



Table of Contents

Click on a topic below:

1. Safety Comparison: STAXI Transport Chairs and Basic Wheelchairs
2. General comments about the safe use of STAXI:
3. There are three groups of persons affected by the use of wheelchairs:



Safety Comparison: STAXI Transport Chairs and Basic Wheelchairs

Prepared for Risk Managers

Introduction

STAXI was developed under the direction of Dr. Geoff Fernie, BSc, PhD, MIMechE, CEng, PEng, CCE at the Center of Studies in Aging. He led a team of nurses, engineers, porters, volunteers, researchers, doctors from various hospitals in order to improve the safety, reliability and functionality of wheelchairs. More than 12 years of R&D and a 2 year independent clinical trial in a hospital setting was completed prior to licensing the design technology to STAXI Corporation Limited in 1999.

On any given day more than 10,000 STAXIs are in use and transport hundreds of thousands of passengers at North America's Top hospitals including Duke University Hospital, Wisconsin Hospital and Clinics as well as military and VA medical centers. STAXI is the leading wheelchair alternative for hospitals and the world's leading nestable transport chair system. In its entire history, STAXI Corporation Limited has never entered litigation or a lawsuit related to its products.

The safety results below use data, reports and findings from third-party tests and sources, which are supported by testing completed by STAXI Corporation Limited.

The safety of STAXI, with its patented features including automatic fail safe braking system, is sometimes a topic of discussion with prospective customers, especially within Risk Management divisions.

The following is an opinion about the safety merits of the STAXI braking system and design, and STAXI performance compared with regular wheelchair use. This opinion was generated with input from the Centre for Studies in Aging at Sunnybrook Health Sciences Centre and Women's College Hospital as well as from independent studies

conducted by the Engineering Department of the University of Western Ontario, Revab (an international Dutch-based producer of high quality wheelchairs that partners with other leading wheelchair companies such as Permobil), and includes results from a regional health services authority risk-assessment report prepared by Ergonomic Advisors at Riverview Hospital, FPSC and B.C.'s Children's and Women's Health Centre.

General comments about the safe use of STAXI:

STAXI is not designed to be used unattended.

Rearward stability of STAXI is decreased so caution should be exercised when traveling on an incline. STAXI was designed to provide ease of mobility even when the chair is carrying its maximum weight capacity of 450lbs. As a result, some rearward stability was traded-off to provide this maneuverability.

To put this comment in perspective, results from STAXI Chair Assessment Final Report, March 2006, a hospital-funded inquiry conducted at B.C. Women's and Children's Hospital concluded that:

"Results indicated that the STAXI Chair was significantly ($p < 0.01$) more stable in the lateral direction but significantly ($p < 0.01$) less stable in the rearward direction as compared to a typical portering wheel. The lower stability found for the STAXI chair in the rearward direction is associated with the rearward displacement of the weight of the base of the weight base of the STAXI chair, which helps to increase maneuverability. An anti-tipping mechanism is attached to the rear of the STAXI chair to prevent over-tipping of the chair."¹

¹ STAXI Chair Assessment Final Report, March 2006, prepared by Rick Hall and Daphne Lee

Like wheelchairs, STAXI should be parked on a level surface.

There are three groups of persons affected by the use of wheelchairs:

1. The Occupant.
2. The Attendant/ Companion (i.e. caregiver, volunteer or porter).
3. Third parties.

The Occupant:

A regular wheelchair is designed such that the brake has to be applied by either the occupant, an attendant/companion or by a person propelling the chair from behind. This allows for error. If the chair is stopped on anything other than a perfectly flat surface and the brake is 'forgotten' then the wheelchair can roll or run away. Further, the brake has to be manually released, usually by an action required to release each wheel separately. This requires a conscious effort. If it is released by the attendant/companion, it usually involves bending over, with a strain on the back. Volunteers and porters typically repeat this action frequently throughout the day and run a higher risk of strain or injury.

By contrast, STAXI's brake is applied automatically when the attendant/companion stops pushing the chair. This does not involve bending and requires no conscious effort or thought. STAXI's brake is released automatically when the attendant/companion squeezes the handle and starts to push STAXI. STAXI's brake is a failsafe system.

The pitch of the seat and the angle of the backrest help prevent the occupant from sliding forward in instances where STAXI's brakes are applied quickly in an emergency stop. Independent tests, conducted by Sunnybrook and Women's College Health Sciences Centre; by the Engineering faculty at University of Western Ontario and by



STAXI Corporation Limited, concluded that STAXI's 'bucket-style' seat helps position the occupant significantly back in the seat relative to the wheel base. The optional seat belt may assist with the security of the occupant but occupants who lack trunk stability should not be transported in the STAXI as there is not adequate support. As with similar devices, it is hazardous to leave occupants unattended and restrained.

If there is an obstacle or hazard in the path of the STAXI, the attendant/companion simply stops pushing and squeezing the handle and STAXI stops immediately. In order to stop wheelchairs, the attendant/companion must stop pushing and then pull back on the wheelchair handles to stop the chair's forward momentum. Wheelchair brakes must then be applied manually and often rely on the attendant/companion's upper body strength to stop the wheelchair in an emergency.

The armrests pivot up and out of the way to allow the occupant to transfer onto or off STAXI from the side. This feature reduces the need for attendants to lift occupants and thereby reduces the risk of injury related to heavy lifting. STAXI's seat is higher than most standard wheelchairs, which also makes getting in and out of the seat easier.

The Attendant/Companion — the person pushing STAXI

STAXI was ergonomically designed and tested by the research and design team at Sunnybrook's Centre for Studies in Aging to minimize the effort required to maneuver the STAXI with the occupant. At Revab testing facilities in Europe, tests were conducted to compare STAXI with an ideal weight distribution ratio used to test wheelchair. This ideal says that weight on the rear wheels should be a minimum of 2.2 times more than on the front casters for ease of pushing a transport chair. Most wheelchairs test 1.52. The results of such independent tests in Europe, report that STAXI has a ratio of 4.2, which is much better than the recommended ideal and significantly better than the average wheelchair.



Instead of the typical two 'bicycle style' handles used to push a regular wheelchair, STAXI uses a full width, single handle bar. Porters and volunteers have complained that pushing a wheelchair with the 'bicycle style' handles causes wrist pain that can cause repetitive strain injury. The single STAXI handle bar is higher than most wheelchair handles, which mitigates the need to bend at the waist or round the shoulders in order to push. By having to bend at the back to push a regular wheelchair the companion/attendant's back is under undue stress. STAXI can be pushed with a straight back and with either hand or both hands. This allows the companion/attendant to have a free hand. When going through doorways and openings the central placement of the companion/attendant's hands prevents the potential for hand injury on door frames. STAXI can also be pulled backwards and into turns very easily, which further enhances its maneuverability.

The automatic failsafe braking system also facilitates safety: the brake is applied even if the companion/attendant forgets and then it is released automatically when the companion/attendant starts to push again. No thought or bending over to release the brakes is needed as on a regular wheelchair. The automatic brake ensures that the chair cannot accidentally move when performing an occupant transfer to or from the STAXI. This helps to prevent injury to the companion/attendant or occupant that could be caused if the chair moves when the companion/attendant is transferring the occupant.

STAXI has several storage areas to place objects. These are a luggage rack under the seat, a basket behind the seat back for documents, purses etc., and hooks on the basket to hang items. These features allow the companion/attendant to have both hands free, focus on transporting and avoid the risks associated with carrying heavy bags (belonging to the occupant) during admission and discharge.



Third Parties:

Third party injuries caused by wheelchairs are common. When a wheelchair is used in areas where there are other people in the vicinity, often third parties will suddenly move into the path of the chair. Intersections in crowded hospital corridors are particularly vulnerable to this problem. To avoid a collision the wheelchair must be stopped quickly. Unlike wheelchairs, STAXI stops automatically and instantly when the brake bar is released. Without an automatic brake, wheelchair operators must stop pushing forward and then pull back hard on the wheelchair handles to stop the forward momentum of the wheelchair, which often occurs too late to avoid accidents.