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Paralytic Lumbar Disc Herniation. A Four Years Social and Economic Impact Study for North-East Region of Romania

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Abstract

The aim of this study was to determine the social impact of the patients suffering from lumbar disc herniation. Although it is a very important medical condition that affects at least once in their lives more than 80% of the population at this point in time it is not analyzed in conjunction with the social and economic costs that can be generated. We have collected the data for a time span of four years from two representative hospital centers from North-East region of Romania. We took in consideration a total number of 7438 patients that were treated by surgical and physiotherapeutic means. Results showed an important correlation between medical decision making, types of medical treatment, number of days of work leave and cost per day of hospitalization. It is of high importance, when we want to reduce the social and economic burden, for the patients to be rigorously investigated and properly addressed to the right therapy treatment.

Keywords: lumbar disc herniation, discectomy, rehabilitation, economic costs, work leave, social impact.

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Introduction

Low back pain due to lumbar disc herniation (LDH) is an important and enormous public health and social issue. Although the discectomy is a relative common surgical procedure for lumbar disc problems, in this moment in Romania we do not find studies that treat this problem in its socio-economical context. In European Union's western countries and in the United States of America there are surveys made by the social security services in order to understand the impact of this health problem on social context and economic costs in the effort to minimize the burden on the society.

In this context the data that is available for comparison is foreign from our national socio-economical specific. A few epidemiological data reveals that 75% - 85% of the population will experience an episode of lower back pain in their life and national statistics from USA report prevalence between 15% and 20%. Back pain is the most frequent cause of job activity limitation for people under 45 years old, the fifth most frequent reason for hospitalization and the third place for surgical procedures. About 2% of the population is chronically and temporarily disabled (Andersson, 1997). National statistics in countries from Europe note that 10% to 15% of all sickness absence from work is due to back pain and the prevalence is between 25% and 45% (Cherkin *et al.*, 1994).

In a recent study with 1.191 participants that aimed to understand the epidemiology of LDH and the cost-effectiveness of lumbar discectomy versus classical treatment the authors found that the average age of patients with LDH was 41 years and the incidence was slightly bigger in males versus females patients (57% versus 43%, respectively). Moreover the proportion of the patients reporting the missing days from work was higher in those treated with surgery than those treated classically (Schroeder, Guyre, & Vaccaro, 2016; Tosteson *et al.*, 2008).

There is a good evidence in the scientific literature that psycho-social environment may have a significant influence in pain perception due to lumbar disc herniation and the development of chronicity (Weiser & Cedraschi, 1992; Burton *et al.*, 1995; Ferguson & Marras, 1997). The influence of these factors may partially explain why lumbar discectomy has not been always successful even if the pathophysiological factors have been dealt with.

According to North American Spine Society, the American Society of Spine Radiology, and the American Society of Neuroradiology, the definition for disc herniation is "localized or focal displacement of disc material beyond the limits of the intervertebral disc space." This concludes that a true herniated disc is a focal pathology that affects less than 25% of the intervertebral disc (Fardon *et al.*, 2014). The herniated disc can be divided in protrusion, extrusion and sequestration. In some cases the extruded part or the intervertebral disc comes in contact with different parts of the neural system that it finds in its path causing among

others radicular compression of a spinal root. When the compression is very important it can be accompanied by loss in nerve trophicity and functions and subsequently loss of different muscle control. Paralytic sciatica due to the incapacity of the subject to lift or pull the forefoot can lead to multiple falls and injuries, reducing mobility and quality of life (Iizuka *et al.*, (2009).

The complications of the LDH are not to be minimized in what concerns the social and economical costs. This can begin with the recurrence of the health problem, hyperalgesic sciatica, loss of different degrees in the capacity of movement in the lower limb (paralytic sciatica) that can produce serious difficulties in ambulation and social interaction and the risk of the condition in becoming chronic (Vialle *et al.*, 2010). The chronic state of the LDH is a real factor to take in consideration because from this point the patients is surely going to access every year rehabilitation or physiotherapy services which in long term will increase the economic costs and the missing days from work.

In the medico-social decision making situation in which various clinical studies stated that in long terms surgical treatment is no more and no less efficient than classical rehabilitation or physiotherapy treatment the costs of the medical services in treating the patients with LDH must be carefully addressed. The current study aims to clarify and approximate the economic costs that are necessary for the treatment of patients suffering from LDH. The subject will be treated cumulating the total costs of hospitalization for surgery and rehabilitation treatment in the idea of obtaining an approximate total cost for the reinsertion/reintegration in the line of work.

Material and Methods

We have collected data from two hospital centers from two different counties in the North-East region of Romania. The data about the costs and patients were received after the approval of the administration and the ethics committee of each of the hospital center. We took in consideration two specialized hospital centers in order to be more representatives for our research as follows: Clinical Emergency Hospital “N. Oblu” from Iasi (First center) and County Emergency Hospital from Vaslui (Second center).

The data were collected from for years consecutively from 2013 until 2016. Because we wanted to understand the dynamic of the combined costs and overall days of work leave we have selected both the Neurology - Neurosurgery hospital Departments for the surgical treatment and the Rehabilitation Department where the patients can achieve a normal physical and medical status in order to resume work and social activities.

In total a number of 7438 patients were found to have received surgical treatment in the neurosurgery departments for lumbar disc herniation from these only 252 patients have received physiotherapy and rehabilitation treatment. This is also due to the fact that either the patients are not guided to the rehabilitation centers by the medical staff or they decide to undertake their rehabilitation treatment in the private sector. In this case our data are limited because we have collected them only from the big hospital centers.

From this data we have analyzed for each year taking in consideration the specific of each medical branch department: total days per year of hospitalization for neurosurgery and rehabilitation treatment, average number of days for each patient, total cost per year per department, average cost for each day of hospitalization, incidence of the LDH from the total number of patients admitted in the neurosurgical departments.

Results and Discussions

The mean age of the patients in the neurosurgery departments were in 2013 – 48.2 years old, in 2014 – 46.9 years old, in 2015 – 50.1 years old and in 2016 46.4 years old. For department of neurology the patients with LDH had a mean age in 2013 of 60.2, 2014 – 59.8, 2015 – 60.8 and in 2016 was 61.3 years old. For the rehabilitation department the patients that addressed the service had a mean age in the first year of 58.8 years old, in 2014 – 58.1, in 2015 55.1 and in 2016 - 61.1 years old. The overall age characteristic of the patients suffering from LDH is in general over 40 years old which means that its affects most the working adult category of population that contribute most to the social security system.

Another characteristic of the demographics is related to the gender of the patients. In the space of four years from 2013 until 2016 the gender difference of population that accessed the services of neurology and neurosurgery was in majority females in proportion of 58.31% and males in proportion of 41.69% (*Figure 1*). This means that the incidence of the LDH among genders is greater in the female population.

After the surgical treatment in the neurosurgery departments a number of patients access the rehabilitation services. The exact percentage is unknown because the population taken in consideration was only from the public health sector and much of them continue treatment in the private sector. For the rehabilitation departments the gender related demographics is approximately the same as in the neurosurgery departments: 59,53% females and 40, 47% males (*Figure 2*).

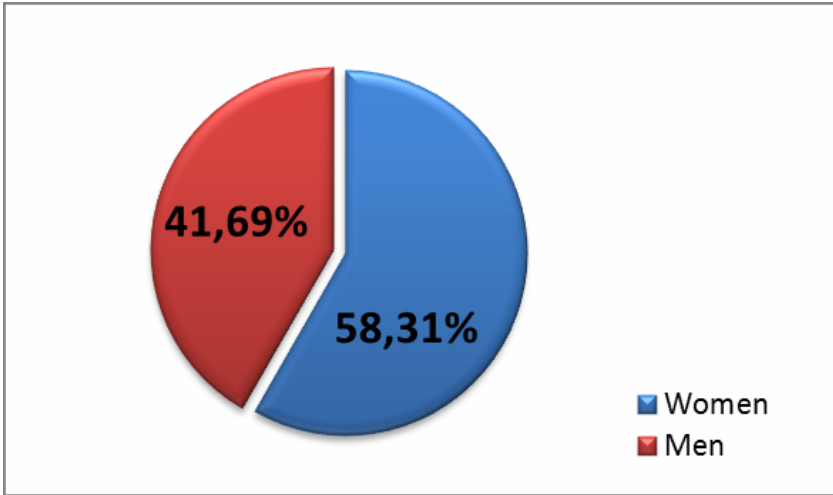


Figure 1. Gender incidence among the patients with LDH from neurosurgery departments

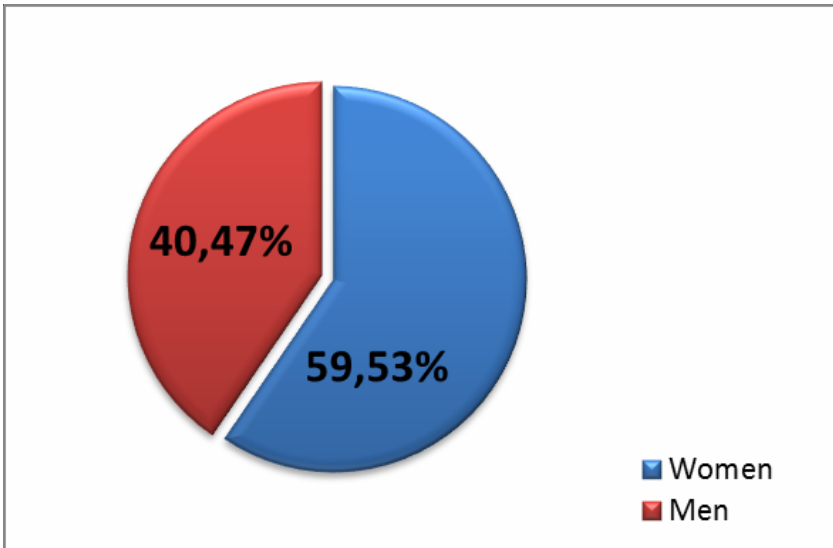


Figure 2. Gender incidence among the patients with LDH from rehabilitation departments

The incidence of LDH among the patients hospitalized in neurology and neurosurgery departments vary from a county to another. In neurosurgery department from Clinical Emergency Hospital “N. Oblu” in 2013 the incidence was 31.55% from the total patients, versus 19.60% in the County Emergency Hospital from Vaslui. The percentage of incidence vary for the next years also: in 2014 was 28.60% versus 51.80%, in 2015 was 27.01% versus 67.64% and in 2016 was 23.43% versus 78.72%. In the rehabilitation department the incidence was as follows: in 2013 – 34.26%, 2014 – 36.69%, 2015 – 24.48% and in 2016 – 24.51%.

The number of days spent in the hospitalization regimen during the discectomy varies in concordance with the difficulty of the cases. In general we have found to be between 6.84 days and 10.78 days. In the rehabilitation service the patients generally stay longer because of the specific of the therapy that needs more time to take its effects on the functionality of musculo-skeletal system. Other data with the reference to the days of medical care are presented in *Table 1*.

Table 1. Days of medical care necessary for the complete treatment from the discectomy to rehabilitation for one patient only

Year	Neurosurgery department. First center	Neurosurgery department. Second center	Rehabilitation service	Total days first center/second center
2013	7.29	10.78	9.43	16.72/20.21
2014	7.37	8.40	10.70	18.07/19.1
2015	7.26	9.35	11.86	19.12/21.21
2016	6.84	8.27	12.36	19.2/20.63

A very important part of the social reinsertion of the different categories of pathology patients are the costs that the social security services pay. These costs depend of the type of pathology, comorbidities, predisposition to chronic development of the pathology, and days of hospitalization. We have divided and compared the costs between the two groups. First group is comprised of patients undertaking surgery treatment and the second group the patients that choose the rehabilitation and physiotherapy treatment.

We have found in the neurosurgery department from the first center in 2013 for a mean number of 7.29 days a cost of 2700.2 lei, in 2014 for 7.37 days a cost of 2800.59 lei, in 2015 for 7.26 days a cost of 2758.8 lei and in 2016 for a mean number of 6.84 days a cost of 2800.59 lei. The cost evolution for the entire four years is graphically represented in *Figure 3* for a better vision of the phenomena.

In the second center in the neurosurgery department we have found in 2013 for a mean number of 10.78 days a cost of 3202.55 lei, in 2014 for 8.40 days a cost of 2635.43 lei, in 2015 for 9.35 days a cost of 2415 and in 2016 for a mean number of 8.27 days a cost of 2070.20 lei. The costs are represented in *Figure 4*.

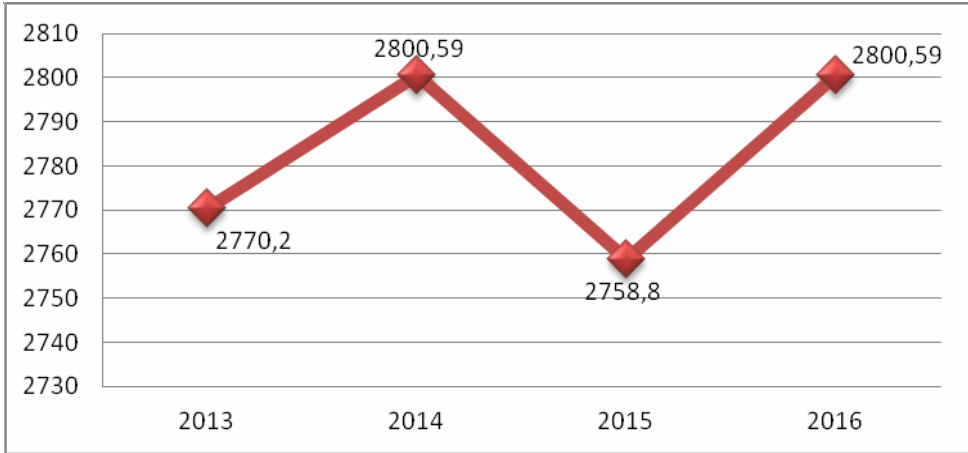


Figure 3. Evolution of costs during the four years in neurosurgery department from first center

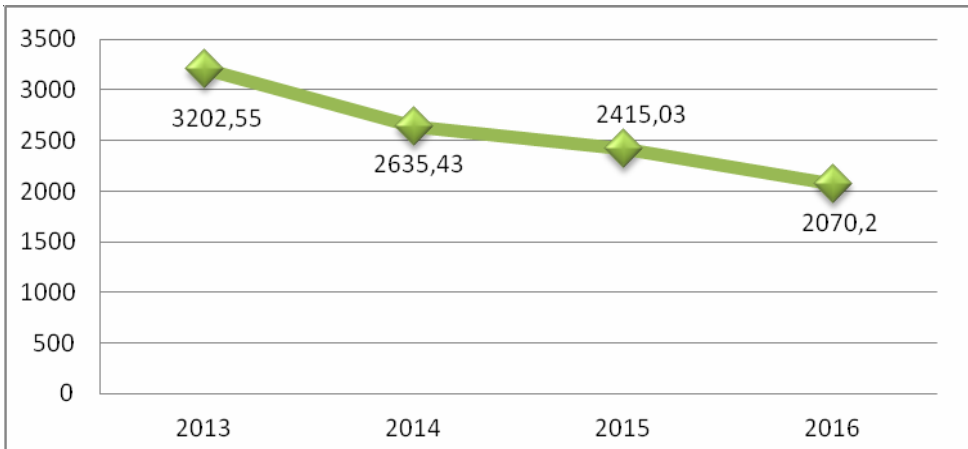


Figure 4. Evolution of costs in neurosurgery department from the second center

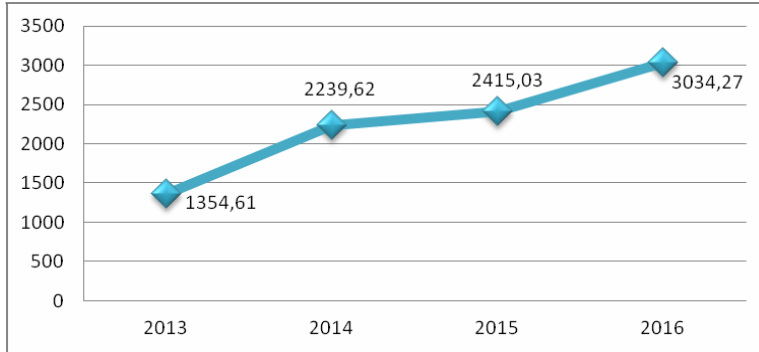


Figure 5. Evolution of costs for the rehabilitation department

As seen in *Figure 5* the costs for the patients suffering from LDH that received classical treatment has an ascendant trend. In 2013 for a mean number of 9.43 days the cost was 1354.62 lei, in 2014 for 10.7 days the cost was 2239.62 lei, in 2015 for 11.86 days the cost was 2415.03 and for 2016 for a mean number of 12.36 days the cost was 3034.27 lei per patient.

From the trends seen on the evolution graphics it may seem that the general costs for the treatment of one patient suffering from LDH is higher for those who access the services of physiotherapy and rehabilitation centers. While the general cost may seem higher for the rehabilitation centers in fact this cost is influenced by the number of days. Because of the physiotherapy specific medical treatment the number of days may vary depending on the functional outcome and residual capacity. The cost per day of treatment for one patient is summarized in the *Figure 6*.

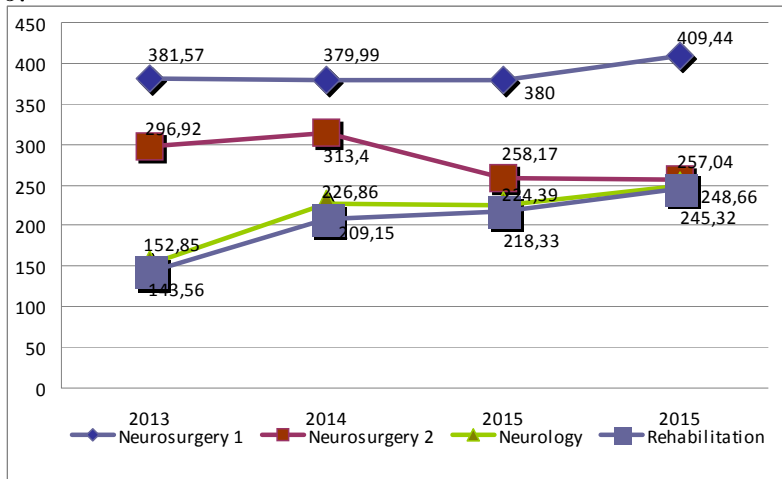


Figure 6. Evolution of cost per patient per day in different treatment departments

We have collected data sensible to the costs and overall days of hospitalization from two hospital centers from the North-East region of Romania in order to try to understand the dynamic of social impact over a four year period. The data have a possible limitation due to the fact that we have not taken in consideration all the hospitals in the region with the neurosurgery departments because of the non-response rate to our inquire.

The process of cost effectiveness evaluation for different categories of pathology should be taken in consideration by the health and social security systems. At this moment we did not find in the literature any scientific article to treat the subject of the patients suffering from LDH and its medical costs in correlation to work leave and its impact on social structure.

From the search in the international literature we have found that the population that seeks help for their lumbar disc pathology has a mean age of 41 (Jordan, Konstantinou & O'Dowd, 2009). In our study we found the age to be between 46 and 62 years old. Also the gender related incidence shows an increased occurrence in women with 58,31% and men 49,61% but the in study Spine Patient Outcomes Research Trial's (SPORT) that evaluated the epidemiology of the patients suffering from LDH the percentage is in favor of men with 57% versus 43%, respectively (Cummins *et al.*, 2006).

A number of studies compare the effectiveness of the surgical treatment versus classical physiotherapy treatment in order to deliver the best medical help for the patient. In these clinical trials they concluded that surgical treatment provided faster relief from back pain symptoms in patients with lumbar disc herniation, but did not show a benefit over conservative treatment in midterm and long-term follow-up. Although early and proper surgical treatment in a case of motor weakness from disc herniation could provide a rapid alleviation (Gugliotta *et al.*, 2016; Tosteson *et al.*, 2008; Hong-Seok *et al.*, 2013).

From our study the data suggest that the costs per day of hospitalization for surgery treatment taking in account all the costs that come along with the hospitalization fees are higher than the cost alone of the physiotherapy treatment. Of course if the medical decision demands for surgical treatment in cases of hard disabilities conjoint with the physiotherapy sessions the costs are cumulative. Not only the direct cost is important when taking in account the social impact of a person suffering of LDH but also the indirect cost in which we can include also the medical investigations and the work leave necessary for the treatment to take place.

The minimum number of days that a person becomes social inactive it depends on whether he is treated only by surgical means in which case he leaves work between a mean number of 6,84 to 10,78 days. If after that he begins physiotherapy treatment than the number of days can rise up to 21,2 days. However the reality of the social cost is higher because a major number of the patients suffering from

LDH are developing a chronic state which means revisiting more than one a year the physiotherapy centers.

Conclusions

The social impact for the patients suffering from lumbar disc herniation is related to the number of medical services that are provided, the indirect cost coming from work leave and hidden cost determined by social inactivity. This is why is not easy to correlate all these data in understanding the final and total costs. To ameliorate the negative influence over the social security system it is important for the medical specialists to make a good decision in differentiating the patients that must have surgical treatment versus patients that only need physiotherapy treatment in order to reduce the number of days of work leave and direct economic costs.

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