

# QUALITY OF LIFE IN THE PRE- AND POSTOPERATIVE PERIODS IN SPINAL FUSION AND DISCECTOMY

QUALIDADE DE VIDA PRÉ E PÓS-OPERATÓRIA DA ARTRODESE DE COLUNA E DISCECTOMIA

CALIDAD DE VIDA EN LOS PERIODOS PRE Y POSTOPERATORIO EN ARTRODESIS DE COLUMNA Y DISCECTOMÍA

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## ABSTRACT

**Objectives:** Considering the epidemiological and functional importance of spinal pathologies and the large number of surgeries performed today, the study aimed to evaluate the impact of spinal arthrodesis and discectomy surgeries on patients' quality of life. **Methods:** This is a retrospective, descriptive, and longitudinal study developed in the neurology and neurosurgery department of a strategic tertiary hospital in an inland town in the state of São Paulo. Data were collected through a telephone interview, using the Oswestry questionnaire (ODI) to assess lumbar pain in patients submitted to surgery in 2014 and 2015. **Results:** There was an improvement in the ODI results in all the periods analyzed. When the evaluations were subdivided by surgical type, there was an absolute improvement in the median ODI results in all procedures, however, only the cervical spine arthrodesis procedure was not statistically significant, probably due to the low number of procedures analyzed ( $n = 12$ ). **Conclusion:** It can be concluded that the current surgical technique can contribute to the improvement of patients' quality of life. **Level of Evidence III; Comparative retrospective study.**

**Keywords:** Spinal fusion; Intervertebral disc displacement; Quality of life.

## RESUMO

**Objetivo:** Devido à importância epidemiológica e funcional das patologias de coluna e ao grande número de cirurgias realizadas atualmente, o estudo teve como objetivo avaliar o impacto das cirurgias de artrose de coluna vertebral e discectomia na qualidade de vida dos pacientes. **Métodos:** Trata-se de um estudo retrospectivo, descritivo e longitudinal, desenvolvido junto ao Serviço de Neurologia e Neurocirurgia de um hospital estratégico terciário do interior do estado de São Paulo. A coleta de dados ocorreu por meio de entrevista telefônica, aplicando-se o Questionário Oswestry (ODI) para avaliação da dor lombar em pacientes submetidos à cirurgia entre os anos de 2014 e 2015. **Resultados:** Observou-se uma melhora dos resultados do ODI em todos os períodos analisados. Quando subdivididas as avaliações por tipo cirúrgico, houve melhora absoluta nas medianas de resultados do ODI em todos procedimentos, porém, apenas o procedimento de artrose da coluna cervical não teve significância estatística, provavelmente devido ao baixo número de procedimentos analisados ( $n = 12$ ). **Conclusão:** Conclui-se que a técnica cirúrgica vigente pode contribuir com a melhora da qualidade de vida dos pacientes. **Nível de Evidência III; Estudo retrospectivo comparativo.**

**Descritores:** Fusão Vertebral; Deslocamento do Disco Intervertebral; Qualidade de Vida.

## RESUMEN

**Objetivo:** Debido a la importancia epidemiológica y funcional de las patologías de columna y al gran número de cirugías realizadas actualmente, el estudio tuvo como objetivos evaluar el impacto de las cirugías de artrodesis de columna vertebral y discectomía en la calidad de vida de los pacientes. **Métodos:** Se trata de un estudio retrospectivo, descriptivo y longitudinal, desarrollado junto al servicio de neurología y neurocirugía de un hospital terciario estratégico del interior del estado de São Paulo. La recolección de datos ocurrió a través de una entrevista telefónica, aplicándose el cuestionario Oswestry (ODI) para evaluar el dolor lumbar en pacientes sometidos a la cirugía en los años de 2014 y 2015. **Resultados:** Se observó una mejora de los resultados del ODI en todos los casos períodos analizados. Cuando se subdividieron las evaluaciones por tipo quirúrgico, hubo una mejora absoluta en las medianas de resultados del ODI en todos los procedimientos, pero sólo el procedimiento de artrodesis de la columna cervical no tuvo significancia estadística, probablemente debido al bajo número de procedimientos analizados ( $n = 12$ ). **Conclusión:** Se concluye que la técnica quirúrgica vigente puede contribuir con la mejora de la calidad de vida de los pacientes. **Nivel de Evidencia III; Estudio retrospectivo comparativo.**

**Descriptorios:** Fusión vertebral; Desplazamiento del disco intervertebral; Calidad de vida.

Study conducted at Hospital Santa Casa de Misericórdia de Ourinhos, SP, Brazil.

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## INTRODUCTION

Degenerative diseases of the vertebral spine have increased greatly in recent years, mainly due to the increased life expectancy. It is currently estimated that 53% of the economically active Brazilian population will suffer from low back pain at some time in their lives, and 33% will have associated sciatic pain, affecting their physical, functional, and emotional capacity, as well as their basic routines and professional activities, and often causing partial or total dependence.<sup>1,2</sup>

Low back pain causes high rates of absenteeism, generating high costs for society and health systems. As a result, studies have increasingly attempted to understand the pain, and how to treat and prevent it.<sup>1</sup> The various types of pain arising from spinal pathologies include mechanical pain, facet joint pain, and radicular pain.<sup>3</sup>

Mechanical pain is pain that worsens with movement and improves with rest. It may impact on the day-to-day activities and cause significant functional limitations. The main causes are lumbar spasms, disc herniation, vertebral fracture, degenerative disk disease, osteoarthritis of the vertebral spine, or congenital malformation.<sup>4</sup>

Facet joint pain is generally very localized and non-irradiating. It is one of the main causes of cervical pain and low back pain, as it is the result of facet joint degeneration, giving rise to pain during movement.<sup>5</sup>

Radicular pain is caused by compression or irritation of the nerve roots. It results in burning, numbness, a sensation of "shock" and decreased sensitivity of the innervated region. An example is sciatic pain.<sup>3,6</sup>

The surgical techniques indicated will depend on the type of pathology to be treated. The main purpose of surgical treatment is to perform decompression of the neurological structures and stabilization, with biomechanical correction of the vertebral spine, treating the pain and giving the patient a quality of life that is closer to normality.<sup>7</sup>

Various pathologies can be treated surgically, including: joint instability, injury, stenosis of the spinal cord, spondylolisthesis, degenerative disc disease, facet and ligament mechanical overload, and pseudoarthrosis.<sup>8</sup>

In microsurgery for disc hernia or discectomy, a foraminotomy is performed, followed by flavotomy on the side of the affected root, with decompression of the root and subsequent removal of the herniated fragment and the affected disc.<sup>9</sup>

Arthrodesis of the spine involves the fusion of two or more vertebrae, in order to remove excess movement on the degenerated vertebra.<sup>9</sup> The technique leads to bone fusion, in which the surgeon may use pedicle and intervertebral prostheses, so that the vertebrae remain joined until the process of bone growth is complete. This is often a high-cost procedure as it involves the use of orthoses and prostheses.<sup>10</sup>

The goal of these procedures is to improve the patient's pain and functional, social, and psychosocial status, preserving neurological function and enabling them to perform routine day-to-day activities, without compromising the biomechanics of the spine. It represents an effective alternative for patients who have already tried conservative methods, but without obtaining significant improvements.<sup>11</sup> This, the most important goal of vertebral spine surgery is to improve the patient's quality of life.<sup>11</sup>

The current clinical trials and policies of the health sectors have increasingly sought quality of life (QoL), which can be defined as an intimate feeling of comfort, well-being or happiness when performing physical, intellectual and mental functions within the family and at work, and the community values to which the person belongs.<sup>12</sup> It is analyzed from different perspectives, whether by science, disciplines, common sense, point of view, objective or subjective, with individual or collective approaches, and is a complex and multifactorial process related to the process of health and sickness.<sup>13,14</sup>

Within this context, assessing the impact of surgical treatment of pathologies of the spine on QoL has grown in importance. Therefore, due to the epidemiological and functional importance of spine

pathologies, and the high number of spine surgeries performed today, the main goal of this study was to evaluate the impact of surgical treatment on patients' quality of life. This study also aimed to characterize the population submitted to treatment.

## METHODS

This is a retrospective, observational and longitudinal study. The research was conducted at the neurology and neurosurgery service of a strategic 166-bed tertiary hospital in the interior of the State of São Paulo. The institution is located in a mesoregion of 553,778 inhabitants, and performs low-, medium- and high-complexity surgical procedures, with an annual average of 4637 procedures per year.

After gaining approval from the Institutional Review Board of Universidade Nove de Julho (via Plataforma Brasil), under opinion number 1,861,843, a data survey of spinal fusion and lumbar disc hernia surgeries performed in 2014 and 2015 was conducted, based on the hospital records. The patients identified in this list were invited to participate in this study. After having its purpose explained to them, they agreed to participate by signing an Informed Consent Form (Annex 1). For those who agreed, the Oswestry questionnaire (ODI) was applied, in a single telephone interview, to evaluate the level of low back pain (Annex 2). The participants' condition before surgery, and after the surgery up to the time of the test, was assessed.

The Oswestry Disability Index evaluates the following aspects: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, and traveling. For each section consisting of six statements, the total score was 5. The intermediary statements were scored according to this ranking. The median of the responses was calculated as instructed by the index itself, using the formula:

$$\left[ \frac{\text{(total no. of points)}}{\text{(total no. of points possible)}} \right] \times 100$$

Basic and analytical descriptive statistics were applied, using the programs Microsoft Excel 2016 and GraphPad Prism version 5.00 for Windows 10, GraphPad Software, San Diego California USA, www.graphpad.com. The results were presented in the form of charts and graphs.

## RESULTS

During the period analyzed, a total of 476 neurosurgeries were performed. Of these, 177 were spine surgeries: 112 spine arthrodeses and 65 discectomies. Out of 177 possible study patients, 3 died, 70 attended the telephone calls, and the remainder did not attend or did not wish to respond to the interview at the time of the interview.

The sociodemographic data of the patients are shown in Table 1.

The results obtained after applying the questionnaire are described in Figure 1. An improvement was obtained in the patients' quality of life after the surgical treatment, with statistical significance of  $p < 0.05$  at all the postoperative times.

The pre- and postoperative indices were also analyzed for each specific type of surgery, as described in Table 2. In all the procedures, there was an absolute reduction in the median of the results, but in the case of patients submitted to arthrodesis of the cervical spine, there was no statistically significant association ( $p = 0.121$ ).

## DISCUSSION

Degenerative diseases of the vertebral spine have increased greatly in recent years, mainly due to the increased life expectancy.<sup>11</sup> In this scenario, surgical treatment of these pathologies aims to improve the pain and functional, social and psychosocial status. Its primary goal, therefore, is to improve patients' quality of life.<sup>11</sup>

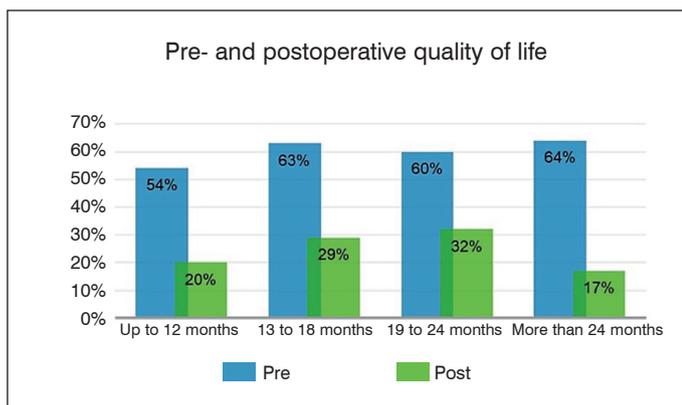
The current clinical trials and policies of the health sectors have increasingly aimed at improving quality of life. This research therefore aimed to evaluate the quality of life of the population submitted to surgical treatment of the lumbar spine.

In this study, it can be understood, based on the application

**Table 1.** Sociodemographic data of the patients submitted to Discectomy and Arthrodesis of the Spine in 2014 and 2015 at the strategic tertiary hospital in the interior of the state of São Paulo. Ourinhos, 2016.

Sex	N
Male	37
Female	33
Age group	N
10 To 20 years	1
21 To 30 years	9
31 To 40 years	12
41 To 50 years	19
51 To 60 years	20
61 To 70 years	7
> 71 Years	2
Diagnosis	N
Spinal cord stenosis	24
Disc hernia	20
Cervical disc hernia	5
Thoracolumbar SCI*	15
Cervical SCI	5
Infectious discitis	1
Surgery performed	N
Discectomy	19
Cervical arthrodesis ant <sup>+</sup>	9
Cervical arthrodesis post <sup>§</sup>	3
Lumbar arthrodesis post	36
Thoracic arthrodesis post	3

\*SCI – Spinal Cord Injury; <sup>+</sup>ANT. – Anterior; <sup>§</sup>POST. – Posterior.



**Figure 1.** Median of the results obtained after application of the Oswestry Index for pre- and postoperative evaluation (n=70) p<0.05 of the study patients, Ourinhos, 2016.

of the Oswestry Index, that the surgical treatment proposed and performed had a positive impact on the daily routines in the quality of life of the patients submitted to spine surgery, at all the postoperative times, with preoperative results ranging from severe incapacity to disability, and postoperative results ranging from minimum to moderate disability. These data are consistent with the current literature which shows, in national and international studies, an improvement in ODI score of 61.04 before surgery and 34.15 after two years, and national studies which showed an average score of 72.3% and after

**Table 2.** Medians of the indices obtained pre- and postoperative by type of procedure performed (n=70).

Procedure	Period	Pre-op	Post-op	
Discectomy	Up to 12 months	52%	20%	
	P < 0.05	13 To 18 months	56%	19%
	N = 19	19 To 24 months	80%	6%
		More than 24 months	62%	12%
Thoracolumbar arthrodesis via posterior	Up to 12 months	62%	19%	
	P<0.05	13 To 18 months	63%	29%
	N = 39	19 To 24 months	60%	45%
		More than 24 months	72%	27%
Cervical spine arthrodesis	Up to 12 months	60%	1%	
	P>0.05	13 To 18 months	58%	8%
	N = 12	19 To 24 months	33%	39%
		More than 24 months	64%	58%

the surgical procedure, an average of 51% at between 12 and 24 months.<sup>15,16</sup> Meanwhile, larger studies have been performed with follow-ups of up to 5 years, showing a reduction in gains in quality of life in the long term, particularly when comparing the results for patients submitted, or not, to lumbar fusion.<sup>17,18</sup>

It is believed that the postoperative benefit is mainly due to the following factors: radicular and/or broad spinal cord decompression, enabling mechanical alleviation and consequently, inflammatory alleviation of the nerve structures; stabilization of the unstable vertebral segments, with an improvement in ligament and para-vertebral myofascial condition, and biomechanical correction of the vertebral spine with improvement in its sagittal balance, which leads to better vertebral osteomuscular and coxofemoral condition, relieving the burden on the joint structures and muscles. Once the goals have been achieved, the main types of pain arising from the vertebral spine can be successfully treated.<sup>19,20</sup> Randomized studies show that there is poor clinical indication, a lack of correct clinical-radiological correlation, failure to observe the sagittal alignment of the spine in the preoperative preparation, the use of unnecessary prostheses, poor postoperative rehabilitation, and patients with poor psychological profile such as underdiagnosed mood disorders and labor conflicts are the main causes of the low postoperative success rate.

Dividing the evaluations by type of surgery performed, we found an absolute improvement in quality of life in all the procedures performed. However, this improvement was not statistically significant in the patients submitted to cervical arthrodesis. This fact that is attributed to the low number of patients evaluated who underwent this procedure. The data obtained corroborate the national and international literature. In Brazil, authors have found an improvement in ODI score after 2 years of lumbar arthrodesis, with a reduction from 61.04 before surgery to 34.15 after surgery, and results of the SF-36 with better results for the domains "Pain", "Emotional Aspects" and "Functional Capacity".<sup>21</sup> Data from European studies have shown an improvement in ODI, SF-36, *Paindetect* (PD) and *Douleurneuropathique* 4 (DN4) scores for surgery of the lumbar spine.<sup>21</sup> In the case of cervical arthrodesis surgery, the results for improvement in quality of life were also evident in the literature, which reinforces the possibility that the low number of individuals analyzed who underwent the procedure on the cervical spine was responsible for the lack of statistical significance.<sup>16,21</sup>

This study addresses a very important theme in the scientific productions on current surgery of vertebral spine, therefore it is essential to evaluate the real impact of the surgeries performed, and the costs of this type of treatment for the health services. This study therefore has local importance, showing that the investment in this type of procedure, for the patients evaluated, resulted in a significant gain in quality of life, improvement in pain and functional capacity, and importance for other services to show that the current conducts have proven efficient for the treatment of patients with injuries of the vertebral spine.

However, this study has some limitations. First, the small number of evaluations does not enable us to conduct a deeper statistical analysis, not enabling analysis of more variables, and the groups analyzed are heterogeneous. The retrospective analysis without postoperative follow-up can also generate data bias. We also noted limitations in obtaining the data from the patients' records with the service studied, due to the lack of proper organization of these documents, with limitations in gaining access to the patients, due to the many telephone numbers that were out of date. Some of the records belonged to family members who refused to pass on the patients' data during the interview, and many were also reluctant to be misled due to the telephone

scams they had experienced. More detailed, prospective studies are therefore necessary, with a larger number of participants and more subdivisions of variables.

## CONCLUSIONS

This work sought to clarify the relationship between surgery of the vertebral spine and improvement in quality of life after surgery. An improvement in the results of the ODI was observed in all the periods analyzed. Subdividing the evaluations by type of surgery, there was an absolute improvement in the medians of the results of the ODI in all the procedures, but only the arthrodesis of the cervical spine failed to show statistical significance, probably due to the low number of procedures analyzed ( $n=12$ ).

This study has importance in showing that the surgical conduct currently used can contribute to improving the quality of life of patients, but more detailed, prospective studies are needed, with a larger number of participants and with more subdivisions of variables.

All authors declare no potential conflict of interest related to this article.

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Annex 1.

**INFORMED CONSENT FORM**

I, \_\_\_\_\_, RG [ID] \_\_\_\_\_, CPF [Personal Taxpayer Number] \_\_\_\_\_, agree to take part in the Student Research Study entitled **“Quality of life in the pre- and postoperative periods in spinal fusion and discectomy”**, under the supervision of Prof. Master’s Degree Candidate Drielly Livia Cristino Braga Rufca and Dr. Flavio Ramalho Romero. The purpose of this study is to conduct a survey of the real impact of the surgery on the quality of life of individuals with pathologies of the spine.

My participation is voluntary and will be done through an interview via telephone contact. The Oswestry questionnaire for evaluation of pain will be applied.

If, after giving your consent, you decide to stop participating in this study, you have the complete right and freedom to withdraw your consent at any phase of the study, whether before or after the data collection, regardless of the reason and without harm to yourself. You will not incur any expense, and neither will you receive any payment. The results of the study will be analyzed and possibly published, but your identity will not be disclosed. Confidentiality will be maintained. For any other information, you can contact the researchers at the following email address: [pesquisarrodeese@gmail.com](mailto:pesquisarrodeese@gmail.com), or you can contact them through the Faculdade Estácio de Sá, Avenida Luís Saldanha Rodrigues, S/N – Bairro: Nova Ourinhos, Ourinhos - SP, CEP: 19907-510, or by telephone: (14) 3302-5000.

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Patient

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Persons responsible for the study

Annex 2.

<b>Oswestry low back pain questionnaire</b>	
Please answer this questionnaire. It was developed to provide us with information about how your back or leg problem has affected your ability to carry out activities of daily living. Please answer all the sections. In each one, mark only the response that most clearly describes your condition at the moment.	
<p><b>Section 1 – pain intensity</b></p> <p><input type="checkbox"/> I feel no pain at the moment.</p> <p><input type="checkbox"/> the pain is very mild at the moment.</p> <p><input type="checkbox"/> The pain is moderate at the moment.</p> <p><input type="checkbox"/> The pain is fairly severe at the moment.</p> <p><input type="checkbox"/> The pain is very severe at the moment.</p> <p><input type="checkbox"/> the pain is the worst imaginable at the moment.</p>	<p><b>Section 6 – Standing</b></p> <p><input type="checkbox"/> I can stand as long as I want without extra pain</p> <p><input type="checkbox"/> I can stand as long as I want but it gives me extra pain</p> <p><input type="checkbox"/> Pain prevents me from standing for more than 1 hour</p> <p><input type="checkbox"/> Pain prevents me from standing for more than 30 minutes</p> <p><input type="checkbox"/> Pain prevents me from standing for more than 10 minutes</p> <p><input type="checkbox"/> Pain prevents me from standing at all</p>
<p><b>Section 2 – Personal care (washing, dressing etc.)</b></p> <p><input type="checkbox"/> I can look after myself normally without causing extra pain</p> <p><input type="checkbox"/> I can look after myself normally but it causes extra pain</p> <p><input type="checkbox"/> It is painful to look after myself and I am slow and careful</p> <p><input type="checkbox"/> I need some help but manage most of my personal care</p> <p><input type="checkbox"/> I need help every day in most aspects of self-care</p> <p><input type="checkbox"/> I do not get dressed, I wash with difficulty and stay in bed</p>	<p><b>Section 7 – Sleeping</b></p> <p><input type="checkbox"/> My sleep is never disturbed by pain</p> <p><input type="checkbox"/> My sleep is occasionally disturbed by pain</p> <p><input type="checkbox"/> Because of pain I have less than 6 hours sleep</p> <p><input type="checkbox"/> Because of pain I have less than 4 hours sleep</p> <p><input type="checkbox"/> Because of pain I have less than 2 hours sleep</p> <p><input type="checkbox"/> Pain prevents me from sleeping at all</p>
<p><b>Section 3 – Lifting</b></p> <p><input type="checkbox"/> I can lift heavy weights without extra pain</p> <p><input type="checkbox"/> I can lift heavy weights but it gives extra pain</p> <p><input type="checkbox"/> Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently placed e.g. on a table</p> <p><input type="checkbox"/> Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned</p> <p><input type="checkbox"/> I can lift very light weights</p> <p><input type="checkbox"/> I cannot lift or carry anything at all</p>	<p><b>Section 8 – Sex life</b></p> <p><input type="checkbox"/> My sex life is normal and causes no extra pain</p> <p><input type="checkbox"/> My sex life is normal but causes some extra pain</p> <p><input type="checkbox"/> My sex life is nearly normal but is very painful</p> <p><input type="checkbox"/> My sex life is severely restricted by pain</p> <p><input type="checkbox"/> My sex life is nearly absent because of pain</p> <p><input type="checkbox"/> Pain prevents any sex life at all</p>
<p><b>Section 4 – Walking</b></p> <p><input type="checkbox"/> Pain does not prevent me walking any distance</p> <p><input type="checkbox"/> Pain prevents me from walking more than 1 mile</p> <p><input type="checkbox"/> Pain prevents me from walking more than ½ mile</p> <p><input type="checkbox"/> Pain prevents me from walking more than 100 yards</p> <p><input type="checkbox"/> I can only walk using a stick or crutches</p> <p><input type="checkbox"/> I am in bed most of the time and need to drag myself to go to the bathroom.</p>	<p><b>Section 9 – Social life</b></p> <p><input type="checkbox"/> My social life is normal and gives me no extra pain</p> <p><input type="checkbox"/> My social life is normal but increases the degree of pain</p> <p><input type="checkbox"/> Pain has no significant effect on my social life apart from limiting my more energetic interests e.g., sport</p> <p><input type="checkbox"/> Pain has restricted my social life and I do not go out as often</p> <p><input type="checkbox"/> Pain has restricted my social life to my home</p> <p><input type="checkbox"/> I have no social life because of pain</p>
<p><b>Section 5 – Sitting</b></p> <p><input type="checkbox"/> I can sit in any chair as long as I like</p> <p><input type="checkbox"/> I can only sit in my favorite chair as long as I like</p> <p><input type="checkbox"/> Pain prevents me sitting more than one hour</p> <p><input type="checkbox"/> Pain prevents me sitting more than 30 minutes</p> <p><input type="checkbox"/> Pain prevents me from sitting more than 10 minutes</p> <p><input type="checkbox"/> Pain prevents me from sitting at all.</p>	<p><b>Section 10 – Traveling (bus/car/tax)</b></p> <p><input type="checkbox"/> I can travel anywhere without pain.</p> <p><input type="checkbox"/> I can travel anywhere but it gives me extra pain.</p> <p><input type="checkbox"/> Pain is bad but I manage journeys over two hours.</p> <p><input type="checkbox"/> Pain restricts me t journeys of less than one hour.</p> <p><input type="checkbox"/> Pain restricts me to short necessary journeys under 30 minutes.</p> <p><input type="checkbox"/> Pain prevents me from travelling except to receive treatment.</p>