APP for the Seating devices prescription process

Adriana N. Klein[1], Roseli de Deus Lopes[1,2]

[1] *Department of Electronic Systems Engineering - Polytechnic School at University of São Paulo*
[2]*Interdisciplinary Center in Interactive Technologies from University of São Paulo*

INTRODUCTION

According to World Health Organization (WHO) there are in the world 70 million people who need to use wheelchairs for locomotion[1,2]. Recent studies indicate that wheelchairs are not always appropriate for their users[3] and in developing countries less than 5% of those who need a wheelchair have access to a suitably adjusted model[1,4]. Seating prescription makes the individualized wheelchair more suitable for posture, comfort and functionality[5]. In Brazil the process of evaluation of Seating is carried out by rehabilitation professionals and the prescription is directed to technicians of specialized manufactory, generating a wheelchair "customized" as final product.

The fail of systematization in this process favors communication failures of what was prescribed by the rehabilitation professional, which may lead to errors of interpretation by the technician and in the final product delivered to the user.

The purpose of this study was to investigate the processes involved in the prescription of Seating in Brazil and to propose an architecture for electronic platform to support the prescription of Seating.

METHODS

Design

This was a investigative, exploratory and descriptive study. We have collected information from fourteen Brazilian rehabilitation centers (public and private) that carry out the seating prescription procedure for elaboration of an electronic system or app for seating prescription. The study was approved by the Research Ethics Board of the Faculty of Medicine, University of São Paulo. Informed written consent was obtained from all participants.

Participants

Were interviewed fourteen rehabilitation professionals (physiotherapists, occupational therapists and physiatrists) to collect data on the main nomenclatures used to prescribe seating devices. The inclusion criteria were: have experience in Seating prescriptions for at least 2 years. In the test of the first prototype participated another six rehabilitation professionals who analyzed the electronic system and suggested new changes.

Equipment

The quali-quantitative data extracted from the interviews were organized into tables in excel®. The answers were categorized and counted for elaboration of a framework. Programming was done with Android Studio® and the Java® software and XML® language. The internal database software was sqLite® and the external back4app®. The images were made using Adobe Flash CS6 and Adobe Photoshop CC and Wacon's Intous Tablet.

Procedure

The semi-structured questionnaire of 34 questions was elaborated by the author of this study, and the interviews were carried out in an interval of 2 months.

The data found in the answers of the professionals were categorized into eight items: types of seat(cushion), types of backrest, types of trunk supports, types of head restraints, types of upper limb supports, lower limb supports, safety system and accessories (tables and brackets). In each category the most cited nomenclature was extracted.

A framework for the construction of the first prototype was developed. It was presented to six other rehabilitation professionals who were not part of the first stage, the results were analyzed and the suggestions were considered in the elaboration of the second prototype, which will be tested soon.

Analysis

The integration of qualitative and quantitative analysis was used to extract as much detail as possible from the nomenclature used by the rehabilitation professionals in the seating prescription in Brazil. The analysis data, although not statistically valid, indicated a great variation in the nomenclature of the devices and little systematization in the seating prescription process.

The data analysis of the evaluation of the first prototype was only qualitative.

RESULTS

The results demonstrated the variety of nomenclature used by professionals (Table 1) The most equivalent terms were selected for the elaboration of the electronic system framework, called *EasySeating*. The suggestions of the analysis of the first prototype were considered for the elaboration of the second prototype that will be validated soon. The second prototype has eight windows for choosing the devices. Each prescription generates an image with text and metrics, the final product appears complete with the features that the user needs. The figure 1 exemplifies the options of the seat model, figure 2 the models of the Backrest, figure 3 the models of head restraints and figure 4 the models of Safety System (belts).

Table 1. Types of Seating Devises

Seating Devices	Analysis quantitative
1.Types of seat	16 differents types
2.Types of backrest	12 differents types
3.Types of trunk supports	10 differents types
4.Types of head restraints	12 differents types
5.Types of upper limb supports	10 differents types
6.Types of lower limb supports	9 differents types
7.Safety System (belts)	9 differents types
8.Accessories	8 differents types

Figure 1. e.g. Seat models

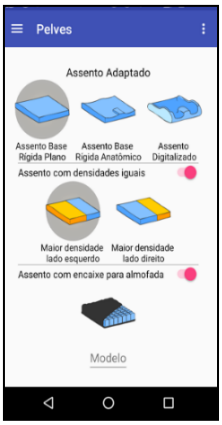
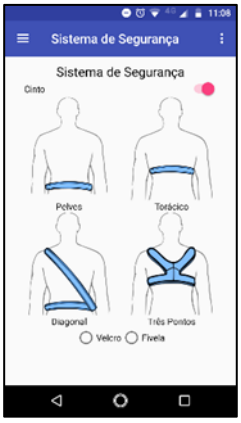


Figure 2.e.g Backrest models

Figure 3.e.g. Head restraints

Figure 4.e.g. Safety System (belts)



DISCUSSION

The initial results of this research confirmed the existence of a lack of systematization in the process of seating prescriptions in Brazil, such as several names to rank the same device, which corroborates with WHO data on the difficulties wheelchair service in less resourced countries[6].

The professionals interviewed reported difficulties in communicating with the technicians who make the seating, and the constant dissatisfaction in the final product delivered to the wheelchair user.

Some studies have already demonstrated the efficacy of telerehabilitation for Seating prescription in developed countries, with the use of the electronic system Remote Wheelchair Selection Advisor (RWSA) that works as support in the decision of rehabilitators, suppliers and patients[7].

The *EasySeating* also has the potential to favor greater systematization and assertiveness for seating prescription in Brazil.

CONCLUSIONS

This study contemplates the use of technology to favor the prescriptive seating process, but also proposes a tool for investigation of seating interventions, due to the possibility of documenting in a more systematized way the clinical needs of the wheelchair user and to monitor their effects and benefits remotely and collaboratively.

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