DBO
kirton

'Patients rightly expect hospitals to be clean, safe and comfortable. As a nurse and now a Health Minister, I know that if hospital equipment and furniture is designed with infection prevention in mind it will be easier to clean, and that it's more likely to be cleaned more often as a result.'

Anne Keen
Health Minister
Design Council publication 2009

'This has been a very exciting project to work on, because it's an area that really has been neglected for a very long time. From a clinical perspective, the bed space equipment we use around the patient hasn't been changed in all the years I've been involved in healthcare. In fact it probably hasn't been changed since Florence Nightingale was a nurse!'

Professor Brian Duerden CBE,
Inspector of Microbiology and Infection Control, Department of Health
Design Council publication 2009

'We were after very flexible, proactive, forward looking people who could pull together the views of the world we knew nothing about - design. We wanted innovation and fresh thinking.'

Paul Cryer, HCAI Technology Innovation Programme Manager, Department of Health
Design Council publication 2009

In 2008 the Department of Health partnered with the Design Council and challenged the UK's top designers and manufacturers to develop new hospital furniture and equipment to combat Healthcare Associated Infections. The initiative was Design Bugs Out.

In response, multi-award winning design consultancy **PearsonLloyd**, leading medical seating manufacturer **Kirton Healthcare** and researchers at Brunel University, joined forces and went to work on the hospital commode and patient bedside chair.

from left:
Luke Pearson & Tom Lloyd

PearsonLloyd

from left:
David Wickett & Martin Battye

kirton

from left:
Dr. Hua Dong
Christopher McGinley
& Farnaz Nickpour

Brunel UNIVERSITY WEST LONDON

Commode

DESIGN: PearsonLloyd

A major **ambition** was to reduce the parts, increasing the speed with which you can dismantle the product and put it back together. The easier it is to clean, the more likely it is to be cleaned.

The **shell** is 100% polypropylene which best survives chlorine-based bleaches, and the **frame** is stainless steel, so there are no secondary coatings to scratch. If a painted surface gets scratched, the commode will be condemned, as it becomes a harbour of germs.

Leading microbiologists advised us against anti-microbial coatings since they have no effect on *C. difficile* spores.

We split the commode into two structures. There is the **shell** which is the part the human interacts with, and the **stainless steel frame** which is the part that supports the 30 stone (190 kg) weight limit. Separating the parts in this way makes the commode a cost effective solution as individual components can be replaced as required without having to purchase an entire chair.

The **armrests** and **footrests** are solid, smooth glass reinforced nylon for both structural integrity and ease of cleaning. We designed them to rotate on the tube axis only to minimise the gaps between parts.

We selected **twin-wheeled castors** over typical single wheeled castors because they improve manoeuvrability, the brakes are easier to operate and they are much smoother and easier to clean.

The **lid** has two indents for hygienic removal. It also has been designed to snap onto the tube frame when not in use.

Traditionally, the **pan** is mounted underneath the aperture of the seat. The problem with this is splash back after an explosive event. The aerosol effect of diarrhoea can be 15 meters [49 feet], and *C. difficile* spreads very easily. We've mounted drop-in pans from a ledge, so that an event is completely captured. From user research we also found that existing pans are not deep enough, so we've doubled the depth of ours.

Our **pan** is available in pulp for one time use and maceration, or re-usable plastic. Although we advocate the use of our pans, we understand that in some situations the existing pan has to be used, therefore we offer a simple clip-on plastic shelf for the steel frame.

One common problem we found during our research was **space saving** in hospital sluice rooms. We therefore designed the frames so that they can nest like shopping trolleys, and developed a storage rack for the shells.

The shells are hung on the rack in an orientation so that the underside of the seat can be easily viewed without having to touch the product. This is beneficial for **hospital audits**. Hung in this way the shells can air dry in seconds. The total height of the rack has been kept to a minimum so that it can go beneath work surfaces.

This introduces a system whereby clean parts are stored separately, making it obvious what has been cleaned, thereby reducing the risk of **contaminated commodes** going back out on the ward.

During the design process we performed a product **lifecycle analysis** to ensure that the materials, manufacturing processes and transportation of parts had the least harmful impact on the environment.

TECHNICAL Specification

Function

Bedside toileting
Portering patient to toilet
Use over toilet as sani-chair

Weight Limit

30 stones
190 kg

Cleaning Tolerances

1000 ppm chlorine releasing bleach
Pressurised steam
Alcohol wipes

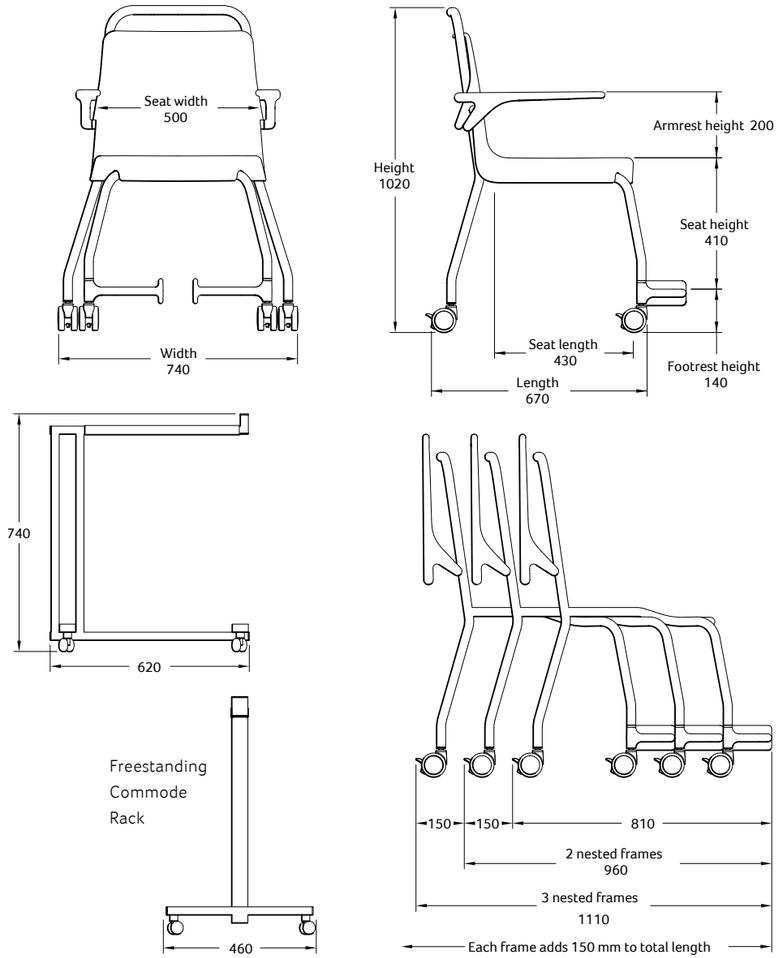
Product Codes

Complete DBO Commode: DD001
Commode frame: 102190
Shell: 102197

Accessories

Product Codes

Pulp Pan: 102191 (Box of 100)
Plastic Pan and Lid: DD100
Pan Shelf: DD101
Freestanding Commode Rack: DD106



All Dimensions in mm

For product test certification contact Kirton on:
Freephone **0800 212709** or download from **www.kirton-dbo.co.uk**

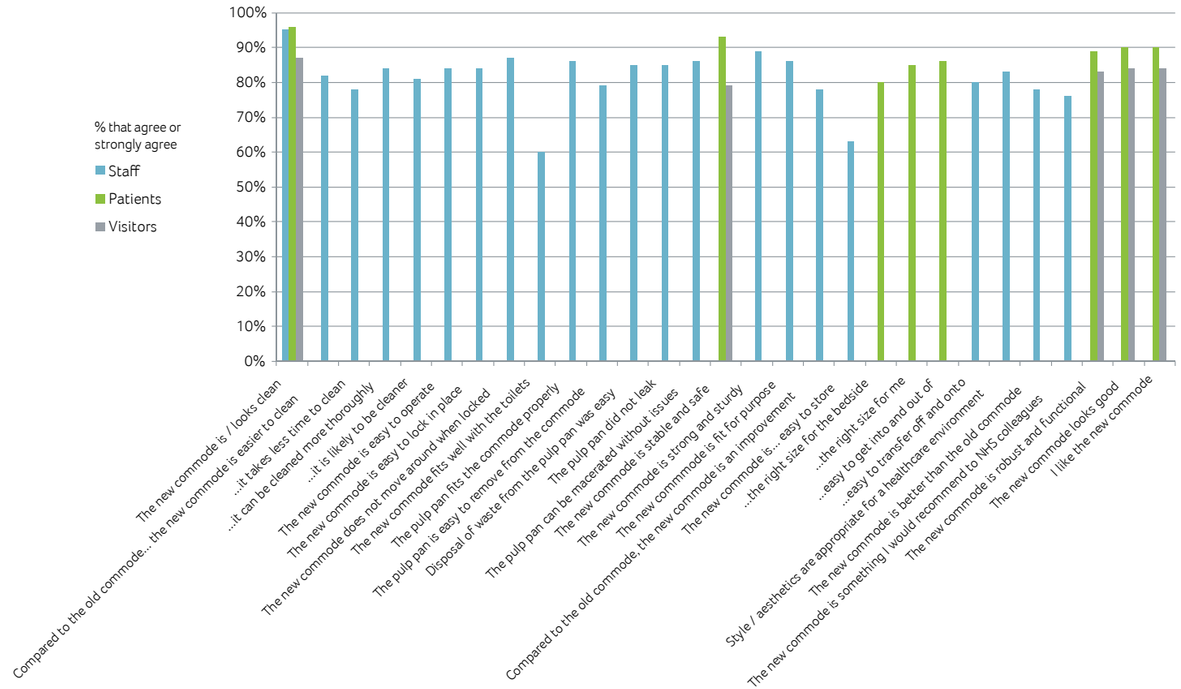
CLINICAL Research

The Department of Health carried out 3 independent studies on the **Kirton DBO Commode**

1. User research from 8 showcase hospitals
2. A human factor study
3. A laboratory study using ATP and microbiology swabs

With the results from these 3 studies, the Department of Health concluded that the evaluation strongly suggests that the Kirton DBO Commode is a significant improvement on existing designs, which is well received by staff, patients and visitors alike.

1 *Showcase Hospital User Analysis*



2 *Human Factor Expert Analysis*

92% of staff and 87% of patients and visitors considered the new commode to be an improvement on the older style. The commode appeared to perform well across all of the stakeholder criteria; better cleaning protocols and management would further enhance its performance.

3 *Laboratory Assessment of Cleanability*

Using the recovery of ATP as a marker for residual soiling and B.subtilis as a marker for microbiological / soil removal, the data suggests that the new commode is significantly easier to clean than the old.

Patient Bedside Chair

DESIGN: PearsonLloyd

DESIGN

Insight

Our research showed that patients commonly sit in bedside chairs for long haul flight durations. The reason we feel bad after a long haul flight is not because we have travelled through different flight zones, it is because we have been sat for long periods with little opportunity to move. This **insight** early in the design process meant that patient comfort was a major priority.

The project was a great opportunity to pool together experience from the design of award winning Business Class Seating for Virgin Atlantic (PearsonLloyd) and Class 1 Medical Devices in pressure relieving seating (Kirton Healthcare) to deliver a much more comfortable **patient experience**.

The **shell** is 100% polypropylene mounted on either a non-swivelling height adjustable, lockable gas lift or set at a fixed height.

Rear wheels are included for housekeeping although they can be replaced with feet when required.

The **assembly** under the seat is protected with a silicone shroud so that the chair can be steam cleaned.

The **star base** is made of glass reinforced nylon for structural reasons and has been designed to work with tray tables.

We wanted to have a chair where the **cushions** would be removable for cleaning but with no fixtures or fittings, so we needed an innovation. We had the idea to use magnets in some way so we put together a team of experts in magnetics, plastic engineering and fabric welding. We got the result we were after. We developed a new technique for moulding magnets into the plastic shell, and one for welding magnets to the inside of the fabric. The magnets we are using are the strongest natural earth magnets but used in a way where the patient does not come into contact with potentially harmful magnetic fields. This has been rigorously tested and is safe for all patient use.

The **cushions** are designed to have a single peripheral weld and no other seams. A special weldable zip is included so that the inside of the cushions can be inspected as hospital audits require. The zip also acts as an essential vent for air flow in and out of the cushion. The zip is protected from fluid ingress by a welded flap.

We found that in mattresses, the Department of Health stopped putting patients on vinyl in the 1980s - but in chairs there was no change, vinyl continued to be used.

The DBO Patient Chair is covered with a version of the current mattress fabric. This is a waterproof but vapour permeable fabric with excellent stretch characteristics. A polyamide knit with a polyurethane membrane. Our **fabric**, which has been specifically developed for seating applications, helps to reduce the build up of sweat which can macerate the skin and increase friction.

Other benefits of our fabric over vinyl is the ability to weld seams and longevity since over time vinyl leaks plasticisers, becomes brittle and cracks. Vinyl [polyvinylchloride (PVC)] is also pretty harmful for the environment.

During the design process we performed a product **lifecycle analysis** to ensure that the materials, manufacturing processes and transportation of parts had the least harmful impact on the environment.

Beneath the fabric is something we are excited about. The R&D Department at Kirton Healthcare have been working on a new technology that significantly reduces the risk of pressure ulcers. This technology is called **Intelli-Gel®**, a deep grid-like array of gel columns. Here's what the tech guys are saying about it.

"we started off looking at a whole range of materials either in use or with potential for use in pressure relieving cushions. Using Interface Pressure Imaging technology,we were able to rank those materials in order based on how good they were at redistributing high pressures. The results were striking, the highest ranking cushions were always combinations of materials incorporating Intelli-Gel®"

"Through iterations we eventually arrived at what we thought was the best cushion design using Intelli-Gel®. We confirmed our results independently at Prof. Stephen Sprigle's lab at Georgia Tech. Their data indicated that our cushion performed similarly to a commercially available air bladder wheelchair cushion, using an instrumented buttocks model"

"We then followed up on the lab testing in an independent clinical evaluation. Although the sample size was small, the pressure ulcers in all volunteers healed. This was measured with both visual inspection of skin quality and imaged with high definition ultra-sound"

Based on the evidence supporting the claim that this cushion has the potential to heal those with pressure ulcers up to Grade 2, the DBO Patient Chair is registered with the Medicines and Healthcare products Regulatory Agency (MHRA) as a **Class 1 Medical Device**.

To request an evidence pack contact Kirton Freephone **0800 212709** or download from **www.kirton-dbo.co.uk**

TECHNICAL Specification

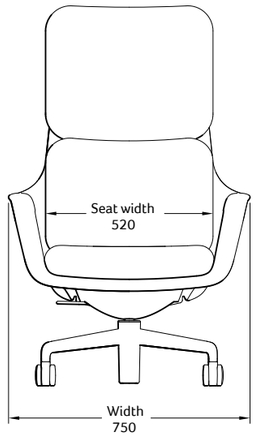
Weight Limit
30 stones
190 kg

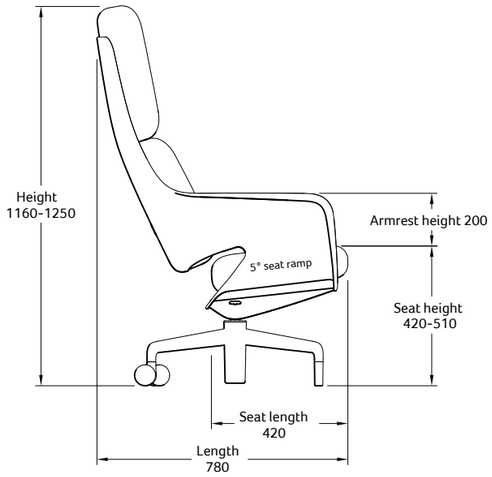
Fire Retardency
Medium Hazard (Crib 5)

Cleaning Tolerances
1000 ppm chlorine releasing bleach
Pressurised steam
Alcohol wipes

Product Codes

DBO Patient Chair complete with cushions:	DC001
DBO Patient Chair – 420mm fixed seat height	DC003
DBO Patient Chair – 470mm fixed seat height	DC004
DBO Patient Chair – 530mm fixed seat height	DC005
Chair frame (No cushions):	DC002
Seat cushion:	DC100
Backrest cushion:	DC101

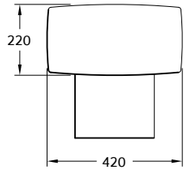




Accessories

Product Codes

Patient Chair Headrest:	DC104



Headrest

All Dimensions in mm

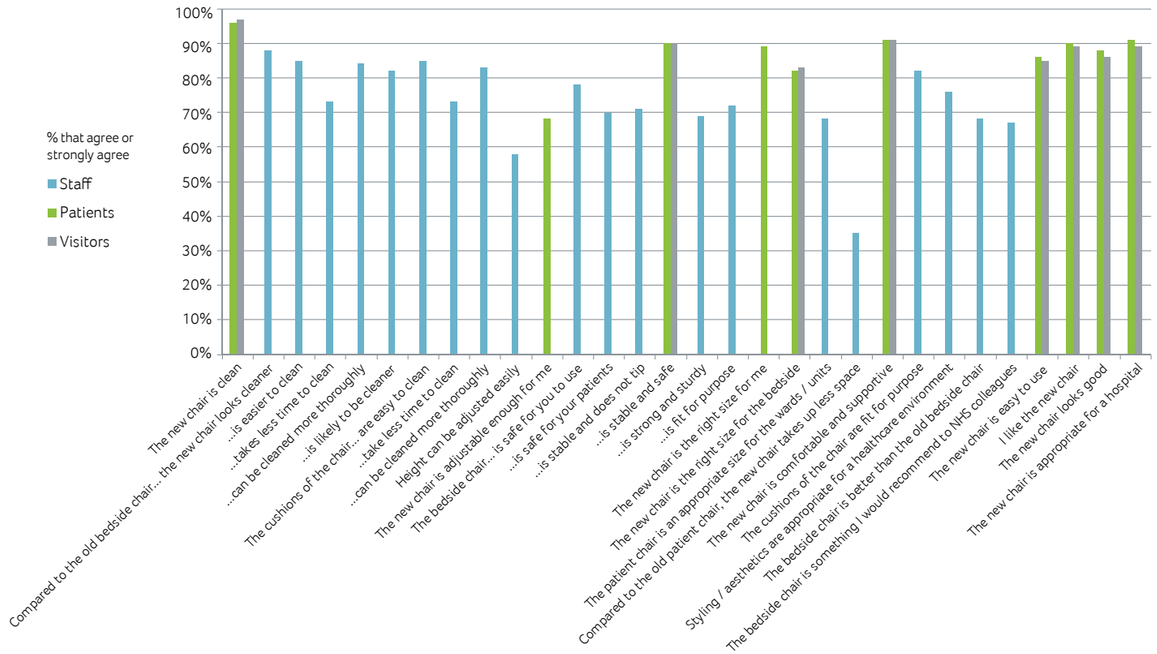
CLINICAL Research

The Department of Health carried out 3 independent studies on the **Kirton DBO Patient Chair**:

1. User research from 8 showcase hospitals
2. A human factor study
3. A laboratory study using ATP and microbiology swabs

With the results from these 3 studies, the Department of Health concluded that the Kirton DBO Patient Chair is a significant improvement over the older style patient chair. The Department of Health raised concern regarding movement in the height adjustment mechanism. This has been eliminated with the fixed height versions now offered by Kirton Healthcare in light of these research findings to give choice to our customers.

1 *Showcase Hospital User Analysis*



2 *Human Factor Expert Analysis*

93% of patients, 93% of visitors and 73% of staff consider the new chair is an improvement over the older style. Ease of cleaning, appearance, ease of manoeuvrability and pressure relieving characteristics are rated highly. Improvements to ward cleaning protocols would bring greater benefits from the design.

3 *Laboratory Assessment of Cleanability*

Using the recovery of ATP as a marker for residual soiling, the data suggest that there is no difference in the ease of cleaning old or new patient chairs. Using B.subtilis as a marker for microbiological / soil removal suggests that the new chair is easier to clean than the old.

KIRTON Who we are

We have been designing, manufacturing and supplying specialist seating for frail elderly and disabled people for over 30 years. We are also a major supplier of multi sensory environments and furniture for demanding mental health settings. We supply to the NHS and private hospitals, to long term care homes as well as to private individuals.

DBO Awards

Design and Health Academy
Building Better Healthcare
Brit Insurance Nomination
Design Guild Mark
D&AD

NEXT Steps

Contact **Kirton** → Product **Training** → Product **Trial** → NHS Customers: **Kirton or The NHS Supply Chain**

Product **Trial** → Non-NHS Customers: **Kirton**

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