

# **International Best Practice Guidelines**

## **BPG4A**

### **Seat-Elevating Devices for Wheelchair Users**

**Use of this document**

As a code of practice, this Best Practice Guideline (BPG) takes the form of guidance and recommendations. It should not be quoted as if it were a specification, and particular care should be taken to ensure that claims of compliance are not misleading.

**Contractual and legal considerations**

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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## Background

This Best Practice Guideline (BPG) document is one of a series of documents prepared in advance for discussion at the 4<sup>th</sup> International Interdisciplinary Conference on Posture and Wheeled Mobility, held in Glasgow in 2010.

A group of Scandinavian PTs and OTs reviewed the RESNA position paper on Seat-Elevation devices (BPG4B). This resulted in some recommended amendments and additions to the document based on the group's clinical experiences which are summarised in this document.

Seat elevation is an important feature to maintain the ability to get into standing and facilitate the function of the arms as long as possible. For a lot of people the feature is necessary for Activities of Daily Living (ADL) and social participation. When choosing a wheelchair with a seat-elevation feature, it is important to bear in mind considerations including diagnosis (if it is a progressive disease), reach, transfer, ADL, social participation, and environmental considerations.

The committee was made up of the following:

- Birgit Werge, PT, Denmark
- Elisabet Rodby Bousquet, RPT, Sweden
- Jan Pool, OT specialist, Norway
- Else Marie Hansen, OT and MPC, Denmark
- Helle Dreier, OT and MSI, Denmark
- Lise Møldrup, OT, Denmark, (group leader)

Comments are welcome using the feedback forms on the website [www.pmguk.co.uk](http://www.pmguk.co.uk) where this document has been posted. The aim is that the Guidelines be updated from time to time, and comments/discussion collected from the website will be taken into account.

## Introduction

This paper is intended to be a supplement to the RESNA paper: RESNA Position on the Application of Seat-Elevating Devices for Wheelchair Users (BPG4B) and

[http://www.rstce.pitt.edu/RSTCE\\_Resources/Resna\\_position\\_on\\_seat%20elevation.pdf](http://www.rstce.pitt.edu/RSTCE_Resources/Resna_position_on_seat%20elevation.pdf)

In the RESNA paper, seat-elevation is defined as:

"A seat elevator will raise and lower the user in their seated position through the use of an electro-mechanical lift system, without changing the seated angles or the seat's

angle relative to the ground, in order to provide varying amounts of added vertical access. A seat elevator may elevate vertically from a standard seat height, or may lower the user closer to the floor."

We agree with the definition, but suggest the following additions to the content of the RESNA paper: transfer, reach, and environmental considerations. When you analyze the needs of the user before choosing a wheelchair with seat-elevation feature, it is very important to pay attention to these subjects and also to the diagnosis, especially for users with progressive diseases.

We would like to add the subjects transfer, reach and environmental considerations as a supplement to the RESNA document.

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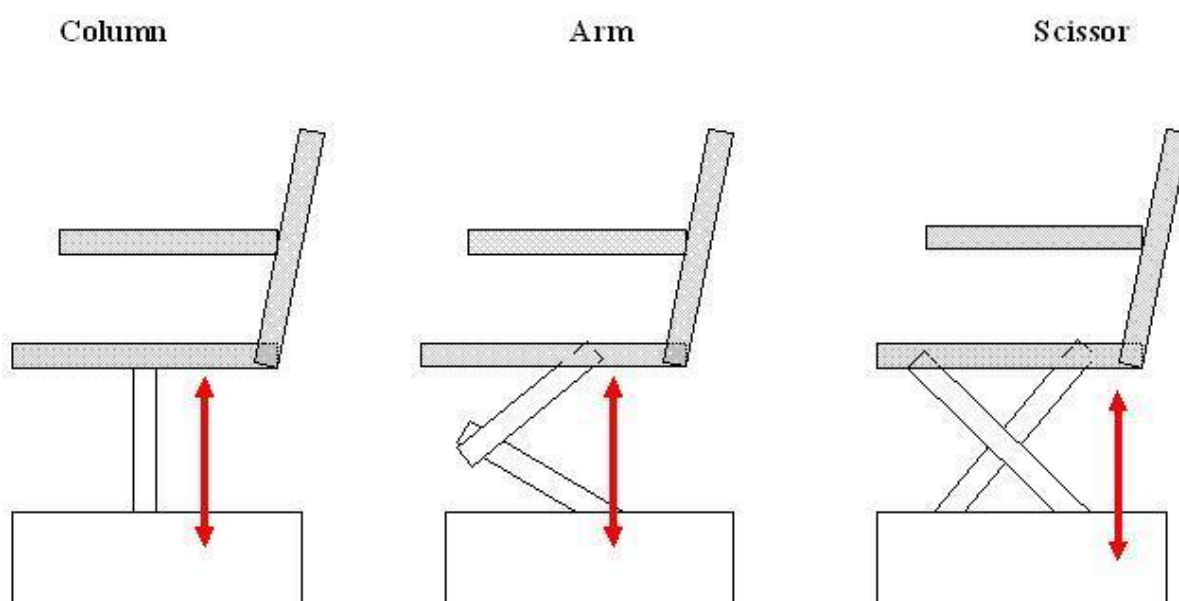
## Product design

Seat elevation features have different constructions. The most common seat elevation constructions are (Figure 1)

- Column lift
- Arm lift
- Scissor lift

All three have their advantages and disadvantages in, for example, range of motion (minimum and maximum height) and stability.

**Figure 1 Most common seat elevation constructions**



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## Seat elevation and stability

Seat elevation influences the stability of the wheelchair and therefore most powered wheelchairs automatically reduce the driving speed by 50% when the seat is elevated.

Most wheelchairs with seat elevation have good stability when the seat is in the lowest position. The differences in stability of the seat elevation constructions becomes clearer when the seat is lifted just a little bit to just before the speed reduction is activated.

For wheelchair users who drive their cars sitting in their powered wheelchairs, it is sometimes necessary to make individual adjustments to be sure the wheelchair is stabilized properly in the driving position.

## Transfers

People with lower extremity and arm weakness may have difficulties assuming a standing position from a normal seat height and may need additional help from a seat-elevation device. The more weakness of the lower extremities and the upper extremities the higher seat elevation is needed.

Several people, such as those with genetic neuromuscular diseases, risk getting so weak that they will only be able to stand and walk with hyper extended knees and hyper extended hips, and with the line of gravity behind the hip joint and in front of the knee joint.



When using seat elevation it is essential that the seat is elevated without changing the seat's angle relative to the ground, to be able to keep the knee and hip joint fully extended, and to avoid collapse of the knees when getting into standing. To make sure that a user can get into standing, as long as he is able to stand or walk, the seat

elevation must be able to lift at least to a level corresponding to the distance from the floor to the ischial tuberosities.

At the same time it is important that the leg supports can be removed, either electrically or manually, to make sure that the user can get into standing without touching the leg supports, and thereby risk falling over. The surface and the shape of the seat cushion must be considered since they affect the ability to move forwards and backwards on the seat.

### **Lowering**

Lowering the seat-elevation to the floor can be beneficial in some circumstances, especially for younger children.

For tall persons it can be of great importance to be able to lower their seat height in order to get into a car while in the wheelchair, to be able to sit upright and to look out of the windows in the car. However, if a person remains in a lowered position for a longer period of time, sitting with straight legs may increase the risk of a posterior tilted pelvis, kyphosis and scoliosis.

Seat-elevation both upwards and downwards is also important for the person who assists a client in transfers in order to reduce the work load and gain an optimal working posture.

### **Reach**

People with severe muscle weakness may require seat-elevation to lower the seat in order to get their hands to their mouth when eating. If the user is getting so weak in the upper extremities that he is not able to lift the upper arms and/or forearms against gravity, it is important for the ability to get a hand to the head and eat independently for as long as possible, that the seat elevation can get so low, that he can passively bend his/her forearm, so the hand can reach the head/mouth. Therefore he/she must be able to get under a table, rest the forearm against the edge of the table, and lean forward. To be able to get under a table it may be necessary for the arm support to be able slope down forward, either electrically or manually.

Most people find it important that the seat-elevator moves quickly, for example to be able to empty a dishwasher, one must go down to the dishwasher and up to a high cupboard a number of times.

### **Environmental considerations**

An appropriate height of sitting at dining table, is of great importance. A standard dining table in Scandinavia has the height of 72-75 centimetres and many tables have an edge under the table top, which means, that a wheelchair user has to lower

the wheelchair further to get under the table. Also, when family and friends are sitting at a coffee table, a low wheelchair is important for social participation.

## Conclusions

Seat elevation is an important feature to maintain the ability to get into standing and facilitate function of the arms as long as possible. For a lot of people, the feature is necessary for ADL and participation. When choosing a wheelchair with a seat-elevating feature, it is important to take into account: the medical diagnosis (if it is a progressive disease), reach, transfer, ADL, social participation, and environmental considerations.