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# Return to work after lumbar disc surgery is related to the length of preoperative sick leave

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## ABSTRACT

**INTRODUCTION:** Lumbar disc herniation (LDH) is associated with high morbidity and significant socio-economic impact as the majority of the patients are of working age. The purpose of this study was to determine the impact of length of sick leave on the return-to-work rate after lumbar disc herniation surgery.

**METHODS:** This was a single-centre study of LDH patients who underwent surgery from 18 May 2009 through 28 November 2014. Data were collected prospectively from the DaneSpine database. Questions in DaneSpine include preoperative length of sick leave and working status one year post-operatively.

**RESULTS:** A total of 678 patients were included and 72% of the patients had returned to work one year after their surgery. The rate of patients returning to work decreases significantly with the length of preoperative sick leave. Among the patients who were on sick leave prior to their surgery, 83% returned to work if surgically treated within three months. In contrast, only 50% of those whose sick leave exceeded three months returned to work.

**CONCLUSION:** The present analysis suggests that the return-to-work rate after lumbar disc herniation surgery is affected by the length of sick leave.

**FUNDING:** none.

**TRIAL REGISTRATION:** This study was registered with the Danish Data Protection Agency.

Lumbar disc herniation (LDH) is associated with considerable morbidity and carries significant socio-economic impact in many parts of the world as the majority of the patients are of working age [1-3].

The patients' ability to return to the workforce following LDH depends on the person's workload, strength of social relationships, level of education and length of sick leave. Some factors can be modified to increase the chance of successful return to the workforce.

The Danish National Health Authority estimates that 1-3% of the Danish population suffers from radicular pain due to LDH, with around 3,000 patients undergoing operative treatment annually for this indication [4]. The majority of patients suffering from LDH can be treated effectively with conservative management. Absolute indications for discectomy include functional neurological deficit, cauda equina syndrome and pro-

gressive neurological deficit despite conservative treatment. The most frequent indication for surgery is persistent pain and disability despite extensive nonsurgical treatment [5-7]. There is little consensus in the medical community on the timing of surgery for patients suffering from non-acute radicular symptoms due to LDH.

In a prospective Norwegian study of surgically treated LDH patients by Nygaard et al [8], a multivariate analysis showed that only two factors were predictive of outcome: duration of leg pain and length of preoperative sick leave. Sick leave for more than seven months increased the risk of not returning to work.

Furthermore, in a more recent Swedish study, Silverplats et al [9] found the time on sick leave to be a clinically important predictor of outcome.

The current Danish national clinical guidelines recommend that patients with LDH without neurologic deficits be managed with non-operative treatment for up to 12 weeks before they are assessed for surgical treatment [10]. The purpose of this single-centre study is to investigate if the return to work rate after lumbar disc herniation surgery is affected by the preoperative length of sick leave.

## METHODS

This is a retrospective study of prospectively collected data from DaneSpine [4]. The Danish Spine Register was established in 2008 and implemented at Lillebaelt Hospital in 2009. Almost all patients (99%) [11] scheduled for surgery for degenerative conditions of the lumbar spine are enrolled in the registry. The relevant approvals for the use of DaneSpine data were obtained from the Danish Data Protection Agency.

Immediately prior to surgery, patients are administered a questionnaire that includes data on the duration of leg pain before surgery, length of preoperative sick leave, use of analgesics, walking distance, back and leg pain on the VAS scale (0-100), health-related quality of life as documented by the Short Form-36 (SF-36) [12] and EuroQoL-5D (EQ-5D) [13] (EuroQoL) and low back-related disability as documented by the Oswestry Disability Index (ODI) [14]. The item enquiring about the patient's length of preoperative sick leave allows for seven responses: one week (acute), 1-4 weeks, 1-3 months, 3-6 months, 6-9 months, 9-12 months and

## ORIGINAL ARTICLE

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TABLE 1

Summary of demographic data.	Age, yrs, mean ( $\pm$ SD)	42.9 ( $\pm$ 9.6)
	Males, n (%)	347 (54.7)
	Body mass index, kg/m <sup>2</sup> , mean ( $\pm$ SD)	26.7 ( $\pm$ 4.4)

SD = standard deviation.

TABLE 2

Working status one year after surgery.

	Not working	Working	p-value
N	178	456	–
Age, yrs, mean ( $\pm$ SD)	41.6 ( $\pm$ 9.8)	43.4 ( $\pm$ 9.5)	0.033
Males, n (%)	88 (49.4)	259 (56.8)	0.032
Smokers, n (%)	85 (47.8)	142 (31.3)	< 0.000
Body mass index, kg/m <sup>2</sup> , mean ( $\pm$ SD)	27.3 ( $\pm$ 4.7)	26.3 ( $\pm$ 4.1)	0.003
<i>Preoperative, mean (<math>\pm</math> SD)</i>			
Oswestry Disability Index	50.1 ( $\pm$ 15.8)	47.9 ( $\pm$ 18.6)	–
EQ-5D	0.25 ( $\pm$ 0.32)	0.27 ( $\pm$ 0.34)	0.117
SF-36 MC	27.0 ( $\pm$ 6.2)	27.2 ( $\pm$ 6.9)	0.651
SF-36 PCS	35.8 ( $\pm$ 11.6)	41.7 ( $\pm$ 11.8)	< 0.000
Leg pain, VAS	60.6 ( $\pm$ 30.8)	60.1 ( $\pm$ 30.7)	0.857
Back pain, VAS	51.7 ( $\pm$ 30.6)	39.3 ( $\pm$ 30.0)	< 0.000
<i>Length of preoperative sick leave, n</i>			
< 1 mo.	21	137	
1-2 mo.s	48	211	
3-5 mo.s	46	79	
6-8 mo.s	23	15	
9-12 mo.s	9	4	
> 1 yr	31	10	

EQ-5D = EuroQuality-of-Life-5D; SD = standard deviation; SF-36 MC = Short Form-36 Mental Components; SF-36 PCS = Short Form-36 Physical Component Summary; VAS = visual analogue scale: 0-100.

TABLE 3

Preoperative duration of sick leave and smoking status were associated with return-to-work rate.	Odds ratio (95% CI)	p-value
Length of sick leave	0.52 (0.45-0.60)	< 0.000
Smoking	0.64 (0.43-0.94)	< 0.000

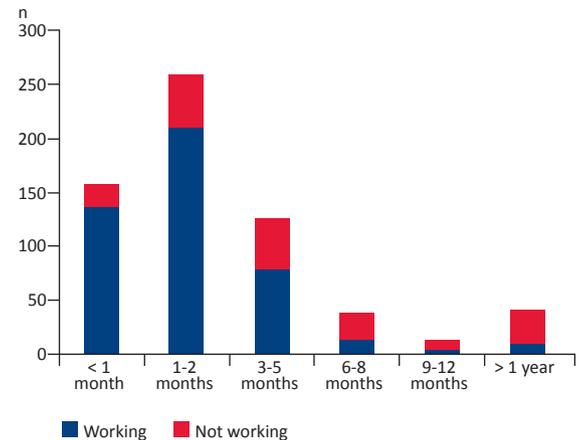
CI = confidence interval.

more than one year. At one year after surgery, the same data collected at baseline are collected once more. In addition, the patient is asked if he or she has returned to work.

Included were patients who underwent decompression and/or discectomy for LDH from 1 May 2009 through 30 November 2014, aged 18-59 years. Patients who had surgery within a week of being placed on sick leave were excluded as these patients were emergent cases with neurological deficits. All patients had mag-

FIGURE 1

Working status one year post-operatively versus duration of preoperative sick leave.



netic resonance imaging concordant findings demonstrating lumbar disc herniation at the level and side corresponding to their symptoms.

### Statistical analyses

All statistical analyses were performed using Stata Ver 14.0 (StataCorp, College Station, Texas).

A threshold p-value of 0.05 was considered significant. For comparisons between the patients who returned to work one year after surgery and those who did not, unpaired t-tests were used to compare continuous variables, and Fisher's exact test was used to compare categorical variables. Binary logistic regression analysis was used to control for known confounders such as smoking status, gender and age alongside length of sick leave.

*Trial registration:* This study was registered with the Danish Data Protection Agency.

### RESULTS

A total of 1,374 patients enrolled in the registry met the inclusion criteria. Of these, 382 patients did not respond to the return to work question one year after surgery, 261 did not respond to the preoperative length of sick-leave question, 53 patients reported that they did not work prior to the operation, and 44 patients had neurologic deficits requiring emergent surgery, leaving 678 patients in the analysis. The demographic characteristics of the cohort are summarised in **Table 1**.

The cross-tabulation of return-to-work status and length of sick leave prior to surgery are shown in **Table 2**. Overall, the majority of patients (n = 456, 72%) had

returned to work one year after surgery. A statistically significantly larger proportion of patients who had surgery within the first three months of sick leave was back at work one year after surgery than among patients who had a longer period of preoperative sick leave ( $p < 0.000$ ) Table 2 and Figure 1.

After controlling for known confounders, stepwise binary regression showed that the preoperative duration of sick leave and smoking status were significantly associated with return to work at one year (Table 3). Specifically, patients with a shorter duration of sick leave and non-smokers were more likely to be back at work one year post-operatively.

### CONCLUSIONS

In a society with free and equal access to public health services, providing care and treatment in the most cost-effective manner possible is essential. To this end, health authorities increasingly require healthcare providers to document treatment outcomes. This need for documentation has led to an increased use of registries or databases that contain patient demographics, treatments received and clinical outcomes after treatment. In patients with lumbar degenerative conditions, validated health-related quality-of-life (HRQoL) measures are used to determine treatment effects.

For patients of working age, the most important socioeconomic endpoint is the ability to return to work. The present analysis based on data from DaneSpine suggests that the return to work rate after LDH surgery is affected by the length of preoperative sick leave.

The main drawback of this study is the large proportion of non-responders, especially post-operatively. From a previously published study from this registry [15], the replies from the non-responders reflected those of the responders, indicating the validity of the data in the present study.

Some of the difference in the proportion of patients that return to work within a year may be explained by the tradition in the Danish society to lay off employees if they have been on sick leave for more than 3-4 months. Furthermore, if patients have lost contact with their workplace due to prolonged sick leave, it is probably harder to find a new job. Another explanation may be that an entrapped nerve root suffers permanent damage if not decompressed in due time as our data indicate that there is a correlation between the length of the preoperative and post-operative sick leave.

The strength of the current study is that data were collected prospectively from consecutive patients before and after surgery from a single site with robust enrollment and follow-up data [15]. In addition, treatments are provided for free in Denmark; thus, the patients in this study reflect LDH patients irrespective of income,



Prompt surgical treatment facilitates return to the workforce.

education or social class. This study is limited by the categorical responses to the length of preoperative sick-leave question, and the inequality of length of time within each of the six categories. That is, our data do not permit testing of the significance of length of sick leave as a continuous variable, and therefore we can only conclude that there is greater likelihood of being back at work one year after surgery with shorter length of sick leave prior to surgery, based on the comparison of the six length-categories in this study.

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**CONFLICTS OF INTEREST:** Disclosure forms provided by the authors are available with the full text of this article at [www.danmedj.dk](http://www.danmedj.dk)

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