Multidisciplinary treatment program for improvement in pain and disability associated with nonspecific chronic low back pain

Programa de tratamento multidisciplinar para melhora da dor e incapacidade associada a dor crônica lombar inespecífica

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https://doi.org/10.5935/2595-0118.20240005-en

ABSTRACT

BACKGROUND AND OBJECTIVES: Lumbar disorders, which contribute to significant workplace absenteeism and chronic disability, are associated with a considerable financial and social burden. Although a conservative approach provides satisfactory pain relief, biomechanical improvement and is associated with a low risk of adverse effects, there is lack of consensus in the literature regarding the best therapeutic strategy in such cases.

METHODS: This retrospective longitudinal study used secondary data from the institutional medical records of patients who completed a multidisciplinary program for the treatment of low back pain between 2019 and 2021. Data regarding pain levels and motor skills were obtained from patients who completed the care program at a private hospital in Bento Gonçalves, RS. The following step-wise treatment algorithm was used: evaluation by a specialist physician for the etiological diagnosis of pain, pharmacological management and dry needling, followed by standard rehabilitation intervention performed by the physiotherapy team and exercises by the physical education team. The visual analogue scale (VAS) was used to measure pain at the start and at the completion of the intervention, and the Oswestry Disability Index (ODI) was used to measure motor skills at the start and at 6 and 12 months following the multiprofessional intervention for rehabilitation.

RESULTS: A reduction in pain and motor disability in patients who completed all stages of the treatment program was observed. Pain by the VAS presented the following scores: baseline 7 [5-8] and after treatment 2 [0-4]; and the scores of the ODI were: at baseline 0.34 [0.26 - 0.40], at 6 months 0.16 [0.08 - 0.26] and after treatment 0.12 [0.04 - 0.21].

CONCLUSION: The treatment program reduced the pain and disability associated with low back pain and can serve as the basis for further studies carried out to confirm the effectiveness of this intervention.

Keywords: Clinical protocols, Dry needling, Low back pain, Motor disability, Multidisciplinary protocol, Rehabilitation, Visual analogue scale.

RESUMO

JUSTIFICATIVA E OBJETIVOS: As doenças lombares, que contribuem para um absenteísmo significativo no local de trabalho e para a incapacidade crônica, estão associadas a um encargo financeiro e social considerável. Embora a abordagem conservadora proporcione alívio satisfatório da dor, melhore a biomecânica e esteja associada a baixo risco de efeitos adversos, não há consenso na literatura sobre a melhor estratégia terapêutica nesses casos.

MÉTODOS: Neste estudo longitudinal retrospectivo, foram utilizados dados secundários dos prontuários médicos institucionais de pacientes que completaram um programa multidisciplinar para tratamento de dor lombar entre 2019 e 2021. Dados sobre níveis de dor e habilidades motoras foram obtidos de pacientes que completaram o programa assistencial de um hospital privado de Bento Gonçalves, RS. Foi utilizado o seguinte tratamento passo a passo: avaliação por médico especialista para diagnóstico etiológico da dor, manejo farmacológico e agulhamento a seco, seguido de intervenção de reabilitação padrão realizada pela equipe de fisioterapia e exercícios pela equipe de educação física. A escala analógica visual (EAV) foi utilizada para medir a dor no início e após a conclusão da intervenção, e o Índice de Incapacidade de Oswestry (ODI) foi usado para medir as habilidades motoras no início e aos 6 e 12 meses após a intervenção multiprofissional para reabilitação.

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Submitted on July 30, 2023.
Accepted for publication on December 05, 2023.
Conflict of interests: none – Sponsoring sources: none.

HIGHLIGHTS
- The multidisciplinary program reduced pain in patients with low back pain.
- The multidisciplinary program improved motor disabilities of patients with low back pain.
- The conservative treatment was effective for nonspecific low back pain.

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RESULTADOS: Observou-se redução na dor e na incapacidade motora em pacientes que completaram todas as etapas do programa de tratamento. A intensidade da dor medida pela EAV apresentou as seguintes pontuações: basal 7 [5-8] e após tratamento 2 [0-4]; enquanto o ODI apresentou as pontuações: basal 0,34 [0,26 – 0,40], até 6 meses 0,16 [0,08 – 0,26] e após o tratamento 0,12 [0,04 – 0,21].
CONCLUSÃO: O programa de tratamento reduziu a dor e a incapacidade associadas à dor lombar e pode servir de base para novos estudos realizados para confirmar a eficácia desta intervenção.
Descritores: Agulhamento a seco, Deficiência motora, Dor lombar, Escala analógica visual, Protocolo multidisciplinar, Protocolos clínicos, Reabilitação.

INTRODUCTION

Degenerative diseases of the spine are associated with significant work-related morbidity and disability worldwide and are a major public health concern across several countries. Low back pain results from several causes, such as degeneration of the spine or intervertebral disks, inflammation, neoplastic diseases, muscle weakness, rheumatologic predisposition, and myofascial syndromes, among others[1]. In Brazil, the prevalence of chronic low back pain is 4.2% in individuals aged 24 – 39 years and 19.6% in those aged 20 – 59 years[2].
Lumbar diseases, which contribute to significant workplace absenteeism and chronic disability are associated with a considerable financial and social burden and are therefore a major public health concern worldwide. Low back pain can be categorized into specific and nonspecific types. Specific low back pain is attributable to extrinsic or intrinsic etiological factors that can explain its symptomatology, for example, a tumor or a fracture.
Theonspecificc or idiopathic type refers to low back pain of undetermined etiology. Inability to determine the causal factor does not imply that it does not exist because the etiology of low back pain is multifactorial, and factors such as sedentary lifestyle, smoking, ergonomic posture at the workplace, education, gender, body mass index, and muscle strength are among the various factors implicated in its causation[3]. This classification includes approximately 90.0% of all cases of low back pain[4].
Patients with chronic low back pain avoid movement due to fear of increased pain. This behavior, referred to as kinesiophobia, results in disuse-induced movement loss, which may lead to changes in body composition and decreased physical fitness secondary to reduced muscular endurance, joint flexibility, reaction time speed, and reduced cardiorespiratory fitness[3], all of which aggravate functional disability[5].
Treatment of lumbar diseases remains controversial. Conservative management shows good results and is recommended by several authors[6-8]. This approach is based on multidisciplinary action that includes rehabilitation care, drug administration, psychosocial approaches, physical activity, as well as patient guidance and re-education[9], however, few studies have investigated the effectiveness of this therapeutic strategy.
Considering the numerous factors and cofactors associated with low back pain, a multidisciplinary approach with lifestyle modifications is strongly recommended[10]. Acupuncture and dry needling reduce pain and improve range of motion; therefore, these modalities are widely used as adjuvant treatment[7,11].
Few centers in Brazil offer structured services with well-defined care protocol flows for management of patients with low back pain, although a well-organized structure is known to provide better results than those associated with segregated professional management. This care format also ensures the patients' safety, patient care is optimized, and a new therapeutic method can be instituted in cases of failed conservative therapy[6].
In view of the significant increase in the number of patients with nonspecific chronic low back pain, the present study investigated whether the care program implemented by the Physiatry and Pain service of the Tacchimed affected pain control and reduced motor disabilities in patients who completed all stages of the program. The researchers also investigated whether the therapeutic effect was maintained for 12 months or not.
This assistance program was developed by the physiatry and physiotherapy teams at the institution, inspired by similar programs implemented in hospitals across Brazil. The objective was to provide optimal care to patients with nonspecific low back pain, without initial quantification of outcomes. However, many patients returned for consultation with reduced disabilities, so the authors decided to perform this study with the aim of better comprehending the success and failure of the program and to determine the feasibility of implementing a care protocol based on the findings.

METHODS

This retrospective longitudinal study used secondary data obtained from the institutional medical records of patients who underwent a nonspecific low back pain treatment program at a specialized service between 2019 and 2021. Medical records were reviewed by a single physiatrist from the team who recorded pain intensity at the initial consultation and 12 months after treatment and also documented the Oswestry Disability Index (ODI), which were obtained at the initial physiotherapy evaluation and during 6- and 12-month post-intervention follow-ups.

Exclusion criteria

1. Diagnosis of nociplastic pain at the initial consultation;
2. Specific low back pain, with symptoms attributable to tumor, bone infection, fracture, or cauda equina syndrome;
3. Unavailability of data, such as visual analogue scale (VAS) scores at the start of the study and at the end of 12 months, the ODI values at study commencement and at 6- and 12-month post-intervention follow-ups.
4. Non-completion of the following steps of the program:
   4.1. Non-completion of five dry needling sessions;
   4.2. Non-completion of 40 physiotherapy sessions;
   4.3. No follow-up with a physical educator upon completion of physiotherapy sessions.

Study population and sample size

The study population included patients with low back pain, who met the inclusion criteria and received treatment during the stu-

dy period. The medical records of 109 patients who met the aforementioned criteria were reviewed.

Assistance protocol

The care program consisted of an initial consultation with a rehabilitation physician for pain diagnosis, pharmacological management, and education in pain neuroscience.

Patients with persistent nonspecific low back pain (symptom duration >3 months) with or without radiculopathy were referred to the treatment program, which included the following components:

1. Dry needling protocol: a 5-week intervention performed at a frequency of once a week and addressing the motor points of the glutes, piriformis, quadratus lumborum, and lumbar paravertebral muscles. An experienced physiatrist performed all procedures.
2. Exercise protocol administered by a physiotherapist: a 40-session intervention performed twice a week. All patients underwent the same exercise protocol. The clinical response was evaluated using the ODI within 30 days after completion of the sessions and 6 months after physiotherapy, and these values were compared with those obtained before initiation of the treatment. In addition to pain reduction, the proposed exercises led to improved body awareness and global mobility (protocol attached).

The same physiatrist evaluated all patients after completion of the physiotherapy protocol. All patients who completed the physical therapy protocol were referred to the exercise program performed by a physical educator team. The program included low-impact aerobic joint exercises and bodybuilding with global reinforcement, which were performed twice weekly for 6 months.

After verification in the medical records, patients were prescribed drugs depending on the type of pain experienced. Pregabalin was used for neuropathic pain considering its efficacy against this pain pattern, the convenience of a once a day dosage, and good tolerability. Dipyrone (1 g) was used for nociceptive pain due to its good efficacy and low adverse effects and it was associated with cyclobenzaprine, which, although causes drowsiness, significantly affecting the patients' daily activities, promotes muscle relaxation without this adverse effect when administered at night.

Outcomes

The VAS[12] and ODI[13] were used in the study. The VAS is a user-friendly pain assessment tool that can be easily used by patients for assessment of different types of pain. VAS is a one-dimensional instrument and only records pain intensity and not its other aspects[12]. ODI is the gold standard for assessment of disability in patients with low back pain because it exclusively focuses on this condition. It measures the effects of low back pain on daily functions[13] and enables evaluation of disability associated with specific or nonspecific low back pain with regard to various functional activities of the patient. It consists of 10 items that include 6 statements each to identify limitations in 9 activities of daily living. Each statement is scored from zero (no dysfunction) to 5 (major dysfunction), and the final score (expressed as a percentage) measures the degree of disability as follows: 0%-20% (minimal disability), 21%-40% (moderate disability), 41%-60% (severe disability), 61%-80% (very severe disability), and 81%-100%.

This work was approved by the Research Ethics Committee of La Salle University, under number 55675221.00000.5307. The protocol followed the conditions established in Resolution 466/12 of Brazil's National Health Council.

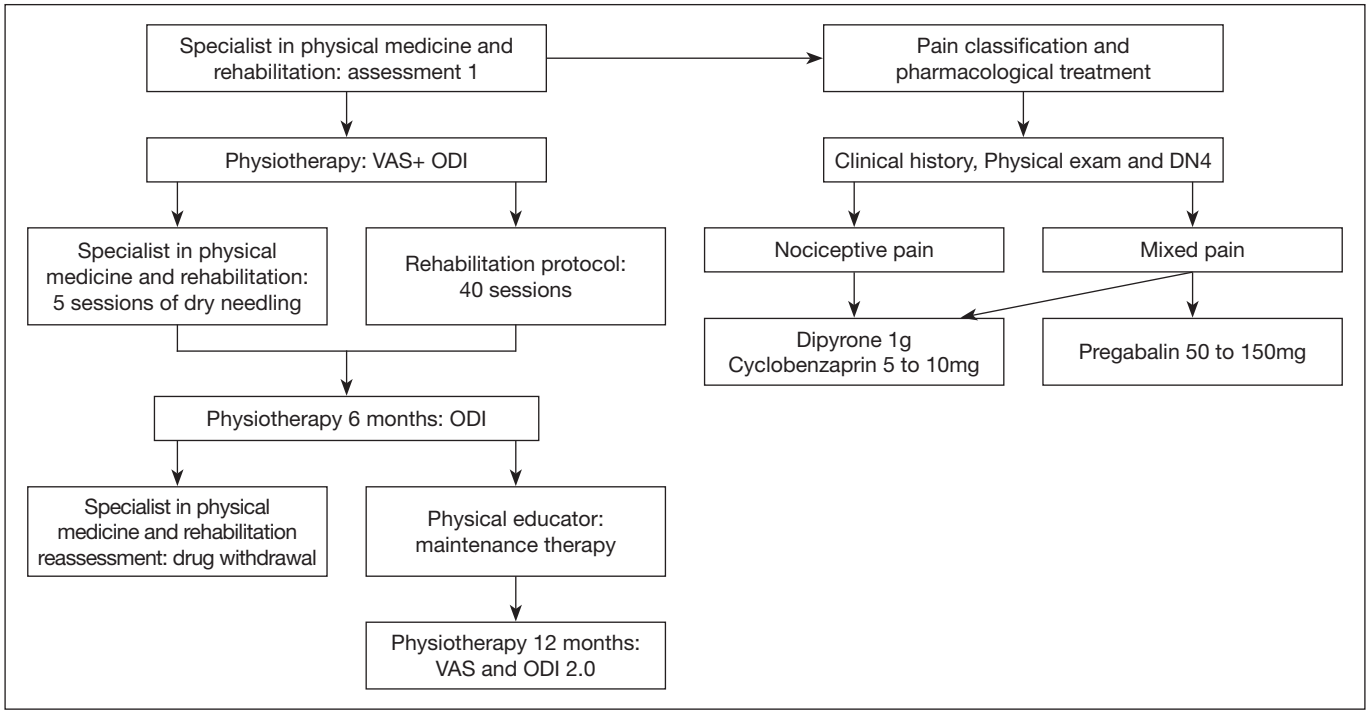

Figure 1. Flowchart of assistance protocol

VAS = Visual Analogue Scale; DN4 = Neuropathic pain diagnostic questionnaire; ODI = Oswestry Disability Index.

Statistical analysis

Based on the normality test, data are presented as means and standard deviations or medians and interquartile ranges. The Wilcoxon test was used for analysis of the VAS scores and the Friedman followed by the Bonferroni tests for the ODI. The P-value <0.05 was considered statistically significant. All statistical analyses were performed using the SPSS software, version 26.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

The study included 109 patients (mean age 50.14±13.94 years), 53.2% female (n=58) and 46.8% male (n=51). Only three (2.8%) patients had previously undergone surgery, and 59 patients (54.1%) were medically diagnosed with neuropathic pain. The results observed were the following: a significant reduction in the VAS pain scores 12 months after the initial evaluation and a reduction in disability 6 months after initiation of the intervention, which was maintained for 12 months following treatment commencement (Table 1). It is important to consider that the independent variables (age, gender, and pain type) were analyzed with the dependent variables (VAS and ODI); however, the researchers did not observe no effects (data not shown), except for a significant correlation between gender and the ODI at 6 months (-0.272,p<0.01) and 12 months (-0.227, p<0.02, generalized estimated equation).

Additionally, there was a reduction in drug use with regard to the administration of pregabalin, dipyrone, and cyclobenzaprine, including a reduction in the number of patients who used the indicated doses following 6-month treatment. Notably, 33 patients used pregabalin before 6-month follow-up, and only 4 patients continued to use this drug (a prevalence of 3.7% of the total study population) at 6-month follow-up. e same results with regard to dipyrone and cyclobenzaprine use (the number of patients who used these drugs at 6-month follow-up was reduced). Only 2.8% and 4.6% of patients continued dipyrone and cyclobenzaprine use, respectively (Tables 2 and 3).

Table 1. Descriptive statistics of the scores of Visual Analogue Scale and Oswestry questionnaires in the baseline and follow-up.

VAS	Median [IQ]	Minimum	Maximum	p-value
Baseline	7 [5 - 8]	1	10	
12 months	2 [0 - 4]	0	8	<0.001[a]
Oswestry	Median [IQ]	Minimum	Maximum	
Baseline	0.34 [0.26 - 0.40]	0.08	0.71	
6 months	0.16 [0.08 - 0.26]*	0.00	0.57	
12 months	0.12 [0.04 - 0.21]*	0.00	0.54	<0.001[b]

a = Wilcoxon test; *both are different from baseline; b = Friedman test followed by Bonferroni

Table 2. Frequency (%) of drug use before and after 6 months of intervention.

Drugs	Before 6 months	After 6 months	p-value
Pregabalin	33 (30.3%)	4 (3.7%)	<0.001a
Dipyrone	42 (38.5%)	3 (2.8%)	<0.001a
Cyclobenzaprine	54 (49.5%)	5 (4.6%)	<0.001a

a = McNemar test

Table 3. Dose of drug before and after 6 months of intervention.

Drugs	Dose	Before 6 months	After 6 months
Pregabalin	50 mg	7 (6.4%)	2 (1.8%)
	75mg	26 (23.9%)	1 (0.9%)
	100 mg	4 (3.7%)	1 (0.9%)
Dipyrone	1g	44 (40.4%)	3 (2.8%)
Cyclobenzaprine	5 mg	40 (36.7%)	3 (2.8%)
	10 mg	9 (8.3%)	1 (0.9%)
	15 mg	8 (7.3%)	1 (0.9%)

DISCUSSION

Based on responses to the ODI, the analysis showed reduction in pain and disability at least 12 months after implementation of the care protocol in patients with nonspecific chronic low back pain. In the present study, gender, age, and pain type were not correlated with pain score, and only gender was correlated with disability (women had higher scores across specific timepoints [6 and 12 months]). Additionally, a significant reduction in drug use and doses were observed after implementation of the assistance program. Nonspecific low back pain is the most prevalent classification among lumbar disorders and accounts for approximately 84.0% of all cases of low back pain[14]. This condition is implicated as a major contributor to disability worldwide[15]. Despite the considerable expenditure on its management, the therapeutic measures adopted across most health service facilities appear to be ineffective in reducing the overall disability in these patients, which may be attributable to the fact that most interventions are based on strategies that show minimal-to-no benefit and may in fact be harmful[16], such as opioid prescriptions[17], excessive imaging[18] and spinal fusion surgeries[19].

Low back pain is diagnosed based on the clinical history and physical examination, and intensive clinical evaluation is only recommended in patients with severe signs, referred to as red flags[20]. The importance of consultation with a specialist extends beyond the diagnosis and administration of analgesic therapy. Consensus on the management of lower back pain includes education in pain neuroscience, which effectively reduces kinesiophobia and pain-related catastrophization[21,22], however, studies show poor adherence to these measures among physicians and other health professionals[23].

The conduct included pain education and counseling strategies implemented during medical evaluations, with good patient acceptance. Previous studies have discussed the importance of these educational measures[22,24,25] because these steps increase patients' self-confidence, and consequently, adherence to nonpharmacological management for pain control.

Multiprofessional collaboration is increasingly being used in large centers for treatment of low back pain[6]. Most patients show

the best response to multimodal treatment techniques, which is likely attributable to the multifactorial etiology of this condition. In this study, the role of the physician in pharmacological management, patient counseling, and minimally invasive interventions, such as dry needling, was associated with the use of kinesiotherapy techniques employed by the physical therapist, in addition to strategies to maintain biomechanical gains performed by the physical education professional, which highlights the synergistic potential of multiple interventions in the treatment of nonspecific low back pain.

The care program was based on a multidisciplinary approach and it resulted in a statistically significant reduction in pain at the end of 12 months. Another important observation was a reduced need for analgesics 6 months after commencement of the intervention, during which standardized dry needling and physical rehabilitation were performed. This highlights the usefulness of pharmacological treatment as adjuvant management for nonspecific low back pain until the patient responds to other multidisciplinary interventions[2,5,6]. Previous studies have reported the synergistic analgesic potential of the dry needling technique associated with physiotherapy[11]. Although there is a lack of consensus regarding the muscles that should be subjected to this technique[27] and regarding the type of exercise that shows the best response to pain reduction in patients with nonspecific low back pain[28-31], an effective reduction in pain using the combination of techniques of the treatment program was observed.

In the present study, nearly 50.0% of the patients had a neuropathic pattern associated with nociceptive pain, therefore, pain control was more challenging[32]. Gabapentinoids are considered first-line drugs for treatment of neuropathic pain[33,34]; they act on the synapses of various neurotransmitters, inhibit calcium-mediated neurotransmitter release through their action on α2δ-1 subunits[35], and also inhibit the direct traffic of α2δ-1 from the dorsal root ganglion and stimulate glutamate uptake by excitatory amino acid transporters. Gabapentinoid effects may also be attributed to mechanisms not directly associated with the release of neurotransmitters in the dorsal horn, such as inhibition of descending serotonergic facilitation, stimulation of descending inhibition, anti-inflammatory actions, and their effects on the affective component of pain[36].

A significant reduction in the need for pregabalin 6 months after initiation of the intervention was also observed. Short-term use of this drug avoids the adverse effects that may occur as a result of prolonged use[37]. Nociceptive pain usually responds well to the administration of simple analgesics and muscle relaxants, however, the need for these drugs was lesser after dry needling and physiotherapeutic exercises, which suggests the possible efficacy of these techniques for treatment of this type of pain. Pain control was maintained for up to 12 months since the start of the protocol and this may be attributed to the multidisciplinary interventions implemented in the program, which have been previously reported as the treatment of choice for low back pain[6,31].

There was also a reduction in disability in the study population. Patients had moderate disabilities (26.0%-40.0%) at treatment commencement[38], and the median disability rate was 16.0% at 6-month follow-up, which indicates improvement with minimal disabilities detected during this period. Further decrease in disabilities was observed at the 12-month follow-up. Notably, the ODI (version 2.0) is used specifically for quantification of low back pain[39]. This tool is useful not only to determine the correlation between disability and pain but also provides information regarding the psychosocial component of low back pain. Based on improved functionality upon completion of the intervention, the conclusion was that the care protocol positively affected patients' ability to adapt to the external environment.

Conservative treatment is commonly used as first-line treatment for the management of patients with low back pain[40] and is strongly recommended by guidelines established in several countries[41]. It was also possible to observe a significant decrease in the number of surgeries performed at the hospital for low back pain after implementation of the intervention. In addition to favorable results with regard to pain control and reduced disabilities, the techniques used in this study are cost-effective and are associated with fewer adverse effects compared with surgical interventions.

However, the association between the prevalence of low back pain and gender remains controversial. Some authors have observed predominance of low back pain in men[42,43], whereas most studies worldwide have reported predominance in females[44-49]. This finding may be attributable to the increased functional limitations secondary to postmenopausal decline in hormones[50], history of pregnancy[51], and effects of ergonomic overload associated with working double shifts[44]. A slight female predominance in the present study was observed.

Limitations of the present study

(a) Despite validation and application by a trained physiotherapist, interpretation of the ODI depends on the patient's experience of pain and may therefore be subjective, and unidimensionality is a limitation of the VAS.

(b) Although the pharmacological intervention was standardized across specific categories in this study, not all patients received all classes of drugs, and the doses differed based on the intensity of pain reported by the patient during the initial consultation, which may have affected homogeneity of the intervention. Moreover, this study included only patients who completed all stages of the program; therefore, results may not be generalizable across the entire population of patients with nonspecific low back pain treated during the study period.

(c) The retrospective study design is a drawback; therefore, the present results cannot definitively establish the efficacy of the program. Further studies are warranted to confirm these findings.

CONCLUSION

The care protocol implemented for the management of patients with nonspecific low back pain led to reduction in pain at the 12-month follow-up, as well as reduced motor disability at 6- and 12-month follow-ups. Treatment of this condition is challenging owing to the multifactorial etiology, however, multimodal therapies in conjunction with a multidisciplinary team approach may be a useful option for these patients. It is important to highlight

the relevance of analyzing this treatment program. This strategy will play an important role in planning rehabilitation protocols at the care center and will additionally serve as a guideline for the implementation of a treatment protocol for nonspecific low back pain.

ACKNOWLEDGMENTS

The authors would like to thank the co-participant institution Hospital Tacchini for the authorization to use the data stored in the medical records and the entire multidisciplinary team, especially the physical therapist Morgana Postal, the physiatrists Carla Ferro and Hans Gehrke and the nursing technician Marquiele Käfer for their active role in the development of the protocol.

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