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Neurofunctional assessment protocol as a guide to the AAC tools selection in subjects with cerebral palsy

Protocolo de avaliação neurofuncional como norteador da seleção de ferramentas de CAA em sujeitos com paralisia cerebral

Protocolo de evaluación neurofuncional como una guía para la selección herramientas CAA en sujetos con parálisis cerebral

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Resumo

Introdução*: A partir de uma reflexão sobre a necessidade de um instrumento de avaliação neurofuncional que norteasse a seleção de recursos de Comunicação Alternativa e Ampliada – CAA, foi construído um protocolo de Avaliação Neurofuncional para Comunicação Alternativa na Deficiência Motora – ACADM.* ***Objetivo****: Construir um protocolo de avaliação neurofuncional e relacionar os tipos de alterações neurofuncionais encontradas com os recursos de CAA a serem utilizados com cada sujeito.* ***Metodologia****: Respaldo no método clínico-qualitativo, articulando-o com as especificidades da clínica fonoaudiológica na interface neurofuncional. O protocolo construído tem base na Classificação Internacional de Funcionalidade, Incapacidade e Saúde – CIF, favorecendo a escolha de recursos para o uso da CAA por sujeitos com deficiência. Ao todo foram avaliados seis sujeitos.* ***Resultados****: Foi realizada a construção do protocolo no primeiro momento, o qual norteou o segundo momento da pesquisa, a avaliação neurofuncional dos sujeitos, referente às partes do corpo que favorecem o uso da CAA; e a partir das especificidades neurofuncionais e o grau de classificação encontrado nos dados da avaliação foram feitas escolhas dos recursos de CAA para cada sujeito, a exemplo de pranchas pictográficas, acionadores e softwares.* ***Conclusão****: Por meio deste estudo, foi possível verificar que as*

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alterações neurofuncionais podem influenciar nas escolhas de ferramentas de CAA e o quanto o protocolo construído-ACADM foi norteador para seleção dessas ferramentas.

Palavras-chave: *Comunicação; Atividade motora; Fonoaudiologia*

Abstract

Introduction*: From the need for a neurofuncionnal assement protocol to help the selection of Augmentative and Alternative Communication (AAC), it was constructed the Neurofuncionnal Assement Protocol from Motor Disabilities (NAPMD).* ***Objective:*** *Building a neurofuncionnal assessment protocol and relate the kinds of neurofunctional changes found with CAA resources for use in each subject.* ***Method****: Support the clinical-qualitative method, linking it with the specifics of speech therapy in neurofuncionnal interface. The protocol is based on the International Classification of Functioning, Disability and Health - ICF, favoring the choice of resources for the use of the CAA by subjects with disabilities. Six subjects were evaluated .* ***Results****: At first it was constructed the NAPMD. It was then performed neurofuncionnal evaluation of subjects, concerning the body parts that interfere with the use of AAC; and from neurofunctional specificities and level classification found in the evaluation were made the AAC resources for each subject, like pictographic boards, drivers and software.* ***Conclusion****: Through this study, we found that neurofunctional changes can influence the choices of AAC tools and how the protocol built-NAPMD was important for the selection of these tools.*

Keywords: *Communication; Motor Activity; Speech, Language and Hearing Sciences*

Resumen

Introducción: *Partiendo de una reflexión sobre la necesidad de un instrumento de evaluación neurofuncional que pudiera guiar la selección de recursos de Comunicación Alternativa y Aumentativa - CAA, se construyó un protocolo de Evaluación Neurofuncional para Comunicación Alternativa en la Discapacidad Motora - ACADM.* ***Objetivo:*** *construir un protocolo de evaluación neurofuncional y relacionar los tipos de alteraciones neurofuncionales encontradas con los recursos de CAA a ser empleados con cada sujeto.* ***Metodología****: apoyo en el método clínico cualitativo, articulándolo con las especificidades de la clínica fonoaudiológica en la interfaz neurofuncional. El protocolo construido se basa en la Clasificación Internacional del Funcionalidad, Discapacidad y Salud - CIF, favoreciendo la elección de los recursos para el uso de CAA por sujetos con discapacidad. En total fueron evaluados seis sujetos.* ***Resultados:*** *se realizó la construcción del protocolo en un primer momento, el cual orientó el segundo momento de la investigación, la evaluación neurofuncional de los sujetos, relativa a las partes del cuerpo que favorecen el uso de la CAA; y a partir de las especificidades neurofuncionales y del grado de clasificación obtenido en los datos de la evaluación, se eligieron los recursos de CAA para cada sujeto, como, por ejemplo, tablas pictográficas, accionadores y softwares.* ***Conclusión:*** *por medio de este estudio, pudo verificarse que las alteraciones neurofuncionales pueden influir en las elecciones de herramientas de CAA y también, cuanto el protocolo construído-ACADM fue el principio rector para la selección de estas herramientas.*

Palabras clave: *Comunicación; Actividad Motora; Fonoaudiología*

Introduction

One of the objectives of the World Health Organization (WHO) is to produce International Health Classifications that represent consensual models to be incorporated by Health Systems, managers and users, in order to be used as instruments with a common language that can be used by trained professionals[1].

Articulating topics related to the field of Speech, Language and Hearing Sciences, this paper proposes the reflection about the need for a neurofunctional evaluation instrument to guide the selection of Augmentative and Alternative Communication (AAC) resources for subjects with Cerebral Palsy. In the insufficiency of an instrument that could guide our choice, a Neurofunctional Assessment Protocol from Motor Disabilities – NAPMD – was constructed, gathering elements based on the International Classification of Functioning, Disability and Health - ICF.

In the case of people with motor deficiencies (specifically in this work, the cerebral palsy), most of them present speech development disorders due to changes in the expressive motor aspects of language, but in many cases, the cognitive capacity is preserved[2].

The existence of some kind of difficulty in communication may imply in the process of language development, of symbolic systems, as well as in social relations. In this context, the Augmentative and Alternative Communication emerges as a support or alternative form of communication.

According to the Comitê de Ajudas Técnicas da Secretaria Especial dos Direitos (Technical Assistance Committee of the Special Secretary for Rights), the Assistive Technology - AT is an area of knowledge with interdisciplinary characteristics that involves resources, strategies, practices and services with the objective of promoting functionality, relating it to activity and participation of people with disabilities. Alternative communication is understood as a subarea of AT[3].

In this context, the resources that support AAC are diversified, specific to the needs of each user, divided according to the complexity and cost of the resource used, being of high or low technology. Low-tech products involve low-cost, easy-to-access and use materials, such as adapted books, adapted computer keyboards, printed boards formed by pictographic symbols, such as Picture Communication Symbols (PCS). High-tech resources, on the other hand, involve high-cost materials, for example: triggers, vocalizers and software. Users of such technology can achieve total communicative independence[4].

When proposing the selection of alternative resources, difficulties in reliably visualizing the capacity and motor disability of each patient are found. Thus, the need to have an expanded view of the individual motor frame arises, and, thus, to think about the possibilities of AAC tools according to the motor capacity of the subjects.

In this perspective, an evaluation instrument was constructed to visualize the general motor frame of the subject and to direct to the best AAC resource, based on the limitations and motor capacities of each subject. Andrade[5] discusses the benefits of an assessment instrument in motor regarding language and communication issues immersed in a therapeutic process, arguing that the lack of transparency during the rehabilitation process can be reduced through the use of reliable and standardized evaluation protocols that aim to standardize the language of the instrument, favoring communication between professionals and the subjects' families.

Thus, this study aimed, at first, to build a neurofunctional assessment protocol and, from the data obtained, to relate the types of neurofunctional alterations to the AAC resources to be used.

Methods

This work was based on the clinical-qualitative method, articulating the methodological assumptions with the specificities of the Speech, Language and Hearing Sciences clinic at the neurofunctional interface. It was developed from a research group of XXXX. The project was approved by the XXXX Research Ethics Committee under the CAAE: 15822613.7.0000.5546. In addition, those responsible for the participants signed the free and informed consent term.

Presentation of the Subjects

Eight subjects were selected to participate in this study. Among the children / adolescents who started the project, six continued until the end and the others were discharged because they presented difficulties in attending the weekly visits.

The subjects of the research were selected regarding some criteria: to have a diagnosis of cerebral palsy; being aged between 5 and 20 years and to present significant changes in oral or expressive language, that is, subjects presenting speech difficulties, in establishing a communicative channel, either by oral or written language.

Procedures

At first, weekly readings and studies were carried out on theoretical references that subsidized the work. The studies were intensified individually and discussed with the whole group, in order to potentiate the discussions and to involve all the participants of the research group on the references studied. Discussions took place in weekly meetings.

In order to meet the research objectives, we selected domains of the ICF that could guide the selection of AAC resources.

The selection of the ICF items subsidized the process of construction of the protocol of Neurofunctional Evaluation, specifically following two chapters: the seventh - "Funções Neuromusculoesqueléticas e funções relacionadas com o movimento" (Neuromusculoskeletal Functions and functions related to the movement) and the second - "Funções sensoriais e dor" (Sensorial functions and pain). In the latter one, articulating the functions related to the eye.

The protocol - NAPMD (APPENDIX 1) aimed to group the data of the mentioned chapters, so that the neurofunctional evaluation was guided by it, in which the obtained results would be grouped allowing a greater visualization at the moment of the analysis of the data. Differently from this, other protocols cover topics in the assessment that do not apply to Alternative Communication, such as Gross Motor Function Classification System (GMFCS), Manual Ability Classification System (MACS) and Communication Function Classification System[6-7]. The NAPMD protocol works with specific motor aspects that can generate adaptations for AC, making it possible to accelerate the process of adapting resources and the therapeutic implementation of CA.

Table 1 presents all the steps performed to achieve the objectives of this research, from the construction of the protocol to the selection of AAC mechanisms after the evaluation of the subjects.

Table 1. Research stages

Stages	Content
1st	Studies of theoretical reference: AAC and ICF
2nd	Protocol Construction - NAPMD
3rd	Neurofunctional evaluation of subjects
4th	Selection of AAC resources

The neurofunctional evaluations guided by the protocol within the therapeutic setting were performed in therapies that occurred weekly, in order to know and evaluate the functional potential of the subjects and their capacity of motor commands, guiding the selection of mechanisms and tools of the AAC. Table 2 presents the presentation of each subject with their age, gender, diagnosis and linguistic situation.

Table 2. Presentation of the subjects

Subject	Age	Sex	Diagnosis	Linguistic Situation
1	15 years old	M	Severe Spastic Cerebral Palsy	The subject understands simple questions and figurative language; communication by blinking the eye.
2	13 years old	M	Severe Spastic Cerebral Palsy	The subject understands simple questions; Communicates by blinking and smiling.
3	9 years old	F	Moderate Atheoid Cerebral Palsy	The subject comprehends simple questions; communicates indicating and speaking little (presents dysarthria and dyspraxia).
4	12 years old	M	Mild Atheoid Cerebral Palsy	The subject understands simple questions; communicates indicating and speaking little (presents dysarthria and dyspraxia).
5	10 years old	M	Mild Atheoid Cerebral Palsy	The subject understands simple questions and figurative language; communicates by indicating with hands.
6	10 years old	M	Mild Atheoid Cerebral Palsy	The subject understands simple questions; communicates indicating and speaking little (presents dysarthria and dyspraxia).

The procedures can be synthesized as follows: protocol construction; neurofunctional assessment of the parts of the body that interfere with the use of AAC; and choice of AAC features, these being the manual boards with pictographic symbols, mouse triggers, computerized softwares and the adequacy of the tools used.

In the protocol, also, it tried to present a language of easy access, allowing the communication between the professionals involved with each user. The evaluation was divided into three moments: moment 1, in which the evaluation was performed through observations during the visits; moment 2, through induction of activities in order to perform the movements required for the analysis; moment 3, specific evaluation. The three moments were applied in a hierarchical manner, that is, moment 2 was performed if the data obtained at moment 1 were not enough for the analysis, occurring the same with moment 3.

Results

In the course of the results, the most significant data of the process of construction of the neurofunctional evaluation protocol, as well as the evaluations based on the protocol, were explained. From the neurofunctional specificities and the degree of classification found in the evaluation data, it was possible to guide the process of choosing the AAC resources selected for each subject.

The protocol elaborated in this work was created in order to have an instrument that, besides directing to the motor issues, presented items that could show the individual in a more integral way, for their social needs and to contemplate them in the applicability of the Augmentative and Alternative Communication (AAC). Thus, elements subsidized by the ICF, linked to the issues that led to the choice of AAC resources, were gathered, and the latter one was understood as a driving force for moments and social sharing.

By looking at the individual results obtained in the evaluation through the NAPMD of each subject, there are:

Subject 1. In the functions of the joints and bones, the subject obtained a severe degree in mobility. According to the evaluation, the high impairment of the articulation of the subject was observed, presenting temporomandibular joint with mobility, stability and control; articulation of the pelvis presented mobility and control of moderate degree of impairment, but with no stability; cervical articulation, only the Atlanto Axial, responsible for horizontal movements (right and left), without control and stability.

These are the only articulations that have some data regarding mobility, stability and control, not presenting any of these items in other joints of the body, such as the wrist, shoulder, knee, among others. As for bone mobility, it presents a severe degree of impairment. The degree 4, severe, is a significant data that discards the possibility of using alternative communication boards, due to the impediment of handling.

According to the data from the evaluation, a convergent possibility with these findings was a bite-triggered AAC feature, since subject 1 presented mobility, stability and control in opening and closing the mouth, sufficient aspects to communicate by pressing a trigger connected to the computer with a software. Another feature would be a trigger referring to eye blinks or capturing the direction of the look, due to the good functional capacity of the eye. The AAC is inserted in this context with the purpose of assisting the subjects with restriction or absence of speech.

Regarding the muscular forces, attention was given for the muscles involved in the AAC system, with this subject for the muscles of the face. The muscles of the body were compromised due to the absence of joints responsible for movement, such as in kicking and in the movement originated from the pelvic joint, since the knee joint, as previously described, presented none of the aspects to be observed. In the movement of the kick, the subject showed strength, but no resistance, this being a crucial aspect for the choice of a resource. The degree of involuntary movement was obtained through evaluation.

Subject 2. The subject obtained, as a result, in functions of the joints and bones, moderate degree of impairment. The subject presented high articulatory impairment in the upper half of the body. And, in the lower half, the voluntary movement occurred only in the knee joint, with mobility, stability and control. The subject only presented moderate degree movement in the articulation of the Hallux; in the others, presented a severe degree. Articulation of the pelvis with low mobility, lack of stability and control; articulation with absence of analysis aspects.

These are the only articulations that have any data regarding mobility, stability and voluntary control, not presented in other joints of the body, for example, the wrist, the shoulder, cervical, among others. Regarding the mobility of the bones, the subject presented a severe degree.

Significant data discard the possibility of using alternative communication boards, due to the impediment of handling.

As for the strength of the muscles of the lower half of the body, which involved the AAC system of this subject, were obtained the following results with the evaluation: muscle strength of the leg (anterior tibial, long and short fibular, sural triceps and others) with presence of low resistance. Regarding the knee joint, the choice of an alternative communication tool through the kick was made. Subject 2 already uses his kick through a trigger installed in his leg, which captures the force generated. The trigger is connected to the computer in a scanning system. Regarding ocular functions, there was no impairment, but features using eye tracking were compromised by the high incidence of spastic movements, interfering with the fixation of the eyes.

The evaluation of this subject happened in the three moments established by the protocol, since the data obtained in the observation were not enough for a good analysis, using moment two and, later, moment three. Thus, the data were reliable with the neurofunctional impairment.

Subject 3. In the functions of the joints and bones, a mild degree of impairment was obtained. The subject presented mild impairment in the upper half of the body, and in the lower half, the voluntary movement occurred with small difficulties regarding stability and control, presenting a moderate degree. The other articulations, such as the scapula, wrist, neck and pelvis, presented mobility, control and stability in a mild degree of impairment, thus, directly involving the use of possible AAC instruments. The subject still presented mobility in the carpal and tarsal bones.

The results illustrated above show precise data regarding the choice of alternative communication tools, pointing out that mild neurofunctional impairment allows the choice of AAC boards as a low technology tool, since subject 3 presents mobility, control and stability in the priority and dependent structures on handling.

Regarding the muscular strength of the upper and lower halves of the body, which are involved with the subject's alternative communication system, the following results, after the neurofunctional evaluation, were obtained: strength and resistance of varying degrees on both sides of the body, presenting moderate degree in the lower half of the body.

From these data, were observed a range of possibilities of tools to be used, such as mouse, adapted keyboard due to the difficulty in making fine movements, trigger related to strength and movement. The authors of this work suggest the choice of using the alternative communication boards for subject 3, due to the approximation of the visual field, but we discard the other possibilities of tools that can subsidize long-term choices.

AAC boards can be carried and used in all environments, are easy to handle and beneficial to support the construction and linguistic structuring.

Subject 4. According to the evaluation, the subject obtained degree zero, that is, no difficulty in the functions of joints and bones. The articulations, for example, the scapula, wrist, cervical, pelvis, present mobility, control and stability in a mild degree of impairment, thus directly involving the use of possible AAC instruments. The subject also presented mild difficulty in the mobility of carpal bones.

With the data above, it is presented in the analysis of the neurofunctional profile of the subject a low commitment in the neurofunctional aspect, which allowed the choosing of AAC boards as a tool of low technology, since it presents stability, mobility and control in the priority and dependent structures for handling this resource.

In the items related to muscle strength, the evaluation presented no data about impairment in the muscles of the upper and lower half of the body, showing strength and endurance on both sides of the body. As for the sensations related to the muscles and the functions of the movement, the subject presented mild deficiency in the sensation of muscular rigidity.

With the data of the neurofunctional evaluation, it was decided that the best AAC resource were the manual boards. Computerized boards were also thought of, but due to the involuntary movements compromising the fine motor motricity in the arms, the low technology boards were selected.

Subject 5. As a result of the evaluation of joint and bone functions, the subject presented: mild degree for the mobility of joints, extending to the topics of joint stability and control, especially the joint involving the shoulder, wrist and knee, in which there were greater difficulties in performing movements. In these three specific articulations the evaluation occurred in the three moments of the protocol, that is, if the observation (moment 1) and the induction of activity (moment 2) were not enough, it was necessary a specific evaluation (moment 3).

In items related to muscle strength also directed to the muscles involved in the AAC system, subject 5 did not present any impairment. In the evaluation, a mild difficulty was observed in the performance of fine movements, for example, the precise handling of the computer mouse.

According to the result of the evaluation, the AAC boards, a low-tech resource, was chosen. Some adaptations were made due to the difficulty of the subject in fine motor coordination, using keyboard and mouse adapted in necessary activities, such as games and computer searches, allowing, thus, other resources in the execution of activities beyond manual boards.

Subject 6. The subject obtained the following data: mild degree of impairment in the mobility of joints. In the voluntary movements of the upper half of the body, more specifically, the right side, the subject presented small difficulties in the items of mobility, stability and control, presenting no difficulty in the left side of the upper half. In the carpal bones, there was a mild degree of mobility, and in the tarsus, a mild difficulty was observed in the performance and control of movements, due to a change in the ankle joint.

With the results of the evaluation, it is concluded that the mild impairment in the right side in the upper half of the body does not imply the handling of the low cost AAC boards, but it compromises the accomplishment of movements that require fine motor coordination, for example, in holding a pencil. With this, low cost adaptation features were also used.

In the items related to muscle strength, the evaluation did not find any data of impairment in the muscles of the upper and lower halves of the body, presenting strength and resistance on both sides of the body, except the difficulty already mentioned on the right side of the upper half of the body, which also involves muscle issues, strength and endurance.

This neurofunctional evaluation occurred in the three moments of the protocol, mainly in the evaluation of the right side joints that had to be induced to have accurate data of the impairment, in order to better evaluate its relation with the use of low technology AAC boards, which was chosen to be implemented with this subject, after the evaluation guided by the protocol.

Discussion

The process of evaluation of the subjects explained above raises the question of the need for an evaluation and classification tool to choose triggers, thus, an instrument that provides improvements and agility in the adaptation of instruments to AAC. Especially in the cases of subjects with severe impairment, the selection of AAC tools was better guided with the neurofunctional evaluation, being able to obtain general data of its motor frame.

The NAPMD allows the professional to obtain longitudinal data of the motor aspects of the patient, and thus, to verify the effectiveness of the choice, as well as the possible exchange of alternative resource throughout the process.

Accordingly, Threats[8] states that classification tools are useful in a variety of settings, whether in the clinical or research field. The longitudinal analysis of children allows providing data for its clinical use, as well as for the choice of a system of AAC in non-oralized children. It is also possible to monitor the efficacy of the therapeutic plan, in demonstrating the therapeutic process to the parents / relatives or even in the clinician's own aid to understand their patients.

Morris et al[9] affirm, in their study, the persistence of the need to develop valid instruments that are in line with the dimensions of activity and participation of the ICF.

Romano and Chun[10] also argue in their work that ICF elements make it possible to classify and qualify aspects related to language, participation and functionality, proving to be a useful tool for analyzing linguistic-cognitive conditions and evolution over time of non-oralized children, users of AAC.

The literature discusses the look, indicative gestures and body movements as possibilities of interaction with interlocutors of the child's rou-

tine[11,12], and this study attests this discussion, demonstrating that from a neurofunctional evaluation, it is possible to visualize the alternative possibilities of communication of the subjects, regarding the motor condition, whether through look, bite or the body movements, and, thus, establish a channel of communication.

Another point of discussion in this work was to think about AAC resources for the subjects' needs, considering their motor deficits, which allow greater autonomy in their daily life, in their social context.

According to the American Speech - Language - Hearing Association (ASHA), it is important for the speech therapist to consider the AAC in the social context, seeking an increasingly active participation of the subject in relevant and interesting activities. In addition, the subject's abilities and the needs of those around him / her must be aggregated in the AAC[13].

Thus, the preference in choosing the bite trigger for M., rather than the eye tracking, was due to the high rate of involuntary movements, requiring a companion to position the subject's head, so that, the visual field would be facing the computer, thus, the subject would always need a companion when he / she wanted to communicate or perform any activity.

In this context, Manzini et al [14] conclude, in their study, that children with cerebral palsy successfully used alternative communication procedures and that AAC increased expressive abilities, attention time and active participation of children in dialogic activity with their mothers.

With the longitudinal data of the patient's motor frame, it is possible for the professionals involved with the subject to draw a therapeutic plan more appropriate to the needs of each patient, such as the physiotherapist who can stimulate certain articulations that, among the results of the evaluation, present a moderate degree; and the speech therapist can establish an alternative system of communication with reliable data, which the patient will be able to use the system autonomously and without difficulties.

We believe, in this work, that the elaboration of this neurofunctional assessment instrument is feasible and possible to be applied by all professionals involved in the rehabilitation process. Thus, NAPMD is not restricted to Speech, Language and Hearing Sciences, but can also be used by other professionals who need to draw a motor frame of their patient.

Conclusion

The evaluation from the NAPMD protocol allowed verifying how much the neurofunctional changes can influence in the choice of AAC tools and how the protocol was guiding the selection of these tools, created and adapted from the neurofunctional framework of each subject. The AAC resources are important tools in the linguistic process, capable of proposing another look at the relations of the disabled subject, such as what can happen to the family, who no longer need to anticipate their children's discourse, but may occupy a more active place in the dialogical relationship.

With the protocol, it was also possible to visualize, in the therapeutic process, the limitations and general capacities of the subject, allowing to guide the Speech, Language and Hearing Sciences activities, understanding the modes of adaptation that are beneficial, comfortable for the subject and that can reach therapeutic objectives in short and long term.

This instrument addressed issues of functionality, participation and body functions, and specifying voluntary and involuntary motor issues with clear and applicable language in various clinical contexts.

With the validation of the neurofunctional evaluation protocol, advances can be seen in the use of AAC systems, promoting greater mastery in areas such as acquisition of biological quantities, data processing, creation of interfaces for interaction and integration of systems. This set of knowledge may be the basis for extending the current project or generating new projects.

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APENDIX 1

EXECUTION PROTOCOL FOR NEUROFUNCTIONAL EVALUATION

Neurofunctional Assessment Protocol from Motor Disabilities (NAPMD)

1st Moment - Evaluation during the moment of the therapy - low technology (Observation)
2nd Moment - Functional evaluation with activities induced, so that, the movement could happen - high technology
3rd Moment - Specific evaluation - with the computer science researcher
Qualifier: Function and Structure
0 - No disability
1 - Mild disability
2 - Moderate disability
3 - Severe disability
4 - Complete disability
S= Strength, R= Resistance, M= Mobility, St= Stability, C= Control, Rig= Rigidity, Sp= Spasm

Identification of the patient:
Diagnosis:
Date:

1. Function of joints and bones

	Qualifier	Moment
Mobility of the cervical joints	M ( ) St ( ) C ( )	
Mobility of the shoulder joint	M ( ) St ( ) C ( )	
Mobility of the wrist joints	M ( ) St ( ) C ( )	
Mobility of the hand joints	M ( ) St ( ) C ( )	
Mobility of the feet joints	M ( ) St ( ) C ( )	
Mobility of the hip joints	M ( ) St ( ) C ( )	
Control of voluntary cervical movement	Only ( ) Multiple ( ) M ( ) St ( ) C ( )	
Control of voluntary hand movement	Only ( ) Multiple ( ) M ( ) St ( ) C ( )	
Control of voluntary arm movement	Only ( ) Multiple ( ) M ( ) St ( ) C ( )	
Control of voluntary movement of the lower limbs	Only ( ) Multiple ( ) M ( ) St ( ) C ( )	
Control of the right side movement	Only ( ) Multiple ( ) M ( ) St ( ) C ( )	
Mobility of the Scapula bones	M ( ) St ( ) C ( )	
Mobility of the Pelvis bones	M ( ) St ( ) C ( )	
Mobility of the Carpal bones	M ( ) St ( ) C ( )	
Mobility of Tarsal bones	M ( ) St ( ) C ( )	
General joint control	M ( ) St ( )	

2. Muscle Functions

	Qualifier	Moment
Functions related to muscular strength of the head	Isotonia ( ) Hypotonia ( ) Hypertonia ( ) Isolated ( ) Group ( ) S ( ) R ( )	
Functions related to muscular strength of the upper limbs	Isolated ( ) Group ( ) S ( ) R ( )	
Functions related to muscle strength of the lower limbs	Isolated ( ) Group ( ) S ( ) R ( )	
Functions related to muscle strength of hands	Isolated ( ) Group ( ) S ( ) R ( )	
Functions related to the muscle strength of the feet	Isolated ( ) Group ( ) S ( ) R ( )	
Functions related to muscular strength	Right Side ( ) Left Side ( ) Lower half ( ) All limbs ( )	

3. Functions Related to movement

	Qualifier	Moment
Functions related to postural reflexes		
Functions related to stretch tonic reflexes		
Hyperreflexia		
Hyporreflexia		
Functions related to involuntary movements		
Stereotypes and perseveration		

4. Vision and Related Functions

	Qualifier	Moment
Acuity		
Field		
Biocular		
Monocular		
Eyelid		
Direction		