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# Brazilian Assistive Technology in Bath or Shower Activity for Individuals with Physical Disability

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## 1. Introduction

The current market tends to expand products designed to serve large portions of the population, providing tools, objects, and furnishings with a design that meets the requirements or needs of people with or without disabilities. Regarding that perspective there has been an increase in the variability of these products marketed to the most diverse purposes, including for daily life activities.

This chapter is the result of a research about assistive technology devices available in the Brazilian market for positioning handicapped people during bath or shower, activity that is routinely performed by people. This activity is directed to the care of the person with his own body and is known as a basic activity of daily living, approaching particular demands, characteristic objects and specific contexts of each person (American Association of Occupational Therapy [AOTA], 2008).

The variation that a physical disability may cause is huge. It might range from the absence of one of the lower limbs or to its paralysis, to the total absence of postural control (characterized by a deficit or absence of cervical control – head, neck and trunk), leading these individuals to need external assistance to support his participation through their involvement in the bath or shower, especially in while seated.

Besides, the variability of the disability may require specific characteristics in the selected equipment for positioning the person during the bath or shower activity. These specific characteristics are materialized in accessories individualized as belts, head supports, lateral seatbelts for trunk, that will promote stability, security and comfort to individuals with disabilities and provide adequate posture to the caregiver/assistant, when necessary.

## 2. Bathing or showering

Personal hygiene is the key factor in the life. Bathing or showering may be described as a sum of experiences that provide maintenance of health, well being and relaxation (Gooch, 2003).

The action of bathing or showering as well as lathering, rinsing and drying parts of the body, approaches the possibility of the person to maintain an adequate positioning while performing bath or shower activity, transferring from a surface to another and to possible bath or shower positions (AOTA, 2008).

Gooch (2003) considers bath or shower as a complex and potentially dangerous activity to all people since it involves a combination of water, foam and a smooth surface, characterized by a tub surface of the floor. Considering this context and the disabled or handicapped person, such situation may become even more complex.

Bathing or showering a person with severely impaired motor function is an activity that demands planning, care and overestimated attention with safety, besides increasing elaboration of complexity and demand degree that come with his limitations and restrictions.

When taking into account bath or shower in relation to children, their growth must be considered while selecting and adjusting the chosen product for the sitting positioning during bath or shower activity. An inadequate choice can result, in long term, in a not pleasurable activity for the child and his caregiver (Tabaquim & Lamônica, 2004). Comfort and safety are also essential characteristics in the process to select the equipment to maintain the adequate sitting posture during bath or shower task of a disabled person.

Bath or shower independence is not existent in people with physical limitation or decreased strength, decreased range of motion (ROM), low or lost postural stability and limited or small ability to manipulate (dexterity).

Thus, if a person remains unstable while seated, he certainly is going to have difficulty to relax and stay on that position. Upper limbs commitment, characterized by weakness and movement limitation, may make complicate to run such posture adjustment and maintenance. In addition, rarely can this situation be associated to osteoarticular deformities caused by contractures, mainly on the knees and hips, which contributes even more to an unstable sit (Shepherd, 2001).

A more adequate and appropriate solution involves a selection and denotation of a bath or shower equipment that must necessarily follow a "*hierarchical path*" to be prescribed, in which it should be primarily thought from the simplest adaptations till a specific bath/shower, being that in more complex cases, environment changes may also become necessary (Gooch, 2003).

The solution in solving such problem requires an intervention with compensatory strategies such as by using assistive technology devices, which comprises interfering on the context - that is, on the environment in which bath or shower task will be carried out - or on the demand of the task with adapted tools and utensils and with adapted furnished appropriate to the maintenance of the person in the sitting posture (e.g., a bath chair).

Assistive technology (AT), a science that combines various professions, such as health professionals (physical therapists, occupational therapists, speech therapist, and so forth), from technology area (engineers, architects, among others) and other areas, is defined in Brazil by the Technical Help Committee (Comitê de Ajudas Técnicas [CAT], 2001) as:

‘an area of knowledge, interdisciplinary characteristic, the includes products, resources, methodologies, strategies, practices and services that aim to promote function, related to activity and participation, of people with disability or reduced mobility, aiming at autonomy, independence, quality of life and social inclusion’.

Consequently, AT is, thus, any technology developed to permit the increase of autonomy and independence of disabled people or the ones with reduced independence in their domestic or daily activities of daily living (BRAZIL/Ministério MCT, 2007).

In this context, AT devices are purposed to aid, enhance or promote the person’s involvement on the task to be performed – that is, shower or bath –, putting satisfaction and occupational performance increment forward or, with respect to changes in physical context, the application of AT on the environment promoting environmental compliance.

Therefore, the suitable sitting positioning of a handicapped person while performing the bath or shower activity may be facilitated by selecting an AT device adjusted to the person’s need or by compensating the physical contexts.

According to Shepherd (2001), people who have problems to maintain their posture and movements, frequently lose control to assume or keep a stable posture during performance activities and are benefited in relation to an adaptive positioning.

Choosing an assistance device, that is, any equipment that promotes the increase and/or the participation of a person with disability on the execution of an activity may be a complex task. All limitations and needs of the user, caregiver and environment must be considered since their sum will define how the device will function and how its function will be perceived (Pain & McLellan, 2003).

Pain and McLellan (2003, p. 396) report in their study that for the indication of a device it must be taken into account that “there is a complex interaction between different factors, such as the user and the caregiver needs, the product characteristics and the environment that will be used”. In order to guide the selection of such device, mainly when dealing with people with more complex needs, it is important that the individual clients’ priorities and needs are clear.

The success of using and accepting assistive devices by a users and/or their caregivers, whether if they are produced in series (in mass) or tailor made, frequently involves a sum of professionals and factors, such as economic, ergonomic and aesthetic, in their development phase. Together, they add values to the product that ultimately is intended to expand or facilitate people and/or caregivers participation in the activity, reflecting their improved quality of life.

### 3. Equipments

Exploratory analysis of AT products, designed to meet the demands imposed by handicapped people in their different needs, resulted in the exposure of various types of

equipments aimed to bath or shower. Most of these equipments have specific physical characteristics in order to attend meet the particular needs imposed by that user.

Among the products designed to bath or shower, the available equipments range from a simple system of seat (stool or regular chair) to specific equipments to people with serious motor commitment, wheelchair users and unable to remain seat without full support during the bath or shower activity.

Currently, the group of assistive devices for bathing or showering is available in Brazil in specialized stores for medical products, catalogues that show assistive technology products and internet websites, varying in their characteristics (Santana et al., 2009).

#### 4. Stool/chair

The more commonly available equipments to help a person who needs support to remain sitting during shower or bath because of temporary or permanent motor commitment. There are many models in the market which can be made specifically for this purpose, as well as other ones that are available for other purposes but adapted for such task. Most of the conventional models are made of plastic with rubberized coating with variations in their design in relation to the model and dimension of the seat and backrest, armrest and variation in height (Figure 1 and 2).



Fig. 1. Models of stools: (A) Four support stool with height adjustment; (B) Edge stool with adjustable height.



Fig. 2. Chair with cut out seat.



Despite the variation in available models of stools and chairs, some aspects deserve attention when choosing the equipment. The seat needs to be in accordance with the dimensions of the user in order to provide comfort and safety. Besides it is important to note their functional aspect to make bath or shower easy, like observing if there are holes that allow better flow drainage during the course of activity, if they show a front cut for making personal hygiene easier, if the seat is removable, what facilitates cleaning and maintenance of the equipment, and if it offers height adjustment promoting feet support on the ground.

Another factor that determines the type of the equipment is related to the base (feet) of the device, in which the model may vary between four supports (Figure 1A) in a three support model (Figure 1B) and type of edge, whose measure may vary according to the model. It is important to point out that, in order to keep the user safety, it is important that the stool/chair has rubber tips or suction cups on the feet that are connected to the ground to ensure stability in the environment. In addition, there are models that offer as an accessory the armrest, which increase the stability of the person in the sitting posture. After all, considering all these aspects for a referral/prescription is very important to ensure a better match between the equipment and the user.

## 5. Bath chair

Another type of AT equipment for showering or bathing is the wheelchair that can be attached to the toilet. This type of chair is usually light, manageable, may have padded seat and backrest made of fabric and armrests that can be articulated to make transferring easy to the chair. Some models may exhibit different accessories accomplished to the chair, as toilet paper support and the possibility of removing parts for cleaning.

Figure 3 (A and B) presents the most commonly used models of bath chair that are found in the Brazilian market, which are made available by reference companies for manufacturing and marketing of AT products. These models have similar physical characteristics, much of it designed to meet the requirement imposed by the adult audience, and is usually related to their design and dimensions. Typically, these bath chair models have their structures made of steel or aluminum, a seat toilet attached to the metal support structure and wheels different in the ring dimension and brakes. Besides, other specific characteristics may differentiate the product lines, as the present of removable armrests, fixed footrests (Figure 3A) or movable footrests, retractable armrest, removable footrest, padded backrest, beyond the ability to be folded for easy transport and storage (Figure 3B).

Usually these models of AT devices are suitable for people with mild or moderate physical disability or to the ones who present reduced mobility and need support to remain seated during bathing or showering, but are able to control body parts while seated, like cervical control and total or partial trunk control. This is because their structures are provided with a simple seat and back system that make it difficult to maintain proper sitting posture of people with severe motor impairment. Moreover, the options for the equipment dimensions end up restricting their indication for adult audiences.

Figure 4 represents another bath chair/hygiene chair model that represents a seat of characteristics designed to meet specific needs of people who have a more severely compromised motor capacity. The presence of removable head support, with possibility of height and depth adjustment, is considered an essential item when it cannot maintain keep



Fig. 3. Adult aluminum shower bath chairs: (A) Fixed structure and (B) Folding structure for closing.

the position of the head against gravity; moreover, the bending system of the seat and back group ("tilt") of up to  $35^\circ$  allows a better accommodation for a person with absent or insufficient trunk control, who are unable to remain seated without support.

The presence of arms and legs support, which might be retractable or removable, supplement the necessary resources that permit a better accommodation of the user. Although the equipment presents more adequate features, the needs of more severely compromised people in the physical aspect, and the possibility of changing the adult toilet seat to a child one, implies that the dimensions offered by the equipment makes its designation more appropriate especially to adults.



Fig. 4. Aluminum bath chair with backrest and headrest tilt system.

Figure 5 represents another model of bath chair that presents a possibility to "tilt" and lean back, what allows the reclination of the seat/backrest group or just the backrest, a choice that depends on the motor requirements imposed by the disabled person and/or the caregiver. The equipment height might be adjusted via a hydraulic system, promoting an excellent body mechanics to the caregiver. Besides such characteristics, there are other ones, such as adjustable headrest, locking casters, height adjustment of the footrest and armrest, that completes the equipment specifications.



Fig. 5. Bath chair with recline tilt system.

Among these AT devices aimed for bathing or showering that have specific features to the demands imposed by more severely handicapped users, there are other models whose dimensions meet more specifically children and teenagers. These models, in their own constitution, usually have a range of resources appropriate to meet some specification, such as lack of motor control, including absence of neck control, insufficiency or default of trunk control, persistency of primitive reflexes and/or involuntary movements difficult to control, a situation that is compatible to people that with cerebral palsy or other disease that seriously compromise the musculoskeletal system.

Since those people are dependent to caregiver to run bath or shower due to their severe motor disability, some models of chair have adjustable height, whose function is, in addition to providing accommodation to the user through their seat and back features, to provide satisfactory positioning to the caregiver, that is, to the one who performs the task of bathing or showering, and to ensure a safer transference of handicapped people.

The bath chair shown in figure 6 meets the specifications previously described. This type of chair can be used without the base and may be kept on the floor of a bathtub or shower, or with the base, avoiding that the caregiver remains crouching during showering or bathing. In relation to the physical characteristics, this product has a tubular aluminum monobloc structure, epoxy paint, seat and back with tailored double coats (the first part in twisted nylon and reinforced and the second one in a sanlux type canvas, aiming to hygiene, comfort and durability), holes for water drainage during bath or shower, waterproof fabric with adjustable via Velcro seat belts for chest and thigh safety, foam injection headrest covered with vinyl that allows only height adjustment as it is attached to the backrest, four swivel wheels with brakes, in addition to a non-tumble front and rear system. The backrest has ten tilt adjustment controls in the seat made by a spring locking device.

It is worth emphasizing that the presence of casters at the base of the chairs indicated to adult and youth may result in facilitating the movement of the equipment and the user in the shower and other rooms of the houses.





Fig. 6. Youth bath chair: (A and B) Removable base with height adjustment and belt and headrest system.

Other bath chair models (Figures 7 and 8) are designed to serve severe motor impairment users also have similar aspects, differentiating in some structural features, design and accessories. They are products whose tubular structure is often made of aluminum and the seat and back set consists of a polyurethane shell form-fitting, with or without holes, whose function is let the water flow during bath or shower.



Fig. 7. Infant bath chair: (A) anterolateral view; (B) posterior-lateral view.

The metal frame of the bath chair in figure 7 (A and B) presents a system of opening and closing in “X”, which is caught by two parallel nylon straps with possibility of adjustment, a seat belt made by a chest band and two in the hip whose adjustment and setting are made through a system of Velcro. The presence of the headrest externally attached to the back of the chair allows its height and depth adjustment, which can influence the choice of the equipment due to its contribution for a better user positioning. The headrest (optional) set on the back (Figure 8) only allows height adjustment that is obtained by displacing it onto the back. Moreover, the possibility of height adjustment of seat/backrest in relation to the

ground (Figure 7) allows a better adjustment of the equipment to the height of the user that performs the shower or bath task. The presence of brake casters makes movement easy and maintain the security of the user.

Added to these products that are part of the AT devices made by large companies in the branch, it is possible to list some equipment in the Brazilian context that present the same purpose as mentioned above, but with its own characteristics, made by artisans or home business companies.

The bath chair presented in Figure 8 is a device produced by a small business, made of painted steel, with a seat and back system made by a plastic sheet and non-slip fabric. It has an "X" locking system concerning its width, while its length remains unchanged after being closed. As it is a tailored-made product, it is possible to get it according to the user measures, caregiver height and dimensions of the environment in use. The presence of foot casters for favoring moving is optional, although, because the seat and backrest are fixed, it is often necessary its transportation to be dried and cleaned.



Fig. 8. Bath chair: (A) anterior view; (B) side view.

Figure 9 presents another device, homemade, whose instructions are available in hospitals and rehabilitation centers, also indicated to attend specific demands of severely handicapped people.

Through explanatory leaflets delivered by those rehabilitation centers to the companions of handicapped people, it is possible to achieve the device in specialty material and fabric stores. Fitting a device up should be done step by step according to the instructions, being the model available in three pattern sizes, that is S, M and B. The structure of the chair consists of connected PVC pipes. For the seat and back it is suggested a non-slip fabric or any washable resistant cloth, such as nylon. It should be noted that the fabric should be attached to the structure (Figure 10).

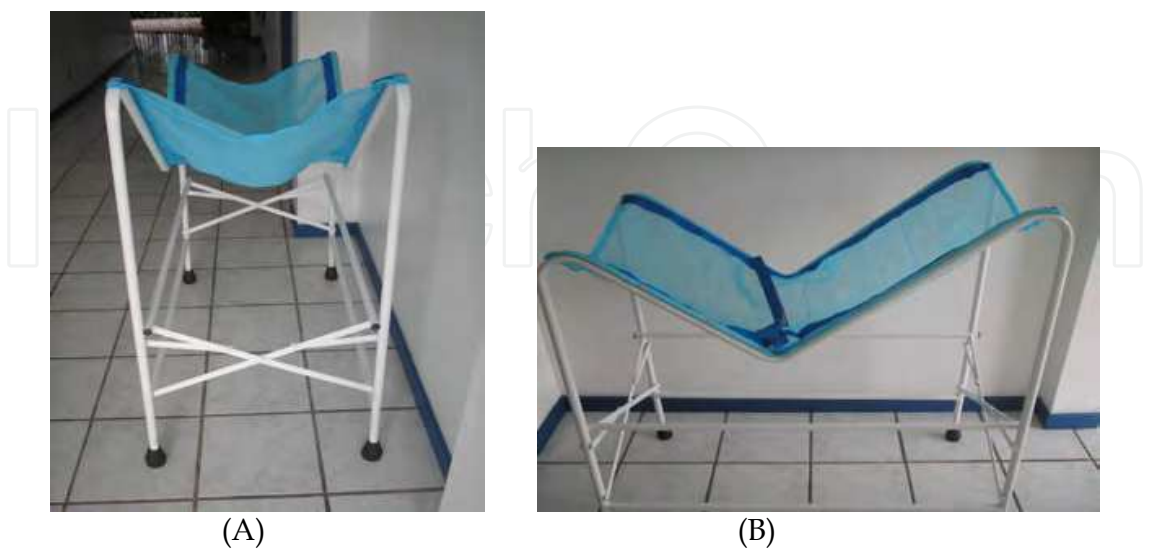


Fig. 9. Bath chair: (A) anterior view; (B) side view.



Fig. 10. (A) and (B): PVC pipes and connections structure; (C) Final craft model.

6. Conclusion

This chapter sought to present some directions for the prescriptions of AT devices, such as bath chairs, available in Brazil, for disabled people, especially physical commitment. Besides, it tried to provide, for the ones who work with handicapped people, relevant information regarding AT equipments that exist to maintain sitting posture during bath or shower.

In today's market there are numerous AT devices designed to meet the requirements demanded by a handicapped person or bath or shower activity. Ideal physical characteristics for usability of an AT product lead to professionals involved in an extensive knowledge of equipments available in the market in order to make it possible a critical analysis in relation to them, providing elements to an adequate indication of the device.

Assistive technology devices used for showering or bathing should accumulate a group of individual characteristics of handicapped people, that is, their structural and functional needs. The set of characteristics analyzed on AT devices should include: (1) product sizes, such as seat width and depth, height of backrest and to the ground; (2) presence of accessories, like head support, belts and other ones; (3) possibility of adjustments, such as height regulation and variation in the angle of the seat/backrest to get a tilt or not-tilt system; and (4) any additional information that enriches analysis for a better indication, prescription and purchase of the equipment.

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This book offers the reader new achievements within the Assistive Technology field made by worldwide experts, covering aspects such as assistive technology focused on teaching and education, mobility, communication and social interactivity, among others. Each chapter included in this book covers one particular aspect of Assistive Technology that invites the reader to know the recent advances made in order to bridge the gap in accessible technology for disabled or impaired individuals.

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