

Prescription and development of adapted seating devices: learning from practice

Prescrição e desenvolvimento de assentos adaptados: aprendizados da prática

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Abstract

Introduction: A significant part of the professional activity of physiotherapists and occupational therapists who assist people with motor disabilities is the prescription and sometimes the construction of adapted seats for wheelchairs. This is a complex task that involves practice, continued education, and material and technical resources. These work together to provide the patient's access to the adapted product. **Objective:** To understand how the prescription and adaptation of wheelchair seats occur in practice in a public institution. **Methods:** This study had a qualitative approach, applied nature, and exploratory objective. We utilized the case study strategy, conducted through semi-structured interviews, with seven professionals from a public state institution. The data obtained and analyzed were professionals' practical experiences on seat adaptation for their patients. **Results:** We found divergences between practice and theory in the institution. The context in which the professionals operate, issues related to the institution, the production capacity of the adaptations, financial and time limitations, custom, lack of protocols and training in the area, and social and patient pressure are some of the causes of these divergencies. **Conclusion:** On the basis, we drew an overview of the prescription and construction of adapted seats by the institution and described the main elements that influence this practice. We believe that the training and updating of professionals, providing more resources, and a better process planning can reduce the divergences between practice and theory.

Keywords: Self-help devices. Wheelchairs. Prescriptions. Physical therapy specialty. Occupational therapy.

Resumo

Introdução: Parte significativa da atividade profissional de fisioterapeutas e terapeutas ocupacionais que atendem pessoas com deficiência motora é a prescrição, e até mesmo o desenvolvimento, de assentos adaptados para cadeiras de rodas. Essa é uma tarefa complexa que envolve prática, formação continuada e recursos materiais e técnicos que atuam em conjunto para proporcionar o acesso do produto adaptado para o paciente. **Objetivo:** Compreender como o processo de prescrição e adaptação de assentos para cadeiras de rodas se dá na prática em uma instituição pública. **Métodos:** Esta pesquisa tem abordagem qualitativa, natureza aplicada e objetivo exploratório. Utilizou-se a estratégia de estudo de caso, realizado através de entrevistas semiestruturadas com sete profissionais de uma instituição pública estadual. Os dados obtidos e analisados foram resultados de experiências práticas dos profissionais acerca de adaptações de assentos que fizeram para seus pacientes. **Resultados:** Encontrou-se na instituição divergências entre a prática e a teoria, divergências. Essas são causadas pelo contexto em que operam os profissionais, por questões relacionadas com a instituição, capacidade produtiva das adaptações, limitações financeiras e temporais, costume, falta de protocolos e formação na área e pressão social e do paciente. **Conclusão:** Foi possível traçar um panorama da prescrição e desenvolvimento de assentos adaptados realizados pela instituição, bem como descrever os principais elementos que influenciam esta prática. Acredita-se que o treinamento e atualização dos profissionais, disponibilização de mais recursos e melhor planejamento do processo podem ser soluções para a diminuição das divergências entre a prática e teoria.

Palavras-chave: Equipamentos de autoajuda. Cadeiras de rodas. Prescrições. Fisioterapia. Terapia ocupacional.

Introduction

When prescribing and adapting wheelchair seating devices, physiotherapists and occupational therapists (OTs) use their professional skills and training to achieve the best possible position to improve the quality of life of their patients.¹ These tasks are complex, so they require the cooperation between multiple professionals and patients,² and the training and updating of the professionals involved.³

In an ideal prescription situation, the professional would be consulted from the beginning, where he/she would have all the necessary resources to prescribe and adapt seating devices using the newest technologies and would accompany the entire process. However, this situation does not seem to be the one that occurs in practice. What often happens is that patients arrive at the offices with poorly fitting adapted seating devices (ASD), recommended by shopkeepers, pharmacists, family members, and others.⁴ In addition, are few such professionals, and they have few resources and little incentive to modernize the area.

Accordingly, we questioned how the process of prescribing ASD for wheelchairs, with a focus on postural positioning, is carried out in a public institution, specifically at the Santa Catarina Foundation for Special Education (FCEE), which is responsible for public policies of special education in the state of Santa Catarina.⁵ We believe that there are gaps between theory and practice, and understanding how the process takes place can help identify factors to be improved both in practice and in theory.

To answer this question, we performed seven case studies through semi-structured interviews.⁶ The study aimed to understand the role of OT professionals and physiotherapists, specifically concerning the assessment of patients for prescribing ASD focused on postural positioning. A specific aim was to evaluate the issues involved in the effective construction of ASD, as FCEE has a specialized division for this purpose.

Theoretical foundation

For people with severe disabilities, positioning equipment can make a big difference in their lives.^{7,8} Regarding the prescription of such equipment, a stable posture⁹ allows people with disabilities to participate in social life.¹⁰ All prescribed equipment should provide postural control and body stabilization and be compatible with the predefined positioning objectives for the patient.¹¹

ASD are used to improve postural alignment and facilitate upper body function.⁹ They are required for the body's stabilization, especially the pelvis.¹² The seating device should be comfortable for some time, physiologically satisfactory, and suitable for a task or activity.^{8,13} Most people with disabilities receive treatment in hospitals, where the goal is to provide

minimal support and release the person when they achieve a certain level of functionality.¹⁴ Unlike these environments, rehabilitation clinics focus on the person's inclusion in society. In addition to improving functional capacities, they promote influence in product choice and provide training for its use.¹⁵ Since it is a participatory procedure and focused on the user, even children should cooperate in the selection.^{11,16} In the prescription of more humanized ASD, there are four components: the activity to be performed, the person who will perform it, the context of use,⁸ and the adapted product.¹⁷

In countries with a tradition in assistive technology services, there has been a paradigm shift to a more social and less medical model, that is, more focused on the needs of users than on adapting the individual to standard models.¹¹ In addition, positive experiences are found, such as greater patient independence, greater functional capacity, and more reports of comfort when prescribing seating systems from multidisciplinary rehabilitation clinics.¹⁸

In the literature that guides clinical practice, a pattern is recommended for positioning the individual in an ASD.¹⁷ It starts with the pelvis, following the lower limbs, trunk, head, and upper limbs.^{14,17,19-22} Some postural positioning specificities are the priority positioning of the pelvis and trunk,^{17,23,24} focus on upper limb freedom, head positioning^{19,20,24,25} and feet stabilization.^{17,19,25} The objectives are generally to increase functional capacity and improve posture and comfort.^{20,22,24,26} Specifically, the clinical goals are pelvic stabilization, trunk and head alignment, and lower limb positioning.²⁵

The seating device should be prescribed on an individual basis to meet specific needs and should require multiple adjustments and tests.²⁷ In a good seating system adaptation, the spine's normal curvature is preserved. Postures that minimize muscle tension and allow for small postural changes for pressure relief are encouraged.²⁸ In addition, it must prevent or accommodate structural deformities and reduce pain.²⁴

Methods

This study had a qualitative approach, applied nature, and exploratory objective. We utilized the case study strategy, conducted through semi-structured interviews, with professional physiotherapists and OTs who are employees of FCEE.⁵ The institution was selected not

only because it prescribed ASD but also constructed them, having qualified professionals for that. As inclusion criteria for the participation, we selected professionals who had prescribed and fabricated ASD for patients with atypical muscle tenacity within the institution. Invitation to participate was done out of convenience²⁹ to all eighteen professionals who met the criteria. Of these, seven accepted to participate in the research.

The interviews were conducted at FCEE, the participants' workplace, in July 2017, after their approval as part of a research project by the ethics committee, under No. 58433316.2.0000.0118, by the Center for Studies and Research (NESPE) of FCEE and by the Management of Research and Applied Knowledge (GEPCA) of FCEE as external research.

The interviews' purpose was to understand how the prescribing and adapting seating devices for wheelchairs take place in practice at the institution. We divided the interviews into two parts: the first to establish the professionals' experience in the area; and the second to obtain a description of a patient they had cared for and how they solved or accommodated their needs with the prescribed ASD. The major interest was in the solutions obtained by the participants to solve problems and accommodate the described patient's deficiencies.

The questionnaire aimed to help with the interviewee's recollection, so the questions copied the patient's evaluation process for seating device selection and adaptation. This questioning method is supported by Pain et al.,³⁰ Furumasu²¹ and Pedersen et al.,³¹ who opt for a sequential approach to patient assessment and seating system adaptation. Initially, we asked questions regarding the professional's experience. We then invited participants to select a patient with whom they had already worked and who, with regard to ASD, had confidence in the accuracy of the information. The only requirement for choosing the patient was that he/she was attended to by the participant and the need to have an ASD; there were no restrictions to the severity of the afflictions. Having chosen the case, we divided the questions about the patient into two sections: the first section related to the patient's postural deficiencies and difficulties and the second to the ASD characteristics.

The first section of questions was as follows: Could you describe the patient you selected? What was the reason he/she was referred to you? What was the clinical picture of this patient? What were the physical characteristics? And psychological characteristics? What were the postural

characteristics of the hip? Legs? Feet? Trunk? Head and neck? And upper limbs? This designation of the body parts tried to ensure that there was no forgetting of clinical conditions related to the patient.

The second section contained the following questions: How was the ASD that you prescribed for this patient? What were the specific seat characteristics? Leg supports characteristics? Footrest characteristics? Backrest characteristics? Headrest characteristics? Armrest characteristics? And finally: Is there anything else you would like to comment on about this patient's prescription and positioning? For the second section of questions, the same strategy of designating the devices' parts was used to guarantee the complete ASD description. This interview was pre-tested to validate the questions and time of application, which varied between 20 and 40 minutes.

We tabulated and illustrated the descriptions made by the participants. The tabulations used the same separation by body part and ASD part made in the interviews so they could be correlated. Considerations were made from the analysis of patterns found in the interviews about the prescription of ASD by the participants for their patients. To preserve the identities of those involved, they were numbered from 1 to 6; for example, interviewee 1 (I1) who described patient 1 (P1), all of whom were referred to as male, even though some were female.

Results

To facilitate the understanding of the results obtained with the interviews, we divided the chapter into two parts. In the first, we provided a contextualization of the prescription and adaptation process of a wheelchair as it happens in FCEE gathered from the various interviewees' responses. In the second, we compiled the interview results on the practical process of prescribing and adapting ASD for the specific cases related to postural positioning.

Contextualization

FCEE was selected because it is a public institution that works with the prescription of ASD for people with different types of disabilities; and because of their differential adaptations for wheelchairs within

the institution, having qualified professionals for this, such as a joiner, a seamstress, and a specialized OT. As part of its assignment, the institution distributes, in the form of a loan, chairs (adapted or not) free of charge to users of the foundation's services. These basic chairs come from collective purchase notices for generalist chairs, individual purchase notices for particular cases, secondhand chairs returned by other patients still in good condition for re-use, and particular users' chairs that can be adapted.

The process of this activity consists in: 1. Consultation of users with a physiotherapist or OT; 2. Need for identification of an adapted chair; 3. Prescription of necessary adaptations - there is no specific protocol for this prescription -; 4. Selection of chairs in the appropriate dimensions available in the foundation's collection - carried out manually, since there is no registration of all available chairs - or purchase order; 5. Request in writing for making adaptations and delivering or sending to the assistive technology adaptation sector - there is no single order model; it is done written out and sometimes with drawings to explain the element -; 6. Receipt of the chair; 7. First test; 8. Return to the sector for adjustments; 9. Second test or as many as necessary; 10. Chair delivery with adaptations for the user; and 11. Training the user and caregivers to use the chair appropriately.

Due to its almost artisanal construction and the need for individualized adaptation of each seating device, the institution does not manufacture using production processes such as the exact patient's body contour and the use of different materials. Nonetheless, foam cutting techniques, upholstery, differentiation of fabrics, creation of wooden barriers, and a mixture of these techniques are some of the possibilities found within FCEE.

Interviews

The group of seven interviewees (I) consisted of four physiotherapists and three OTs, with working time in the area between 4 and 17 years. We recorded a total of 161 minutes of interviews, with an average time of 23 minutes per participant. The interviews occurred in the participants' offices and clinics located within the foundation.

One of the participants (I0), due to his experience and position held at the institution, was charged with drawing an overview of the most common patient afflictions and ASD adaptations to serve as a basis for comparison. The

others (I1 to I6) described real situations of a patient (P1 to P6) for which they prescribed an ASD.

The data collected from the interviews were organized in two tables: one for the patient's afflictions (Table 1) and the other for the ASD developed for these patients (Table 2). In Table 1, which follows, the patients' disorders are separated by body part.

We can see from the analysis of Table 1 that some characteristics predominated among the patients described, namely: spastic quadriplegia cerebral palsy, presence of rotation and abduction in the pelvis and

feet, lower and upper limb crossing pattern (scissoring), and lack of trunk and head control, accompanied by kyphosis and/or scoliosis and hyperextension. With these being the most prevalent characteristics, one can also describe an expected ASD, as indicated in the specialized literature^{1,3,14,17,19} for these standards. It would be: seat and backrest contoured to the patient's body, headrest with lateral supports, leg container and abductor, table as preferential support for the upper limbs, tray-type foot support, and use of corrective and/or preventive orthosis.

Table 1 - Comparative chart of patients' (P) afflictions

	Disability description	Pelvis	Legs	Feet	Trunk	Head and neck	Upper limbs
P0	Spastic quadriplegia cerebral palsy	Rotation + extension	Crossing pattern (scissoring) + extension	Ankle flexion	No control	No control	Crossing pattern
P1	Spastic quadriplegia + hypotonic cerebral palsy	Abduction	Knee contracture	Can stand upright + ankle orthosis	No control + kyphosis (trend)	Leans to one side	Elbow flexion + closed hand
P2	Spastic quadriplegia cerebral palsy + low vision	No deformity	Crossing pattern + flexion and extension	Ankle orthosis	No control + kyphosis	No control + hyper-extension	No deformity + crossing pattern
P3	Spastic quadriplegia cerebral palsy	Without deformity	Crossing pattern + flexion and extension	Without deformity + ankle orthosis (preventive)	Without control + scoliosis	Good control	Right arm dislocation + Left arm spasticity
P4	Quadriplegic	Dislocation + rotation	Spasticity	No deformity + ankle orthosis (preventive)	Without control + scoliosis	No control	No deformity + hand orthosis (preventive)
P5	Spastic quadriplegia cerebral palsy	Rotation + abduction	Crossing pattern (scissoring) + internal rotation	No deformity	No control + scoliosis	No control + hyper-extension	No control + wrist rotation
P6	Spastic quadriplegia cerebral palsy + dystonia	Good control + abduction + spasticity	Knee contracture	Ankle flexion + supination feet	Good control	Good control	Uncontrolled + shoulders forward + elbow flexed

Note: P0 = Most common patient problem, as reported by participant I0.

As in the first table, the ASD described in Table 2 are also arranged separately by body part, making it possible to make a direct comparison between the affection and the prescribed ASD. When the adaptation of part of the seating device was not present, this was indicated by "did not exist".

When analyzing Table 2, we can see that the expected seating device described was not found. For example,

P6 had pelvis abduction but used a flat seat. This same patient did not use footrests, a factor that differs from the literature.²⁸ In addition, the use of lateral supports was found in most cases, despite the table's reported importance by the participants themselves. This and other factors diverged from the literature and also at times from what the participant himself indicated as being ideal.

Table 2 - Comparative table of adapted patient (P) seating devices

	Pelvis	Legs	Feet	Trunk	Head and neck	Upper limbs
P0	Contoured seat at 90° with pelvic belt	Abductor	Tray	Curved support at 100° with side supports and butterfly belt	Curved support at 90°	Table
P1	Contoured seat at 90°	Abductor	Flat support with ankle belt	Curved support at 100° with butterfly belt	Did not exist	Side supports
P2	Curved seat at 90° with pelvic belt	Abductor	Flat support with ankle belt	Curved support at 100° with side supports and butterfly belt	Curved support at 90° with side supports	Table
P3	Curved seat at 90° with pelvic belt	Abductor	Flat support with ankle belt	Curved support at 90° with side supports and butterfly belt	Did not exist	Side supports
P4	Contoured seat at 100° with pelvic belt	Flat support at 100°	Tray	Curved support at 90° with side supports and butterfly belt	Curved support at 90°	Side supports
P5	Contoured seat at 90° with pelvic belt	Flat support at 90°	Flat support	Curved support at 90° with side supports and butterfly belt	Curved support at 90°	Side supports
P6	Flat seat at 90° with pelvic belt	Did not exist	Did not exist	Curved support at 90°	Did not exist	Side supports

Note: P0 = Most common adapted patient setting devices, as reported by participant I0.

To expedite the visualization of what is described in the tables, we illustrated each case and their respective ASD (Figure 1). The figures have a diagram of a seated body with arrows representing the deformities' directions and markers for the locations of orthoses, and alongside illustrations representing the ASD are representative colors of support in pink and containment in green.

The following are the main considerations for the described patients and their ASD that help understand the interviewees' choices and the relationship of these propositions with the context in which they were placed:

For P1, who was the youngest described, I1 developed a preventive seating device, since his deformities were not fixed yet. This participant commented on the importance of the active participation of parents and caregivers, since the patient was not able to perform transfers and the necessary assemblies of his ASD. One of the problems mentioned by I1 was the difficulty of access and time elapsed between the prescription and its effective delivery, which caused the ASD to be smaller than expected. This meant that the seat, which was initially contoured to the patient's body, had to be modified in an artisanal manner to ensure the correct patient's positioning. In addition, for this same patient (P1), we found possible ASD inadequacies, such as the

fact that the patient's hypotonia caused his head to hang to the side, but a headrest had not been prescribed.

P2 was the patient described with the most severe affliction. For him, the described seating device was the most appropriate possible since his deformities, especially the crossing/scissoring patterns, were so severe that it wasn't even possible to make the correct use of the seat adaptations such as the abductor. For this patient, I2 reiterated the importance of using the table as the principal support for the upper limbs, being the only participant to have done so. He commented that the main cause of not opting to use the table is the social stigma that can be generated for patients.

For P3, who had greater affliction in the upper limbs and trunk, some choices differed from what was expected, because they were adapted to the patient's life condition. Despite little trunk control, the patient used head movements to communicate and control equipment, and, for this reason, I3 removed the headrest. In addition, the patient was responsible for moving around in his chair, which made I3 opt for the primary use of lateral supports to facilitate his visualization when he was moving. These changes were different from what is proposed in the literature, but they are indispensable for the best and actual use of the seating device in the patient's situation.

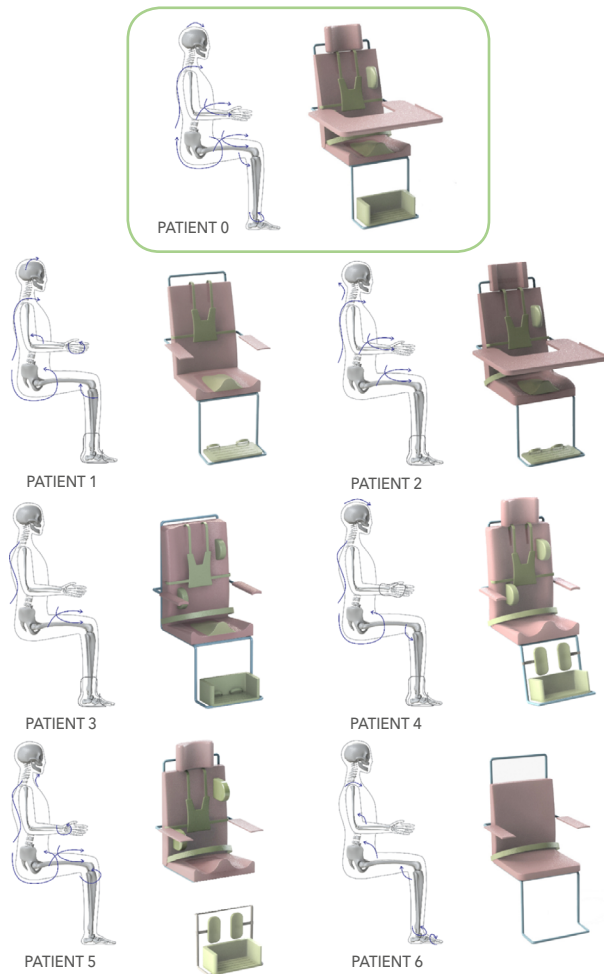


Figure 1 - Illustrations of the described patients and their adapted seating devices.

P4 was a quadriplegic, with neuromotor sequelae such as spasticity and communication problems. His communication was by blinking. His seat was well adapted to his body shape, but the use of tilt was quite excessive,^{32,33} which affected the patient's visibility, making it difficult to participate. In addition, because he was unable to move in position and because of spasticity, he used a seat contoured to his body with various types of support, such as belts.

Similar to P2, P5 also had deformities so severe that they could only be properly accommodated with surgical intervention. His main affliction was in the legs, with a crossing/scissoring pattern. IS's role was essential for the patient's positioning so that he could join society. The previous ASD that he owned was not suited to his needs. In the participant's words:

When he [P5] came for the assessment, he already had a wheelchair that had been adapted for him in the past. It was a chair that had no tilt or recline system. He was practically lying in the chair. Although he did not have the system [recline/tilt], he would lie down because, as he entered this "extension pattern", the belts were not enough to break this pattern. Also, the angle of the backrest and seat was greater than 90° and he ended up increasing his extension. He had difficulty feeding because he was practically lying down. He kept looking at the ceiling all the time because the angle of the chair didn't help much. [...] it was the most serious case I have ever evaluated. I spent about 3 months thinking about how I would make his chair, because it was a very serious case, very difficult to do. [...] So, I took this chair [Conforma Tilt Ortobras], and first I did a test with it. I made some [foam] cutouts on the seat that I thought would respect [his shape] since he doesn't uncross his legs. I brought the angle to 90° to improve his feeding. I estimated that he had hip mobility. His hip was not fixed at more than 90°, so he was able to stay at 90°, and then I started doing the backrest. We made a backrest with flaps, lateral trunk supports to help with his stability, and the cut-out seat respecting this deformity that he had.

Finally, P6 had a peculiarity in which he had more control with the lower limbs than upper limbs and therefore used his lower limbs to control the chair. This patient was also able to communicate his wants and needs, having more ability to adapt his seating device. The patient did not use only his chair, where he was able to walk short distances and transfer from the chair without assistance. One of the adaptations made at the patient's request was removal of the footrest, which he said hindered locomotion. However, good foot positioning is important for good posture,²⁸ and its presence is recommended even if it is not used all the time.

Discussion

In FCEE we found a prolific activity in the prescription, construction, and maintenance of ASD. However, some reports made during the interviews showed problems in the prescription process that can make it difficult to understand and replicate the information. Especially for those in charge of building or adapting the seating devices and who do not necessarily have training in

OT/physiotherapy. Also, the prescription process is not standardized, and it is up to the professional to make the decisions and write out the prescription.

Although it is not possible to generalize for the whole institution, since we did not interview all professionals, we noticed that the participants carefully considered the well-being, health, and safety of patients in their context. The professionals work with the limitations imposed by the production processes to achieve the objectives of seating device adaptation in the best possible way.

It was also clear that there is a need to create specific and individualized objectives for each patient, and such was the case for P6, who had a mobility objective. In this situation, it is important to highlight that even if the literature recommends certain positions and adaptive elements, the participant's individual need is the most meaningful one and, therefore, sometimes these recommendations need to be disregarded in favor of individual solutions.

In addition to the participant's individual need, the manufacture capacity and the lack of resources for the purchase of new equipment were the main limiting factors for the preparation of ideal ASD as recommended by the literature.¹⁶⁻¹⁸ When understanding this factor, many of the participants' choices were understandable, such as the use of curved headrests even at times when other models would be more suitable, specifically due to the ease of carrying out a bidding process for chair with existing factory parts. Specifically, the seat, the backrest, and the side supports were the most prescribed modifications.

The use of tilt (change of the entire system's angle) and recline (change of the backrest's angle),^{32,33} although some participants commented on this, did not seem to be considered influential for the question of postural positioning, but for repositioning the body and to facilitate transportation, eating, etc. For postural positioning, participants considered only the seating device's contour and the necessary restraints and supports.

We surmised two hypotheses for the seating devices' selection patterns found in this study: the first concerning the variables influencing the production capacity of ASD and the second relating to the social stigma of using certain ASD. In the first case, concerning production capacity, we noticed that routinely when the literature recommends seating devices with a profile adapted to the anatomy, the professionals used flat seating devices with lateral supports, given the difficulty of producing

the contoured profiles to fit the body. These supports, prescribed by most participants, are made of wood and foam, positioned in pre-purchased wheelchair structures. In addition, abductors and belts are also present in most cases and fulfill positioning and patient safety functions since most patients had spastic movements.

In the second case, given the social stigma that can arise when patients use certain ASD, most professionals preferred the use of side supports over tables and trays, the use of fewer supports than necessary, and sometimes, especially in the last case (P6), the removal of essential elements such as the foot support.^{17,25,28} This stigma orders the "normalization" of people with disabilities wanting them to approach a position considered normal. We noticed, therefore, that some decisions are made so that there is less negativity and victimization imposed on the patient; however, this ends up making aesthetics more important than the patient's best access to their daily activities.¹⁷ In conducting the interviews, participants were asked to describe a patient for whom they prescribed some type of ASD; in these descriptions, only patients with severe disabilities and the need for multiple adaptations were described. Thus, we raise the hypothesis that wheelchair users with mild deformities are not considered for ASDs. It should be noted, however, that small deformities must also be positioned, since if left unattended they can worsen and become a problem.³⁴

Another point in the discussion is the time spent between the ASD prescription and its manufacture. Since there is a bidding process for its purchase and manufacture time, it will probably reach the end-user with some delay. This problem has the greatest impact on children, as they are still growing and undergo other bodily changes due to their health status.¹⁷ Therefore, the seating device that was prescribed at a given moment can be delivered with the most diverse inconsistencies, as was the case with P1, for whom the seat was considered too small at the time of receiving the product.

Finally, the lack of knowledge about the various possibilities for adapting ASD can lead to restrictions in their construction, causing repetitions of known elements that may not always be the best solution for the individual problem. A partnership created with designers would be a possibility to bring together the needs of patients and the knowledge of health professionals.

Conclusion

In this study, we evaluated the real situation of the practice of prescribing and adapting ASD by qualified professionals in the context of a state public institution. We noticed that in this context the determination of an adequate posture is mediated by the patients' functional needs, wants, and tastes, as well as the production capacities of the seating device, financial resources, and manufacture time. As a consequence, the final results obtained differ from theoretical models considered ideal.

Although this is not necessarily the case with the results obtained by the study participants, it is important to highlight some elements that should be contemplated when performing this activity in practice. First, the excessive concessions to positioning elements, from the perspective of the difficulty of socialization, can be harmful to patients. Likewise, the creation of seating devices adaptation patterns without a critical view of their real application to a subject with specific characteristics must be considered, as such adaptations can be harmful to the health and quality of life of people with disabilities.

In addition, the ability to prescribe and adapt seating devices by professionals directly influences the quality of the patient's final ASD. If the professional can perform the adaptation by himself, having access to all factors involved such as material resources, qualified personnel, and adequate space and tools, he can achieve results that are as close as possible to his real need.

Also, there may be a loss of information in the process of transferring information about the adaptation needs to agents who will develop the seating device, thus resulting in a ASD that is not suitable for the target subject. It is therefore necessary to create robust and standardized communication systems with which good communication can be maintained.

In addition, we suggest that in future works a comparison be made between the results obtained in the prescription process of adapted seating devices and the functional capacity of individuals, preferably using functional recognized indices such as FIM (Functional Independence Measure Scale) or ICF (International Classification of Functionality) in an attempt to find relational patterns between these two elements. In this research, this was not done because these standards were not used universally in the selected institution,

which would make it difficult to compare the cases as was done.

Finally, we believe that the training and updating of professionals regarding ASD construction, available options, new technologies and state of the art of ASD, input of new human, financial and technological resources, and better planning of the process can be solutions that enable the development of ASD that are increasingly better adapted to the user's needs.

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Authors' contributions

ISS was responsible for conceptualizing, curating the data, investigating, managing the project, and writing the article, while MLLRO oversaw the research and other stages of the project. Both authors were responsible for the formal analysis, methodology, and final writing of the article (review and editing).

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