION

Reviewing the replies from the rehabilitation units across the Region of Southern Denmark, it seems that all of the 22 municipalities have succeeded in creating a uniform post-surgical rehabilitation service for patients operated for lumbar disc herniation. This finding is consistent with the fact that we were unable to detect any significant difference in the patient-reported outcome measures from the 22 municipalities or even among the five municipalities with the largest sample sizes. A correlation was observed between patient sick leave and outcome, which indicates that a longer sick leave results in worse outcomes. Patients with short sick leave (0-6 months) had greater improvements in ODI and EQ-5D than patients whose sick leave was longer (> 6 months).

Because the post-surgical rehabilitation programmes offered by the 22 municipalities were similar as were also the one-year patient-reported outcomes, we were unable to determine the optimal schedule for post-operative rehabilitation of patients with herniated lumbar disc. This will require a prospective clinical trial

TABLE 3

One-way ANOVA comparing change in EuroQol-5D and Oswestry Disability Index including all municipalities.

	All municipalities							5 municipalities with largest sample size						
		ΔEQ-5D			ΔODI				ΔEQ-5D			ΔODI		
Sick leave	n	mean	SD	p-value	mean	SD	p-value	n	mean	SD	p-value	mean	SD	p-value
< 3 months	355	0.43	0.40	–	29.91	21.59	–	248	0.44	0.42	–	30.05	21.97	–
3-6 months	104	0.47	0.34	–	30.87	19.58	–	63	0.48	0.38	–	30.19	20.89	–
6-9 months	30	0.28	0.44	–	21.00	20.49	–	25	0.32	0.47	–	21.52	22.12	–
9-12 months	132	0.23	0.44	–	13.42	21.67	–	88	0.20	0.45	–	13.64	22.03	–
1-2 years	5	–0.38	0.28	–	6.40	27.55	–	3	–0.35	0.31	–	17.33	32.15	–
Total	626	0.38	0.42	0.000	25.98	22.37	0.000	427	0.38	0.43	0.000	26.10	22.81	0.000

ANOVA = analysis of variance.
ΔEQ-5D = change in mean EuroQol-5D value in patients before surgery and after 1-year follow-up.
ΔODI = change in mean Oswestry Disability Index value in patients before surgery and after 1-year follow-up.

in which subjects are randomly assigned to different rehabilitation programmes.

In this study, a somewhat surprising finding was the large difference in satisfaction with the communication between the various spine units in the region and the rehabilitation units. Since the primary element in the communication between the secondary sector and municipalities is statutory rehabilitation plans, there must be considerable difference in the quality of these plans. Several municipalities proposed different solutions for these problems. The main issue was almost non-existent communication between the hospital and the treating physiotherapists.

Municipalities generally wanted a better direct contact between the surgeon and the treating physiotherapist as questions or difficulties with the patient's rehabilitation do occur. Some physiotherapists requested fixed office hours and, if necessary, email correspondence with guaranteed response time. Other physiotherapists suggested an annual meeting where the respective surgeons and local physiotherapists could meet and discuss issues relating to their common patients. Such seminars could also provide a framework for distribution of new knowledge.

CONCLUSION

In this study, we found no substantial differences in the post-operative rehabilitation programmes for patients with lumbar disc herniation among the 22 municipalities in the Region of Southern Denmark. This is evidenced further by the lack of significant differences in patient-reported outcomes among the patients in the various municipalities. A longer sick leave is associated with inferior outcomes. Of note, our study showed a need for increased cooperation and coordination between the hospitals performing the surgery and rehabilitation planning on the one hand and the municipalities providing rehabilitation on the other.

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LITERATURE

1. Authority DHaM. Lændesmerter – lave rygsmerter. https://www.sundhed.dk/sundhedsfaglig/laegehaandbogen/fysmed-og-rehab/tilstande-og-sygdomme/ryg-nakke-og-bryst/laendesmerter-lave-rygsmerter/#headerHA^A (13 Mar 2014).
2. DaneSpine Årsrapport 2013. http://drksdanespine.dk/wm420129 (13 Mar 2014).
3. Gibson JN, Waddell G. Surgical interventions for lumbar disc prolapse: updated Cochrane Review. Spine (Phila Pa 1976). 2007;32:1735-47.
4. Oosterhuis T, Costa LO, Maher CG et al. Rehabilitation after lumbar disc surgery. Cochrane Database Syst Review 2014;3:CD003007.
5. Ebenbichler G, Inschlag S, Pfluger V et al. Twelve-year follow-up of a randomized controlled trial of comprehensive physiotherapy following disc herniation operation. Clinical Rehabil 2014 Oct 6. pii: 0269215514552032 (e-pub ahead of print).
6. McGregor AH, Dore CJ, Morris TP et al. ISSLS prize winner: Function After Spinal Treatment, Exercise, and Rehabilitation (FASTER): a factorial randomized trial to determine whether the functional outcome of spinal surgery can be improved. Spine (Phila Pa 1976) 2011;36:1711-20.
7. Fairbank JC, Pynsent PB. The Oswestry Disability Index. Spine (Phila Pa 1976) 2000;25:2940-52,discussion 52.
8. Brooks R. EuroQol: the current state of play. Health Policy 1996;37:53-72.