

Proposed Protocol for Neuropathic Pain Assessment

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Abstract

Introduction: Pain with neuropathic characteristics is one of the most limiting as a consequence of injury or disease that affects the somatosensory system.

Objective: An assessment protocol is proposed to quantify the impact of neuropathic pain integrating personal, clinical, work and social aspects and to establish guidelines in its management and evolutionary control. **Method:** The medical literature on neuropathic pain and its impact is reviewed as a basis for including the variables that must be part of the protocol. **Results:** The variables are quantified individually and by groups of factors. The final result is stratified into four grades (mild, moderate, severe, extreme), which will serve for the subsequent control, monitoring and prevention of risks. **Conclusion:** The proposed protocol evaluates the impact of neuropathic pain in all aspects of the person who suffers it and quantifies the results establishing degrees for its control, follow-up and clinical, social and occupational intervention.

Keywords

Neuropathic Pain, Limitations, Assessment, Occupational Health, Occupational Medicine

1. Introduction

The concept of pain has been changing over the years. One of the most widely accepted pain definitions today is the one proposed by the International Associ-

ation for the Study of Pain (IASP), which defines it as an unpleasant sensory and emotional experience with actual or potential tissue damage, or described in terms of such damage [1].

Neuropathic pain (NeP) is understood as the result of an injury or disease that affects the somatosensory system [2] and can be classified according to its location (central or peripheral), its distribution (localized or diffuse), its etiology or production mechanisms.

The most characteristic symptom of DN is the painful or burning sensation (dysesthesia), together with hyperalgesia (exaggerated response to pain) or and allodynia (perception of any stimulus as painful), characteristic of an altered hypersensitivity, making the difference between positive sensory symptoms and negative [3].

The special group on the study of neuropathic pain (NeuPSIG) proposed a classification system to guide decisions about the level of certainty with which NeP can be determined in a patient: possible, probable, and definitive [4].

In reference to the guidelines for the therapeutic management of NeP, consensus recommendations are followed and complementary treatment algorithms have been developed for use in the Primary Care setting and by non-pain specialists [5] [6], as well as those recommended by Special Interest IASP Group on Neuropathic Pain (NeuPSIG) for peripheral and localized neuropathic pain [7].

The objective of this work is to propose a protocol for the assessment of NeP that allows quantifying its impact in the personal, health, work and social environment and to establish guidelines for its management, evolution and adaptation in the work environment.

2. Method

Prior to including the variables in the protocol, a review of the existing scientific literature on the global concept of NeP and its relationship with work, social impact and quality of life was carried out. The search was done in Medline through the PubMed platform (<https://pubmed.ncbi.nlm.nih.gov/>), free access and with wide international coverage. The search period was limited to the 10 years prior to the start of the study (2009-2019) and, especially, to the last 5 years, including classified journal articles (editorials, originals, letters, reviews, clinical notes). The search strategy has been based on relating neuropathic pain with specific aspects of the occupational world. The MeSH headings used were: “neuropathic pain” “neuropathic pain and work” “neuropathic pain and work neurotoxicity” “neuropathic pain and work health”.

Based on the results found in this review, elements to evaluate the impact and repercussion of DN were included in the protocol: personal aspects, with a global assessment of 10 points (age, level of training or education, economic situation, support from the environment—understanding as such the support of family members, cohabiting friends at home or of aid agencies or entities- and employment situation); clinical and care aspects, with a global assessment of 50

points (pain, muscle tone, function or muscle balance based on the modified Medical Research Council Scale [8], peripheral pulses-associated, vascular alterations, neurological involvement—sensory, motor, reflex alteration, sphincter alteration, gait disorders, complementary examinations-electromyography); therapeutic aspects (effectiveness of the treatment, side effects and comorbidities); labor aspects, with a global score of 30 points, med a self-created preventive labor check-list; and social aspects-quality of life, with a global score of 10 points, for which the use of the HAQ questionnaire is proposed.

Each of these aspects is scored individually to obtain a maximum total score of 100 points. The limitation is stratified in scores according to the final punctuation: 0 - 25 points, mild score; 26 - 50 points, moderate score; 51 - 75 points, severe score and 76 - 100 points, extreme score.

3. Protocol

Based on current evidence and taking into account the changes that scientific research is permanently incorporating, different evaluation parameters have been included in this Neuropathic Pain Assessment Protocol, structured in four sections, to reach a final assessment. The aspects to be assessed are summarized in **Figure 1** and detailed in **Tables 1-4**.

This is a proposal that has not been validated at the present time.

Table 1. Personal aspects related to neuropathic pain impact.

		Points
Age	<30 years	0
	31 - 65 years	1
	>65 years	2
Educational level	Primary/elementary education	2
	Secondary education	1
	Higher education	0
Economic situation	Bad (insufficient income)	2
	Medium (it is not possible to face extraordinary expenses)	1
	Good (it is possible to face extraordinary expenses)	0
Support system (personal-family, friend, caregiver- or in entities-day center, physiotherapy ... -depending on need)	No support (no support)	2
	Partial support (less than 50% of the time needed)	1
	Full/good support (100% of the time needed)	0
Employment situation: Unemployment, not in the labor force. In case of being employed: Temporary Disability in the last year	Unemployment—not in the labor force	1
	No sick leave or TD < 3 months/year	0
	TD > 6 months/year	1
	TD > 6 months/year	2

Table 2. Clinical and therapeutic aspects related to neuropathic pain impact.

Pain	Points
Intensity (max. 5 points)—VAS scale	
Minimum (0 - 1)	0
Mild (2 - 4)	1
Moderate (5 - 7)	3
Severe (8 - 10)	5
Frequency (max 5 points)	
Intermittent (once a month)	0
Sporadic (a few times every week)	1
Frequent (several days a week)	3
Constant (daily)	5
Duration (max. 5 points)	
Hours	0
Days	1
Weeks	3
Months/years	5
distribution (max 5 points)	
Located	0
radiating	1
Referred	3
Diffuse	5
Associated signs (max. 5 points)	
Alterations in limb alignment or limb dysmetria	1
Muscular atrophy	1
Joint deformity	1
Maintained antalgic posture	1
Neurovegetative involvement: vasomotor alterations (hyperthermia, vasodilation, acrocyanosis), sweating or trophic disorders of the skin and appendages.	1
Muscle Tone (max. 2 points)	
Hypertonia	1
Normal	0
Hypotonia	1
Absent	2
Muscle strength (max 5 points) Modified scale of the MRC (Medical Research Council)	
Absent: total paralysis. (Active muscle contraction is not detected)	5
Minimal: visible muscle contraction without movement. (Some muscle contraction can be seen or palpated, without movement)	4
Low: movement, gravity removed. (Can move in the absence of gravity)	3

Continued

Regular: partial movement only against gravity (Slight contraction possible against gravity)			2
Regular+: full motion only against gravity			1.5
Good-: full motion against gravity and minimal resistance (Movement possible against gravity and little resistance)			1
Good+: full movement against gravity and strong resistance			0.5
Normal: full movement against full resistance. (Normal contraction force compared to the opposite side)			0
Vascular assessment -pulses- (max = 2 points)			
Increased			1
Normal			0
Diminished			1
Absent			2
Neurological repercussion (max. 7 points)			
	Paresthesias/dysesthesias		0.5
	Hypoaesthesia/Hyperesthesia		0.5
Sensory disorders	Hyperalgesia		0.5
	Allodynia		1
	Anesthesia		1.5
	None		0
Motor disorders	Paresis		2
	Paralysis		3
	Abolished		2
	Diminished		1
Reflexes	Normal		0
	Hyperactive without clonus		1
	Hyperactive with clonus		2
Complementary tests: Electromyography (max. 3 points)			
Normal			0
Neurapraxia			1
Neurogenesis			2
Axonotnesis			3
Therapeutic aspects (max. 4 Points) * If the patient is not receiving treatment, the assessment will not be applied until it starts and has been with it for at least 3 months.			
	Good: pain suppression and improved function	Mild	0.5
Response to administered treatment (max. 2 points)	Regular: partial relief of pain and partial improvement of functionality	Moderate	1
	Bad: does not improve pain or function	Severe	2

Continued

Adverse effects of treatment (Max. 2 points)	Digestive effects: gastritis, ulcer, intestinal alteration, liver disease...		Mild ≤ 1 effects	0.5
	Neurological effects (drowsiness, altered consciousness ...)		Moderate = 2 o 3 effects	1
	Immunosuppressive effects			
	Cardiovascular effects: hypertension, hypotension, rhythm disturbance, thrombosis.			
	Respiratory effects: irritation of the upper tract, bronchitis, pulmonary edema, pleurisy ...		Severe > 3 effects	2
	Kidney effects: kidney failure, lithiasis, nephritis ... Others: vertigo, tinnitus, visual disturbances			
Associated pathologies (max 2 points) * Only those pathologies that modify the course or prognosis of the neuropathic pain under evaluation are evaluated.				
Traumatological	Yes	No	Mild = 1 associated pathology	0
Cardiological	Yes	No		
Dermatological: important skin lesions (large scars for example)	Yes	No	Moderate = 2 associated pathologies	1
Vascular: arteriovenous or lymphatic lesions	Yes	No		
Digestive: pathologies that interfere with the treatment	Yes	No	Severe = 3 or 4 associated pathologies	1.5
Psychiatric: conditions that coexist or interfere with the treatment	Yes	No		
Autonomic nervous system disorders	Yes	No	Very severe: 5 or more associated pathologies	2

Table 3. Labor aspects related to neuropathic pain impact: CHECK LIST.

Labor Tasks-Score (between 0 - 6)		Not applicable	1/3 day	2/3 day	All day
Manual mobilization of loads	MML ≤ 5 kg	0	1	2	3
	MML 5 - 10 kg	0	2	3	4
	MML 10 - 25 kg	0	3	4	5
	MML > 25 kg	0	4	5	6
Manual mobilization of loads Score: _____ (max. 9 points)					
Repetitive movements	MR Shoulder elevation > 90°	0	2	4	6
	MR flexion and extension or prono-supination of the wrist	0	2	4	6
	Flexion and extension. Trunk or lower limbs	0	2	4	6
Repetitive movements Score: _____ (max. 18 points)					
Prolonged postures	Prolonged ambulation	0	2	4	6
	Standing or continued sitting	0	2	4	6
	Other fixed positions and without alternation of positions in your work	0	2	4	6
Prolonged postures Score: _____ (max. 6 points)					
Work organization	Continuous work, with repetitive/monotonous tasks and without the alternating of tasks	0	2	4	6

Continued

	There is no adequate relationship with bosses/colleagues	0	2	4	6
	The workload is inadequate (excessive, irregular, not adapted to their abilities ...)	0	2	4	6
	Impossibility of taking rest breaks during work	0	2	4	6
	It is impossible for the worker to complete the tasks assigned to them	0	2	4	6
	The job consists of shift work (assess the monthly shift)	0	2	4	6
Work organization Score: _____ (max. 36 points)					
	The environmental conditions of the patient's job (temperature, humidity ...) worsen their clinical picture	0	2	4	6
	There are no support elements for the tasks (devices, instruments, machines ...)	0	2	4	6
	The worker is exposed to noise > 85 dBA or peaks of noise > 140 dBA	0	2	4	6
	Worked is performed at height (>3 m)	0	2	4	6
Working condition	Work is carried out in confined spaces (tunnel, drain, pit ...)	0	2	4	6
	The worker carries out live electrical work	0	2	4	6
	Regular/prolonged driving is performed	0	2	4	6
	Machines or tools with vibration are handled	0	2	4	6
	Neurotoxic chemicals are handled	0	2	4	6
	The worker is to biological contaminants	0	2	4	6
	The worker performs tasks that require high attention/concentration	0	2	4	6

Punctuation maximum 135 * MML are exclusive. The maximum score for a block/The maximum block score is 9 points; Prolonged postures are exclusive. The maximum score for a block/The maximum block score is 6 points.

Final Points	Score
0 - 10	0 puntos
10 - 22	5 puntos
23 - 44	10 puntos
45 - 67	15 puntos
68 - 89	20 puntos
90 - 112	25 puntos
113 - 135	30 puntos

Table 4. Social aspects/quality of life related to neuropathic pain impact. HAQ questionnaire.

HAQ score	Degree of limitation	Points assigned
0 - 0.625	No limitation/disability	0
0.75 - 1.25	Slight limitation/disability	4
1.375 - 1.875	Moderate limitation/disability	6
≥2	Severe limitation/disability	10

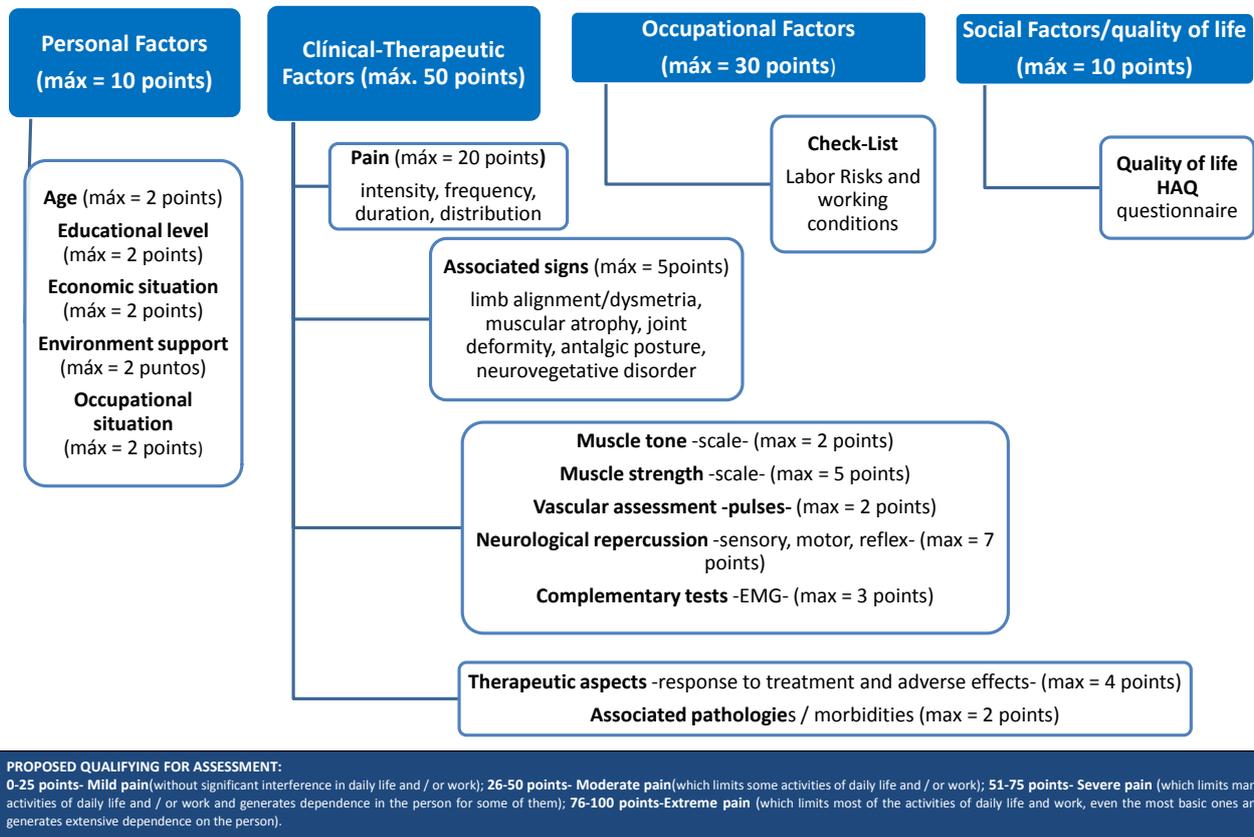


Figure 1. Protocol for assessment of neuropathic pain in occupational health.

4. Discussion

The medical bibliography collected in databases specialized in health sciences (PUBMED) shows studies on NeP that estimate its prevalence at around 7% - 10% of the general population, with an increasing trend, probably associated with the increase in diseases that accompany the aging of the world population, changes in lifestyle, the increase in the incidence of diabetes mellitus, and the improvement of treatments for some diseases, such as cancer survival after chemotherapy, but with subsequent adverse effects. This means that the burden of chronic NeP is also increasing and has repercussions on economic, health and quality of life costs for the affected people. Therefore, personalized interventions are recommended with a multidisciplinary approach to the management of this disease [9].

The causes of NeP can be multiple. The Tax Society Pain Taxonomy (AAPT) developed, in collaboration with different public and private entities, diagnostic criteria for central NeP that are organized according to the multidimensional framework of the AAPT: central diagnostic criteria, common characteristics, medical comorbidities and common psychiatric, neurobiological, psychosocial and functional consequences and supposed neurobiological and psychosocial mechanisms, risk factors and protective factors [10].

But if its diagnosis is complex and its etiology and epidemiology varied, the

therapeutic management is more complicated, which requires periodic updates. NeuPSIG affirms that the inadequate response to pharmacological treatments constitutes a substantial unmet need in patients with NeP and recommends for future trials the use of pain relief scales, patient and physician global impression of change, validated measures of patient quality. NeP and sleep assessment, assessment of mood, functional capacity, and quality of life [11].

From an occupational point of view, the medical bibliography contains specific publications on prevalent pathologies, caused or aggravated by work, with associated NeP. Among others, the carpal tunnel syndrome [12] [13] [14] and chronic cervical and lumbar pain [15]; The relationship of age, gender and tobacco consumption with this group of pathologies that present with chronic NeP is also relevant [16] [17] [18]. Post-traumatic pain directly affects the work environment, especially after traumatic occupational accidents and commuting or traffic accidents during work, and its management is often complex since appropriate treatment options must be considered to minimize the sequelae [19].

Highlight as specific NeP in the workplace that is derived from exposures to neurotoxic substances, such as acute carbon monoxide poisoning or late neurotoxicity due to toluene, where early action is essential to prevent the development of neuropathy and improve prognosis [20].

The scientific literature collects data that support the fact that the presence of NeP is associated with a greater burden of disease in the population, with chronicity in its evolution and that is reflected in terms of quality of life, health status, work experience and direct medical costs [21]. Along with the personal, individual cost, the cost of NeP for society must be assessed for all aspects: direct medical costs, loss of ability to work, loss of caregivers' ability to work and possibly increased need for institutionalization or other assistance for daily life activities. A more complete estimate of efficacy, utility and costs would facilitate future research regarding the profitability of the therapies used in the treatment of NeP [22].

In Spain, the experience of pain represents a substantial burden both for people and for the country's economy. It is reflected in the questionnaires commonly used to measure the impact of pain (both SF-12 and SF-6D) [23], especially with regard to severe pain, but it also implies less participation in work activity and greater absenteeism and presenteeism, with substantially higher patterns of use of health resources [24] [25]. The researchers affirm that this type of pain and its impact far outweighs the consequences provided by the more traditional assessments of health-related quality of life (HRQoL) deficits, in addition to being the main factor associated with increased visits medical, emergency services and in need of hospitalizations [26].

The basis of this protocol is to homogenize the assessment of the impact of NeP including all those factors that may condition the result. Although many studies have evaluated individual aspects, such as the profitability of the treatments, the significant heterogeneity among them prevents reaching a homoge-

neous synthesis of the results. The standardized methodology and the improved reports would allow more reliable comparisons between the studies [27]. Strategies are proposed to maximize the results, employing, when possible, agents that address both pain and comorbidities in order to restore function and improve function, quality of life of the patient [28].

Previously proposed assessment tools, such as the pain DETECT Project, already have long-standing experience, with more than 300,000 patients assessed, providing one of the world's largest data sets on chronic pain, and generating subgroups of patients based on their individual sensory profiles, with the idea of being able to stratify the treatment and, ultimately, to be able to reach a personalized therapy. Today, it is used for clinical and research purposes all around the world [29].

The protocol that we present here within the AlVaDoNe [30] project serves as a new tool, with a broad focus, although more specific in occupational health and that could be validated in the future.

5. Preventive Recommendations

The main preventive recommendation in relation to the protection of workers with chronic NeP is to reduce risk exposure and facilitate their social and occupational integration, through different actions:

- With correct health surveillance, care coordination in the process of diagnosis, treatment, control and monitoring by all those involved: occupational health, primary care and specialties, specifically with the pain units, hospital care and Organisms public health.
- With application, within the scope of the specific competencies of the Prevention Services, of all technical and sanitary measures aimed at reducing the risk in the work performance of the affected people to act, both in primary and secondary prevention, or limit their consequences through all available options: training and specific information for workers; adoption of organizational and preventive measures, collective and individual; health surveillance aimed at detection and protection of especially sensitive workers; and coordinated care work.

It is recommended:

1) In cases of mild pain, without significant interference in daily life and/or work, preventive surveillance actions.

2) In cases of moderate pain, which limits some activities of daily life and/or work, in addition to preventive surveillance, assess possible adaptations that minimize the risk in their usual work or job changes.

3) In cases of severe pain, which limits many activities of daily life and/or work and generates some type of dependence on the person for some of them, assess actions for processing temporary and/or permanent disability and, in any case, support the affected person with the necessary reports for its processing.

4) In cases of extreme pain, which limits the majority of activities of daily life

and work, even the most basic and generates extensive dependence on the person, facilitate management towards disability and disability procedures and support the affected person with the necessary reports for its processing.

6. Conclusions

In Spain, Law 31/1995, on Occupational Risk Prevention (LPRL) [31] establishes the right of workers to effective protection in terms of safety and health at work. One of the instruments used by Occupational Medicine to control and monitor the working health population status and the impact of working conditions on them is Health Surveillance, through an individualized assessment of each worker with the performance of specific medical examinations based on the risks of the position (individual surveillance), and a subsequent joint analysis of all the results obtained in the company (collective surveillance).

The assessment of work aptitude is the evaluation of the psychophysical capacity of the individual to carry out their work without risk to their own health or that of others, based on the relationship between work demands and the health of the individual who is going to do it.

It is the final result of the specific evaluation of the health state as an individual health intervention within the framework of the surveillance of the worker's health, and it is also necessary for the Occupational Physician to have a thorough knowledge of the detailed demands and requirements of the job, understanding by job the set formed by the physical place, the tools, tasks, duties and responsibilities assigned to a person in a work environment.

For the assessment from the perspective of Health Surveillance of a worker with NeP, the clinical history and physical examination are particularly relevant, since in most cases the results of the complementary tests have little correlation with the functional impairment of these patients. The clinical history should collect the severity and evolution of the symptoms and the functional repercussion they entail, analyze the response to the received treatments and their repercussion in the physical and emotional spheres. In a complementary way, the necessary laboratory or imaging examinations will be added, the most useful being electromyography.

The NeP Assessment Protocol is shown as a tool that helps the professional to assess the consequences of NeP in the patient's daily life, socially and at work.

No patient/worker should be evaluated without having diagnostic confirmation of neuropathic pain: clinical data and, if possible, confirmation of nerve injury with electromyography.

In all cases, for a global assessment in the workplace of the patient with NeP, in addition to the clinical-therapeutic aspects, it is necessary to consider personal and work aspects, due to their interrelation with pain and the influence of pain on the quality of social and work life of the patient/worker.

Conflicts of Interest

There is no conflict of interest. This work has had the support of Grunnenthal

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