



# Postoperative recommendations for single-level lumbar disc herniation: a cross-section survey

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## Abstract

**Background** Lumbar degenerative disc disease is one of the leading causes of low back and leg pain. Conservative treatment is the mainstay treatment, but for some patients surgical approach is required. The literature concerning postoperative recommendations on patients' return to work is sparse. The aim of this study is to assess spine surgeons' consensus regarding postoperative recommendations, including return to work, restart of daily-living activities, analgesic medication usage and rehabilitation referral.

**Methods** An online GoogleForms survey was sent, via electronic mail, during January 2022, to 243 surgeons described as having expertise in spine surgery, using the dissemination means of Sociedade Portuguesa de Patologia da Coluna Vertebral and Sociedade Portuguesa de Neurocirurgia. Participants ( $n=59$ ) had predominantly hybrid clinical practice in Neurosurgery field.

**Results** Only in a minority of cases (1.7%) no recommendation was given to patients. Nearly 68% of participants advised patients to return to sedentary professional work up until the 4<sup>th</sup> postoperative week. Light and heavy workload workers were advised to wait longer until initiating work activity. Low mechanical impact activities are started up to 4 weeks, and higher stress activities should be further postponed. Half of the surveyed surgeons estimates to refer to rehabilitation 10% or more patients. No differences were found when comparing recommendations given by more and less experienced surgeons—as defined by number of years in practice and number of annual surgeries—for most activities.

**Conclusion** Despite not having clear guidelines in postoperative management of surgically treated patients, Portuguese practice is in line with international experience and literature.

**Keywords** Lumbar disc herniation · Postoperative recommendations · Return to work · Survey

## Introduction

Low back pain (LBP) is a commonly reported symptom, being experienced at least once by 70–85% individuals during their lifetime [1, 2]. In the United States, LBP is the most common cause of activity limitation and job absenteeism in

people younger than 45 years [3]. This accounts for significant morbidity in work-active years and consequently for a significant economic burden. A Dutch Workforce assessment extrapolated the total sick leave costs to be over 244 million euros in 2017 [4].

Conservative treatment is the mainstay treatment for most patients with lumbar disc herniation. However, surgical approach is, at times, required. In the perception of patients with LBP, the most important outcomes are those of daily living, workplace ability, and sexual function [5]. As such, patients' return to work is one of the most relevant outcome measures of the effectiveness of medical care [5].

The literature concerning recommendations on patient's return to work and restart of daily-living activities after surgery is sparse [6, 7]. Intuitively, the recommended time period to return to work or driving a car after spinal surgery might depend on the extent and type of surgery [8], the

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patient's postoperative physical status and workload [8, 9]. Surgeon's specialty and training background and practice settings may also be implied.

Therefore, the aim of this study is to assess spine surgeons' (SS) consensus regarding postoperative recommendations, including return to work, restart of daily living activities, analgesic medication usage and rehabilitation referral.

## Materials and methods

### Study design

An online survey (Supplementary Material) was developed using the GoogleForms platform, to assess Portuguese SS' current indications on postoperative recovery from spine surgery in the context of single-level lumbar disc herniation.

The demographic data collected included geographic location; surgeons' specialty, type of practice; number of estimated annual spine surgeries and number of years in practice.

SS were asked to indicate how long after lumbar disk herniation surgery (regardless of the indication criteria that led them to such) they specify their average patient with an uncomplicated recovery to return to sedentary, light, and heavy work; light and heavy household chores; weightlifting; changing positions; driving; long flights; sexual activity and sports activity. The classification of activities as sedentary, mild, moderate or heavy was based on the Canadian Classification and Dictionary of Occupations [10]. Functional Ability List and PROMIS-Physical Functioning v2.0 [11] questionnaires were used to select additional relevant activities of daily life.

The following section concerned the postoperative management concerning analgesic medication, imaging studies (such as Magnetic Resonance Imaging-MRI) and rehabilitation referral.

### Participants and setting

The final questionnaire was sent to 243 SS described as having expertise in spine surgery, during January 2022, using the authors' network and the dissemination means of Sociedade Portuguesa de Patologia da Coluna Vertebral (SPPCV) and Sociedade Portuguesa de Neurocirurgia (SPNC). Members of the SPPCV and SPNC who were actively practicing in Portugal and had an active e-mail address on file were included. A reminder e-mail was sent 10–14 days later to encourage adherence. No financial compensation was provided for participation in the survey.

All received responses were included in the data set, so respondents' selection bias by demographics, type of

practice, surgery volume or other variables cannot be excluded. No sample size prediction was made.

Approval was granted by the Ethics Committee of Faculty of Medicine of University of Porto.

### Variables and statistical analysis

The primary outcome of this investigation was the agreement between SS regarding the postoperative recommendations for returning to work. Secondary outcomes included surgeons' agreement regarding daily-living activities. Number of years in practice, number of annual spine surgeries, type of practice and medical specialty were assessed as potential predictors of postoperative recommendations.

Primary statistical analyses were descriptive. Data are presented as medians and interquartile range for continuous variables and frequencies and percentages for qualitative variables. Data were summarized in two-way contingency tables using counts and percentages.

Pearson Chi-squared statistic was used to test significance of the relationships between various demographic factors and surgeon response to case variables.

Independent samples *t* test was used to compare the percentage of patients referred to rehabilitation programs between neurosurgeons (NS) and orthopedic surgeons (OS) or residents. Additionally univariate ANOVA test was executed to compare indication for rehabilitation between more and less experienced specialists (in terms of both years in practice and burden of surgeries performed). The null hypothesis was that there was no difference in the indication for postoperative physical rehabilitation between these groups. Bonferroni sensitivity analysis was performed whenever adequate.

There were no missing data. No subgroup analysis was performed. Statistical significance was set at the *p* value of 0.05. All analysis were performed using IBM SPSS Statistics version 27.

## Results

### Participants

Of the 243 SS contacted, 59 completed the survey (24.3%). Among these, 14 (23.7%) described clinical practice exclusively in the public sector; 13 (22%) exclusively in the private domain and 32 (54.9%) had a hybrid clinical practice. There were 46 (78%) NS and 13 (22%) OS among the responders. Table 1 presents the distribution of participants according to number of annual spinal surgeries and duration of clinical practice. Most participants (52.5%) practice in the North of Portugal, and the minority of them practice in the autonomous regions of Madeira (1.7%) and Azores (1.7%).

**Table 1** Distribution of participants in terms of years after residency and number of surgeries performed annually

	Absolute frequency (n)	Relative frequency (%)
Number of surgeries performed per year		
< 50	13	22.0
50–100	17	28.8
101–200	14	23.7
201–300	9	15.3
> 300	6	10.2
Number of years in practice after the end of residency		
Intern	7	11.9
< 5 years	13	22.0
6–10 years	10	16.9
11–15 years	8	13.6
16–20 years	4	6.8
> 20 years	17	28.8

### Current practice

The preferred surgical modality was microdiscectomy, closely followed by discectomy without microscope. Surgeons did not differ significantly in terms of surgical technique used, considering type of practice and number of years of experience. NS and residents in Neurosurgery used microdiscectomy more frequently ( $p=0.022$ ). Surgeons with an annual surgical burden greater than 100 more frequently use discectomy ( $p=0.049$ ) and microdiscectomy ( $p=0.019$ ).

### Postoperative recommendation on return to work and daily living activities

Nearly 68% of participants advised patients to return to sedentary professional work up until the fourth postoperative week. Light and heavy workload workers were advised to wait longer until initiating work activity; up to 4–8 and 8–12 weeks, respectively. For both sedentary and light work, some SS did not restrict immediate return to activity.

### Postoperative recommendation on return to daily living activities

Only in a minority of cases no recommendation was given to patients (1.7%), concerning specifically sports activities and common day-to-day activities (walk up or down the stairs; bend over; drive a car; take a flight; initiate sexual intercourse).

Low mechanical impact activities (driving, light housework, intercourse, low-intensity physical activity) are started up to 4 weeks, according to surgeons' reference. Higher stress activities (heavy domestic chores, strenuous

physical activity) should be started after a longer recovery (4–12 weeks). The responses are stated in Table 2.

### Postoperative recommendation on pain medication

Only 2 SS (3.4%) did not prescribe postoperative pain medications routinely. Three quarters of the responders (76.3%) preferred painkillers, whereas non-steroidal anti-inflammatory drugs were prescribed by 38 responders (64.4%) and steroids by 1 responder (1.7%). No surgeon reported the prescription of opioids. Some surgeons use diverse drug groups, isolated or in combination.

Most responders state the analgesic medication should be maintained for a week (42.4%) or two (47.5%) and a minority (3.4%;  $n=2$ ) prolongs its use for more than a couple of weeks.

### Postoperative recommendation on lumbar corset usage

The overwhelming majority of SS (93.2%;  $n=55$ ) does not recommend the use of a lumbar corset to a patient operated for a single-level lumbar disc herniation, with a recovery described as uncomplicated. Those who make this recommendation advise its use for less than a week.

### Postoperative recommendation on rehabilitation and follow-up

The referral rate of patients to postoperative rehabilitation ranges from 0 to 100% among SS, with 50% of them referring 10% or more patients. Axial pain (16.9%), motor deficit (20.3%); isolated or in association (28.8%) are the most common indications. Referrals take place during the first postoperative evaluation in 72.9% of the cases. The remaining occur equally at discharge and after 3 months.

The first postoperative appointment takes place in the first 2 weeks (33.9%;  $n=20$ ), or between the 2nd and the 4th week (45.8%;  $n=27$ ) in most cases. Surgeons with fully or partially private clinical practice tend to have an earlier postoperative evaluation ( $p=0.056$ ).

Most SS (96.6%) do not ask for MRI after a lumbar discectomy with an uneventful postoperative course.

### Results based on surgeon's expertise

No differences were found when comparing recommendations given by more and less experienced SS—as defined by the number of years in practice and the number of spine surgeries performed—for most activities described above (Table 3).

Surgeons with fewer annual interventions (< 100) recommend 4–8 weeks of recovery before taking a long flight,

**Table 2** Postoperative recommendations for an average patient, with an uncomplicated recovery

	No recommendation % (n)	Immediately after discharge % (n)	1–4 weeks % (n)	4–8 weeks % (n)	8–12 weeks % (n)	Over 12 weeks % (n)
Sedentary work (e.g., receptionists)	0 (0)	6.8 (4)	61 (36)	30.5 (18)	1.7 (1)	0 (0)
Light work (e.g., hairdressers)	0 (0)	1.7 (1)	25.4 (15)	59.3 (35)	13.6 (8)	0 (0)
Heavy work (e.g., construction workers)	0 (0)	0 (0)	1.7 (1)	44.1 (26)	40.7 (24)	13.6 (8)
Light domestic chores (e.g., cooking)	0 (0)	18.6 (11)	57.6 (34)	15.3 (9)	8.5 (5)	0 (0)
Heavy domestic chores (e.g., gardening, washing the toilets)	0 (0)	1.7 (1)	18.6 (11)	49.2 (29)	25.4 (15)	5.1 (3)
Moderate weightlifting (e.g., shopping bag)	0 (0)	5.1 (3)	37.3 (22)	40.7 (24)	16.9 (10)	0 (0)
Walking up or down stairs	6.8 (4)	66.1 (39)	20.3 (12)	6.8 (4)	0 (0)	0 (0)
Bending over	3.4 (2)	15.3 (9)	52.5 (31)	23.7 (14)	5.1 (3)	0 (0)
Driving a car	3.4 (2)	15.3 (9)	55. (33)	23.7 (14)	1.7 (1)	0 (0)
Taking a long flight	5.1 (3)	6.8 (4)	44.1 (26)	40.7 (24)	3.4 (2)	0 (0)
Sexual activity	8.5 (5)	22 (13)	52.5 (31)	16.9 (10)	0 (0)	0 (0)
Sports activity (walking)	1.7 (1)	52.5 (31)	42.4 (25)	1.7 (1)	1.7 (1)	0 (0)
Sports activity (cycling)	1.7 (1)	3.4 (2)	32.2 (19)	52.5 (31)	10.2 (6)	0 (0)
Sports activity (weight training)	0 (0)	0 (0)	5.1 (3)	33.9 (20)	39 (23)	22 (13)
Sports activity (team sport)	1.7 (1)	1.7 (1)	10.2 (6)	32.2 (19)	28.8 (17)	25.4 (15)

**Table 3** Chi-square *p* values in multiples comparisons

	Number of annual surgeries	Number of years after residency	Speciality	Type of practice
Sedentary work (e.g., receptionists)	0.552	0.078	0.161	0.535
Light work (e.g., hairdressers)	0.847	0.519	<u>0.018</u>	0.548
Heavy work (e.g., construction workers)	0.764	0.384	0.202	0.478
Light domestic work (e.g., cooking, dusting)	0.573	0.220	<u>0.015</u>	0.259
Heavy domestic work (e.g., gardening, washing the toilets)	0.469	0.226	0.494	0.254
<u>Moderate</u> weightlifting (e.g., shopping bag)	0.211	0.231	0.328	0.878
Walking up or down stairs	0.836	0.905	0.454	0.515
Bending over	0.424	0.438	0.547	0.178
Driving a car	0.619	0.633	0.877	0.194
Taking a long flight	<u>0.017</u>	0.551	0.637	0.458
Sexual activity	0.593	0.060	0.304	0.559
Sports activity (walking)	0.722	0.668	0.384	0.574
Sports activity (cycling)	0.100	0.712	0.570	0.081
Sports activity (weight training)	0.774	0.236	0.528	0.640
Sports activity (team sport)	0.581	<u>0.045</u>	0.273	0.357

Underlined *p* values are considered significant, according to 0.05 level of significance

but more experienced surgeons tend to recommend shorter periods of recovery (1–4 weeks) ( $p=0.017$ ). Surgeons with less than 15 years of practice recommend 4–12 weeks of

recovery before initiating intense sports activity, and those with more years of clinical practice tend to allow this type of activity only after 8–12 weeks ( $p=0.045$ ).

The level of expertise of the surgeon ( $p=0.586$ ) and the number of years in practice ( $p=0.954$ ) were not found to be associated with the choice of postoperative pain-relieving medication. No significant differences were identified for annual surgical volume ( $p=0.466$ ) or number of years in practice ( $p=0.105$ ) in terms of percentage of patients referred to rehabilitation.

### Results based on surgeons' speciality and type of practice

No major incongruence was identified when comparing recommendations given by SS with private, public or hybrid practice for most activities described above (Table 3). The same is true for the comparison between OS and NS.

There are 2 exceptions. OS recommend 4–12 weeks of recovery before initiating light work-related activities, whereas NS recommend shorter periods of recovery (1–8 weeks) ( $p=0.018$ ). Recommendations from OS for light house chores (1–8 weeks) are more conservative than from NS (up to 4 weeks) ( $p=0.015$ ).

NS and OS presented no difference in regard of analgesic drug prescription ( $p=0.219$ ), requisition of imaging exams ( $p=0.444$ ) or referral to rehabilitation ( $p=0.833$ ). Nevertheless, OS apparently use lumbar corsets more often than NS ( $p=0.030$ ), despite small sample dimension. The type of clinical practice presented no clear association with class of pain-relieving medication ( $p=0.620$ ), recommendation of lumbar corset use ( $p=0.983$ ), requisition of MRI ( $p=0.587$ ) or referral to rehabilitation ( $p=0.397$ ).

### Discussion and conclusion

Conservative treatment is the mainstay treatment for most patients with lumbar disc herniation. A surgical approach might be needed in specific cases, to provide more rapid relief of pain in the minority of patients whose recovery is unacceptably lengthy after a minimum period of conservative treatment of 6–12 weeks [12, 13]. Surgery is also indicated in serious or progressive neurologic deficits [13].

In the subjective perception of patients with LBP, the most important health outcomes are those associated with everyday performance including daily living, workplace, and sexual sphere [5]. As such, patient's return to work is a key outcome measure, as it has palpable implications for both individual patients and society at large [5].

After surgery for lumbar disc herniation, patients have been advised to restrict sitting, lifting or resuming other activities of everyday life [14]. Nevertheless, literature concerning recommendations on patient's return to work and restart of daily-living activities after surgery is sparse [7]. Given the paucity of relevant data, the Council of

State Neurosurgical Societies Workforce Committee carried out a survey-based study [6] to assess current practice on activity restriction after spine surgery. This survey depicted little consistency regarding return-to-work recommendations, general activity restrictions and orthosis utilization following spine surgery. Inconsistencies within and between surgeons in their postoperative management of patients as been stated elsewhere [15].

Within the scope of this survey, SS were asked to indicate their recommendations for an average patient with an uncomplicated postoperative evolution after a surgical intervention for single-level lumbar disc herniation, considering activities with varying levels of mechanical load. Concerning sedentary professional activity, surgeons consider it may be initiated up until the fourth postoperative week. Light and heavy workload workers need to wait longer. An occupational cohort study [16] among 389 public sector employees who underwent lumbar disc herniation surgery showed that employees took 78 days on average to regain workplace functionality, which supports the recommendations provided by the survey responders. A recent 2020 study [17] corroborates the findings of our study, but emphasizes that as complexity of surgery increases (number of affected lumbar levels, surgical approach), extended periods of time are favored prior to resumption of both heavy labor and strenuous physical activity.

Low mechanical impact activities, such as driving a vehicle, doing light housework, initiating intercourse or low-intensity physical activity, may be initiated up to 4 weeks after surgery. Higher stress activities should not be started before 4–8 weeks. Regarding driving, a 2020 systematic review [9] established that driving as early as 2 weeks is acceptable for patients undergoing single-level lumbar spinal fusion, which is in line with current practice.

Recommendations for initiating sedentary and light work-related activities from OS (4–12 weeks) were more conservative than NS' (1–8 weeks), which might be explained on the greater usage of minimally invasive techniques by NS.

No difference was found when comparing recommendations given by more and less experienced SS for most activities. This might be due to the lack of straight-forward guidelines orienting postoperative follow-up, which leads younger residents to guide themselves by their senior fellows' clinical practice.

Bono et al. [18] observed no significant differences in functional outcomes as assessed by Oswestry Disability Index when comparing short (2 weeks) and long (6 weeks) periods of activity restriction following lumbar discectomy. Having this in mind, Portuguese SS may be adopting an overly conservative strategy.

Increasing evidence indicates that effective pain treatment with a minimum of side effects is required to enhance



postoperative rehabilitation [19]. Almost all surgeons follow this directive, using painkillers as first-line treatment. No surgeon described the prescription of opioids on a daily-basis, which meets the 2016 NICE Guidelines [20].

Half of surveyed SS estimate to refer 10% or more patients for rehabilitation, following surgical intervention. Referrals occurring during the first postoperative evaluation in most cases. An Australian-centered SS survey [7] found that nearly 16% of SS always referred patients for outpatient physiotherapy and 23% of them never referred patients for rehabilitation. A survey-based investigation in the United Kingdom [21] suggests that outpatient physiotherapy may not be necessary for all patients. Oswestry Disability Index and Zung Depression Scale are suggested as useful tools for identifying patients with probable benefit.

Extensive changes are frequently observed after spine surgery on MRI [22], which is associated with neither functional outcome nor patient satisfaction [23]. Routine realization of MRI is not recommended by most surveyed surgeons after a lumbar discectomy with an uneventful postoperative course.

We must acknowledge several limitations of this analysis. A key limitation of our study is the potential for non-response bias, dependent on the means used for the dissemination of the questionnaire. In addition to the low response rate (24%), there was some heterogeneity among the responses received, which may suggest even greater heterogeneity among the wider population of surgeons.

We also acknowledge that the use of self-reported data may not be a true reflection of clinical practice. Steps were taken to promote accurate reporting: eligible clinicians had proven expertise in spinal surgery and were asked to think about their own practice, rather than answer hypothetically.

We failed to identify clinical predictor factors used by the surgeon in the moment of providing postoperative recommendations to patients. This should be addressed in future investigations.

Despite our sample of respondents representing the entire Portuguese territory and including surgeons with different levels of experience and different backgrounds, the small sample size does not guarantee the generalisability of the results presented. Notwithstanding, this may represent a great step toward a better management of patients with single-level lumbar disc herniation.

As to conclude, despite not having clear guidelines to orient postoperative management of surgically treated patients, the clinical practice of Portuguese SS seems to be in line with the international literature. Further prospective cohort studies are needed, to fully guarantee the safety of short-sighted return to work.

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**Author contributions** FdSC, OS and PP conceived and designed the study. OS and PP provided methodological and statistical advice. FdSC performed data extraction and drafted the first version of the manuscript. All authors provided clinical feedback in interpreting the results, contributed critically to subsequent revisions and approved the final version of the manuscript. All authors had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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**Data availability** The datasets generated during the current study are available from the corresponding author, on request.

## Declarations

**Conflict of interest** There is no conflict in interest in presenting the information included in this paper.

**Ethical approval** Granted by the Ethics Committee of Faculty of Medicine of University of Porto, with the collaborative agreement of the clinical associations involved.

**Informed consent** Tacit.

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