



Collaborative Development of An Innovative Shower Chair



Advanced Manufacturing Research Centre



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Presentation Outline

- Introduction to **D**evices for **D**ignity (D4D)
- Rationale of Research Project
- Research Approach - *Clinical Consultations*
- Progress to Date
- Research Collaborating Partners
- Summary

D4D: A Healthcare Technology Co-operative (HTC)

*Based in the NHS, an HTC is a **national** clinician-led, collaboration between **clinicians, patients, carers, academia and industry** which acts as a focus for **'technology pull'** into the NHS*

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Sheffield Teaching Hospitals 
NHS Foundation Trust

North Bristol 
NHS Trust

 UNIVERSITY OF
CAMBRIDGE


Sheffield

Coventry 
University

Barnsley Hospital 
NHS Foundation Trust

 The
University
Of
Sheffield.

The Leeds Teaching Hospitals 
NHS Trust

*
Host trust

Sheffield Children's 
NHS Foundation Trust

Devices for Dignity HTC

Our Mission: *“To deliver innovative devices to support patients with long term conditions, which preserve their dignity and independence.”*

Renal Technology



**0.05% of population
but 2% of NHS budget**

Assistive Technology



**11 million people in the UK
with disabilities**

Urinary Continence Management



**2nd most common
reason for need for
institutional care**

D4D's Unique Selling Point

D4D is a **national resource** working with patients, industry, academia and clinicians to find out **what people really need**, then bringing together **national teams of experts** to **design and develop** solutions and **deliver** them back to the patients

Discover → *Design* → *Develop* → *Disseminate*

Shower Chair: Collaborating Partners



1. **Kingkraft Ltd** – leading the project and overseeing the coordination of all project activities



2. **D4D** - providing clinical and regulatory advice on issues related to the development of the proposed product (e.g. CE marking, standards and user group advisory services)



Advanced Manufacturing Research Centre



3. **Advanced Manufacturing Research Centre** - producing tooling and moulds for the components (also working with a design consultancy that will be producing drawings, Computer Aided Design (CAD) Finite Element (FE) analysis)

Rationale of Research Project

- Static showering and bathing aids are available to assist wheelchair users at home or in hospital.
- However, for those independent wheelchair users, who wish to be able to **travel or participate in sports**, there is **limited** availability of products that can be transported easily by users.

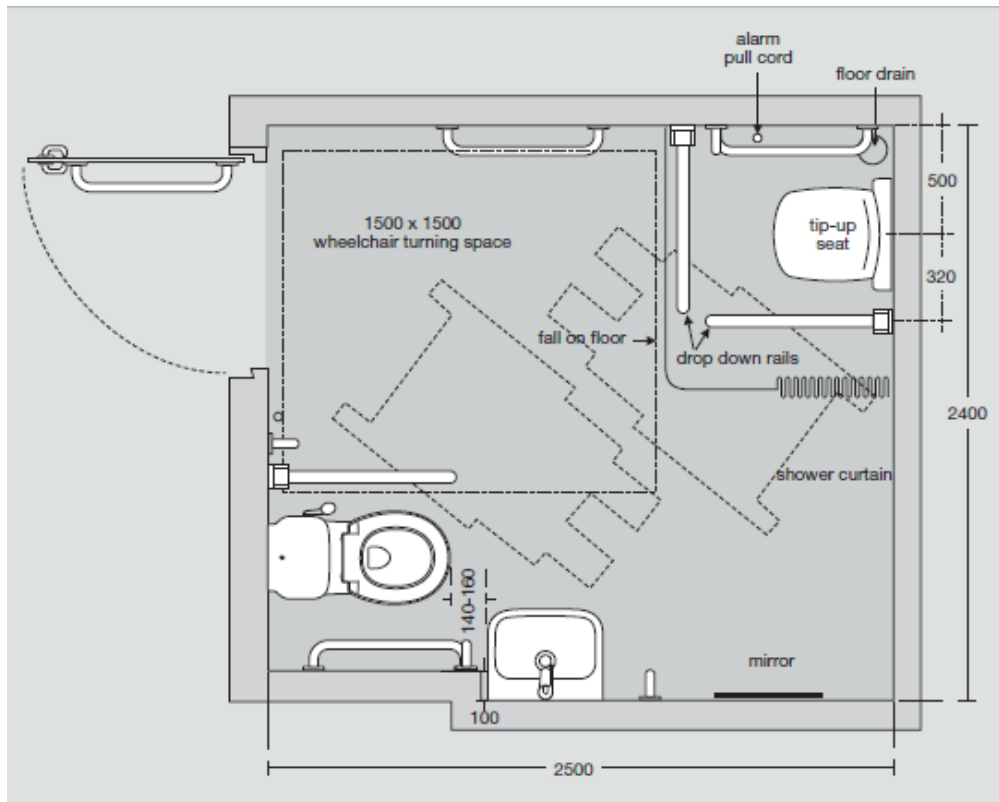


“A typical mobile shower chair”

Background to Research Project

- *Kingkraft Ltd* had conducted interviews with independent wheelchair users.
- Participants reported that despite the *Disability Discrimination Act (DDA)*:
 - 1) facilities are often poor in UK hotels or sports centres,
 - 2) often resulted in unacceptable situations such as:
 - a) precarious manoeuvring onto static shower chairs in wet conditions
 - b) crawling across shower room floors.

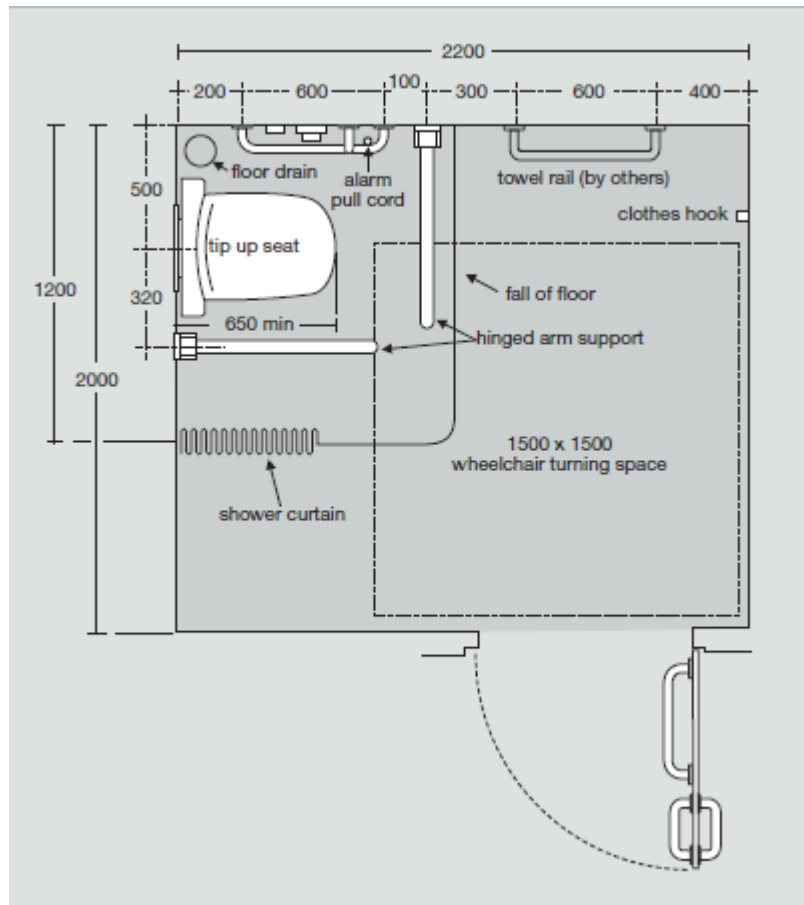
DDA Regulations relevant to showering



Hotel Shower Room

- 5% of rooms must provide for disabled use.
- 2.5% of bedrooms should have disabled use shower facilities

DDA Regulations relevant to showering



Public Shower Facilities

(e.g. Sports centres, swimming pools and health and leisure centres)

- At least one wheelchair accessible facility should be installed.
- Layout must allow privacy and space for assisted care.

Aim of Research Project

- The aim of the project was to design an **innovative shower chair to meet the needs of the active, independent, self-purchasing wheelchair user** *[the majority of whom were expected to have Spinal Cord Injury (SCI)]*.
- The research project will **produce a fully-functional shower chair.**

Clinical Consultation

- D4D consulted **multi-disciplinary specialist clinicians** at the Spinal Injuries Unit at the Northern General Hospital, Sheffield (2nd largest unit);
 - *obtained extensive feedback on existing designs of mobile shower chairs, in particular their functionality, ease of use and ergonomics and also preliminary designs for the new prototype.*

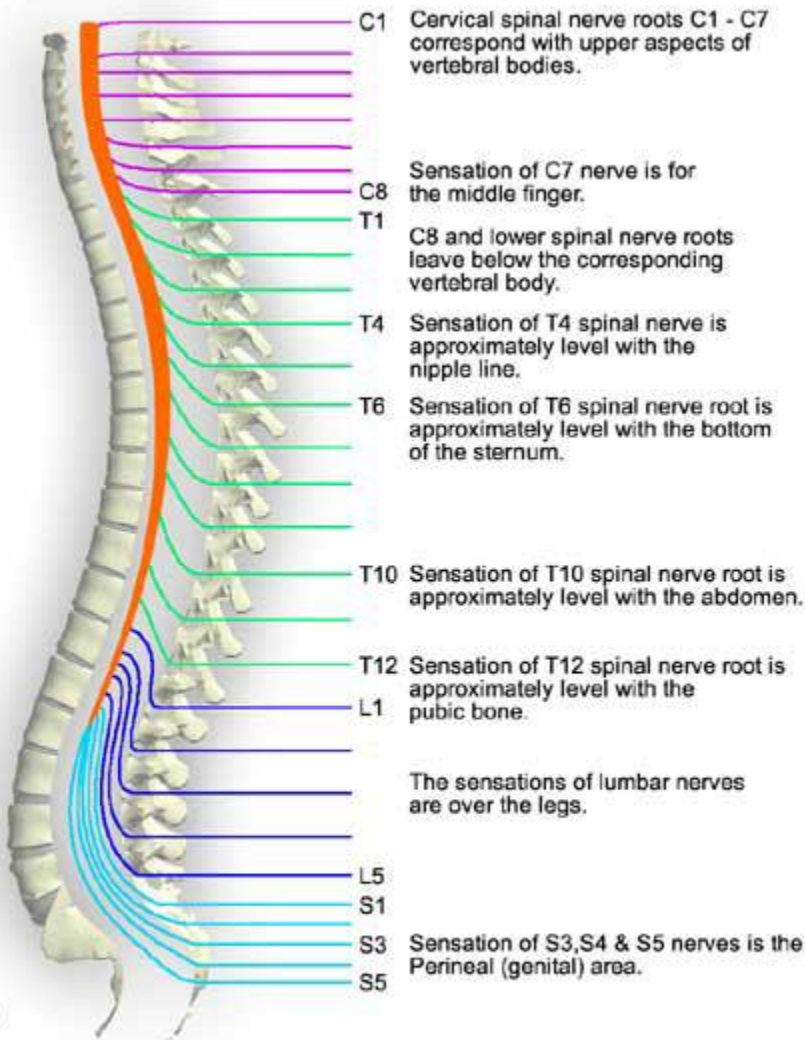
Bone notch at the base of the neck is C7.

The spinal cord ends approximately between L1 & L2.

Sacral cord segments (S1-S5 'Cauda Equina') are level with T12-L1 Vertebrae.

The sacral vertebrae are fused to make up the sacrum.

The coccygeal vertebrae are fused to make the coccyx or "tail bone".



Tetraplegia

(all 4 limbs/torso impaired)

Paraplegia

(lower limbs / variable torso affects)

T2/3 no trunk muscles
T6 - T12 - trunk and abdominal muscles

Identifying potential shower chair users

- Complete Paraplegics (short term use)
- Incomplete walkers awaiting major adaptations to housing
- Not likely to be useful for Tetraplegics
 - No independent transfer, manual propulsion, etc
- ***3 most clinical issues for people living with SCI is bladder, bowel and skin care: good hygiene is one critical aspect in protecting skin integrity.***

Functional Design Considerations

- Static or mobile chair?
- Pressure relief to protect skin integrity
- Safety: user weight, strength, stability
- Optimal balance between rigidity, weight, pack size

Generic SCI User Considerations

- Who will be purchasing
 - *User purchased so greater flexibility on cost than NHS prescription*
- Looks/Aesthetics/Appearance
- What level of Spinal Cord Injury?
 - *Postural support & determining usage restrictions*
 - *Muscle tone / spasm*
- Transfer ability and varying user methods?
- Size/weight of packed unit?
- Usability of deploying the chair
 - *Accommodate potential for impaired hand function*

Regulatory considerations

- Medical device or not?
 - *Depends on prime intended purpose*
- Relevant standards?
 - ***BS EN 12182:1999** Technical aids for disabled persons. General requirements and test methods*

Progress to Date

- **Developing and manufacturing of a prototype – COMPLETED**
 - An early tested prototype has been developed for evaluation of concept
- **Confirmation of Intellectual Property protection – AWAITED**
 - SO SORRY NO PHOTOS OF PROTOTYPE YET DUE TO IP
- **Running a user focus group – DEC 2011** 
 - a group of 10 spinal-injured participants is being recruited through the Aspire charity, based at Stanmore .
 - *to discuss, evaluate, and receive opinions on the new design shower chair, in terms of its effectiveness, ergonomics, aesthetics, etc., to ensure that it meets user requirements before proceeding further.*

Summary

- The research focuses on developing an innovative shower chair for the independent wheelchair user showering markets.
- The new design will offer users a higher quality of life, allowing them freedom to travel and participate in sports.
- A fully-functional shower chair will be ready by the end of 2012.

Acknowledgement

- This research would not have been possible without the *NIHR Early-stage Product Development Invention for Innovation (i4i) Award.*