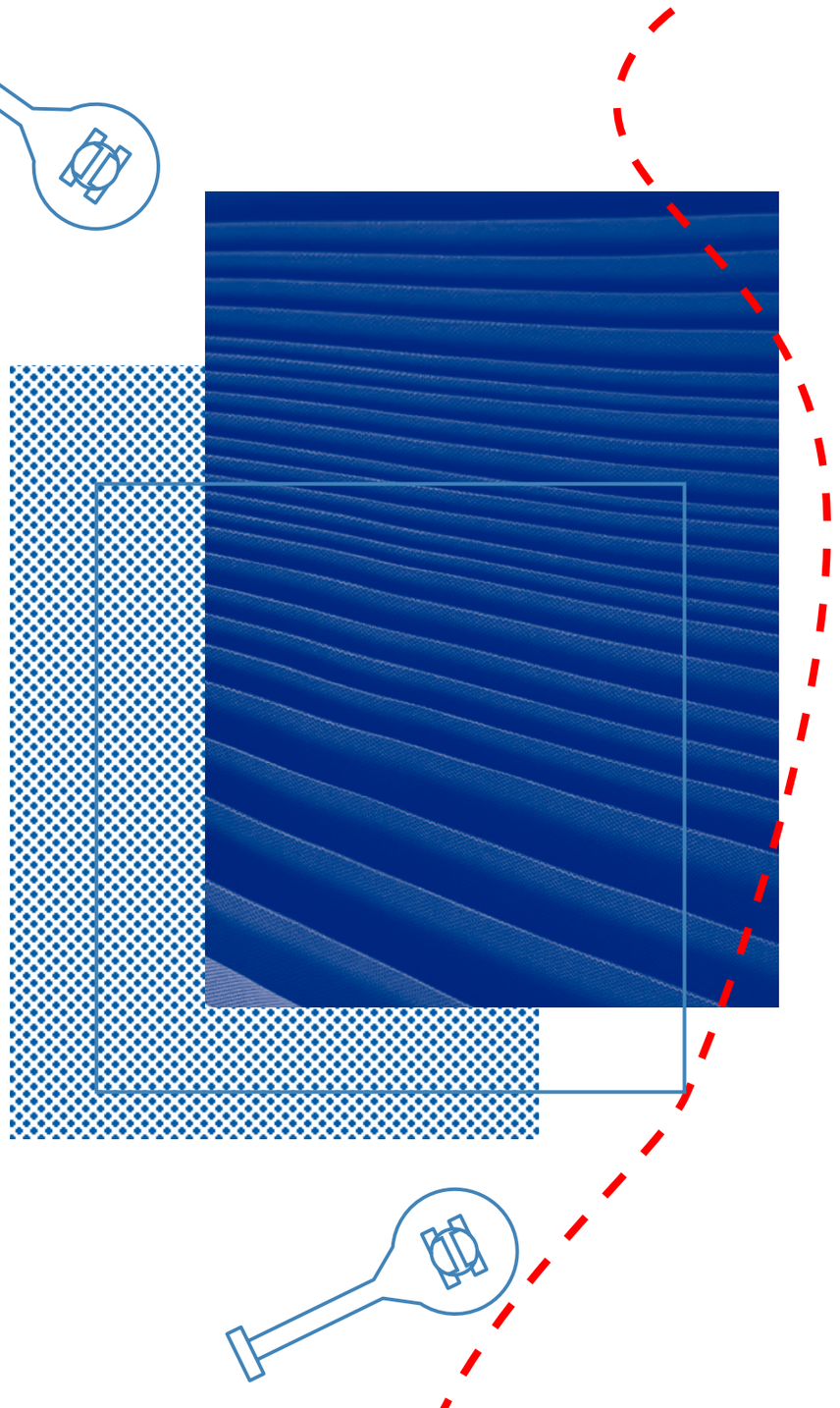
Amelio:

Improving the hospital curtain system



Brunel University London

NHS
Guy's and St Thomas'
NHS Foundation Trust

The Problem

Hospital curtains are a ubiquitous single-use plastic product used at Guy's and St Thomas' NHS Foundation Trust (GSTT) and across the NHS. They are lightweight and are not furnished with any closing mechanism that enable patients' privacy and support their dignity. As space is at a premium in hospitals, each bed space is also limited and staff moving around the patients continue to pull and drag the curtains to readjust them. Often this is done whilst wearing gloves used to attend to the patients. This means the curtains are problematic in terms of infection control as well as patient privacy and dignity.

Common issues with cubicle curtains

- Get stuck frequently.
- Draw back at inconvenient times.
- Don't provide clear message that privacy is required.
- Get in the way because bedspaces are too small.
- Get dirty very quickly.
- Account for a large amount of waste.

Table 1, Issues with cubicle curtains

Figure 1, Disposable cubicle curtains.

Through a collaborative project between Brunel Design and GSTT, sponsored by the Trust Charity and Brunel University London, an alternative solution for the hospital curtain has been identified through 6 user-centred design iterations and including 60 users with different expertise in the Trust. The proposed system, Amelio, consists of several components that enable appropriate closure of the curtains, unambiguous communication regarding respecting patients' privacy, temporary extension of the bed space to host equipment, and the extension of the lifespan of the current single plastic curtains.

Designing a solution

The first design iteration (seen above) was the concept that won the project funding for further development in early 2020. The concept was a reusable, easily wipeable panel that attaches to the cubicle curtains and allows the curtains to be securely closed to the wall or another curtain through the use of magnets.

The feedback from this prototype helped to develop the following iteration which was then evaluated by staff in a simulated ward at GSTT. This evaluation provided the feedback required to make the following design iteration. This process was repeated for iteration 3 and 4, after which point the concept was ready for evaluation in a clinical environment. As the design progressed over the first 4 iterations, the panel became flexible and longer in length. The signage improved and gradually simplified, as did the handle. The panel now had its own hook, meaning supported itself on the curtain rail rather than hanging on the curtain.

The fifth iteration was evaluated for 8 days within an in-use ward. Although the prototype worked well to begin with, the evaluation showed that it didn't continue to work well over time.

Figures 2 & 3, The first iteration of Amelio.

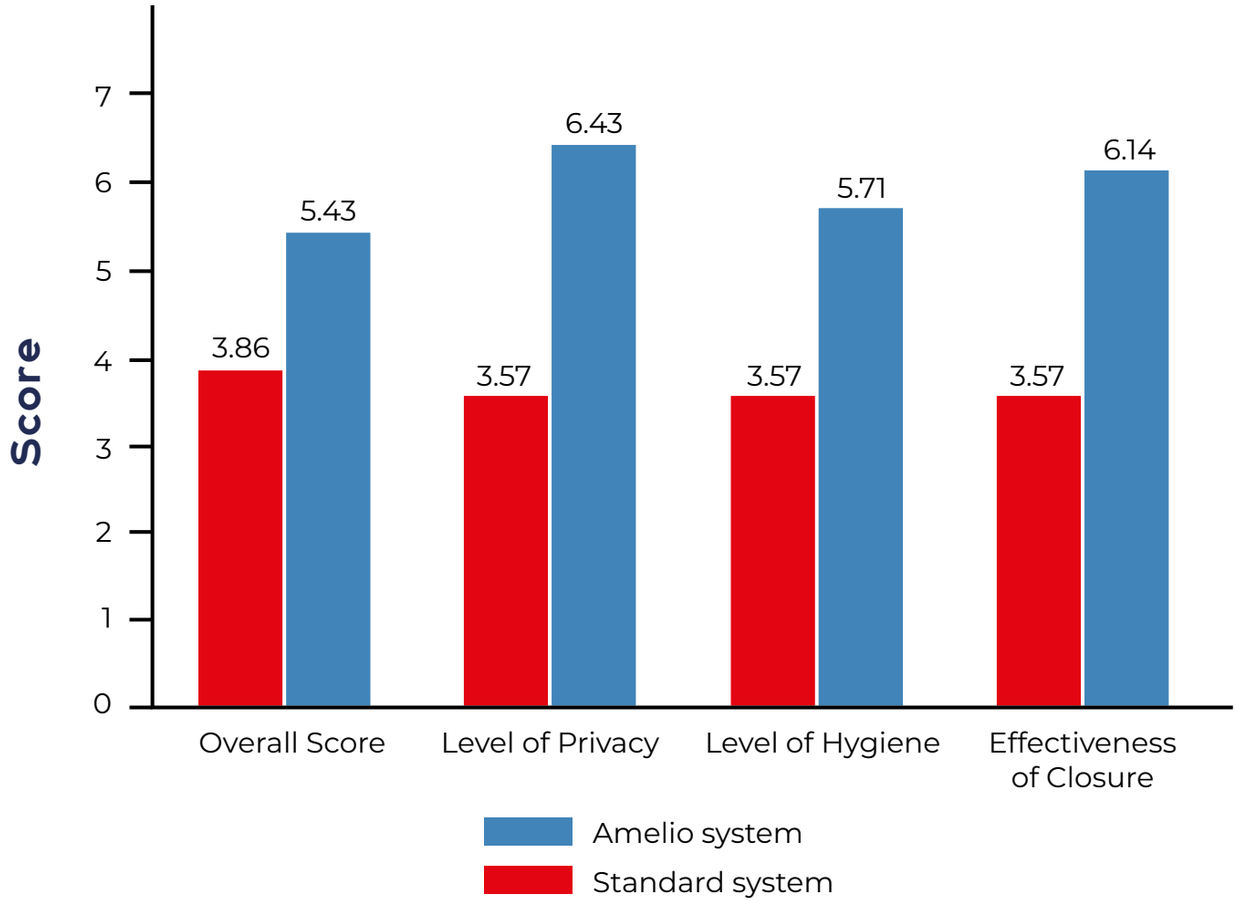
All prototypes developed after the award of funding in July 2020 cannot be shown due to Intellectual Property concerns.

Evaluating in Clinical Settings

The final iteration was evaluated in a clinical environment for a total of 30 days. This evaluation not only helped to gather feedback from staff but it also allowed patients to share their views on the prototypes. Because the evaluation was so long, it meant that improvements could be made ad-hoc. The main improvements made to the panel over the course of this evaluation were:

- Optimising magnet strength and position.
- Increasing strength of the attachment to the curtain rail.
- Optimising size and positioning of the signage.
- Optimising the handle shape and position.
- Improving the connection between the panel and the curtain.

After the final clinical evaluation, the members of staff involved in the project in the ward where the prototypes were installed were interviewed individually and asked fill out a questionnaire comparing the Amelio system to the standard system. The results clearly showed that the Amelio system was preferred in terms of privacy, hygiene and effectiveness of closure.



Figures 4, Comparing Amelio to the standard system.

The Environmental Impact of the Curtain System

During the process of designing the Amelio system, it was found that the curtain system as a whole at GSTT is extremely damaging to the environment. Therefore, another project began, this time in collaboration with the Sustainability department at GSTT and Brunel University London.

The first step was to map out the life-cycles of the curtains used within the Trust. Disposable curtains are used almost universally in GSTT so their life 'cycle's are in fact rather linear. A streamlined lifecycle analysis (SLCA) was performed in order to calculate the environmental impact of the curtain system and to create a baseline off of which alternative curtain options could be assessed.

Through engaging with clinical and non-clinical staff, and reviewing policy documents, it was found that the reason for using disposable curtains was because it was thought to better for infection control. However, the Royal Brompton and Harefield clinical group (RBH) that merged with GSTT in early 2021 still uses some washable curtains in their wards, as do many other Trust across the UK, so the view that disposable curtains are necessary for high levels of infection control is not shared throughout the NHS.

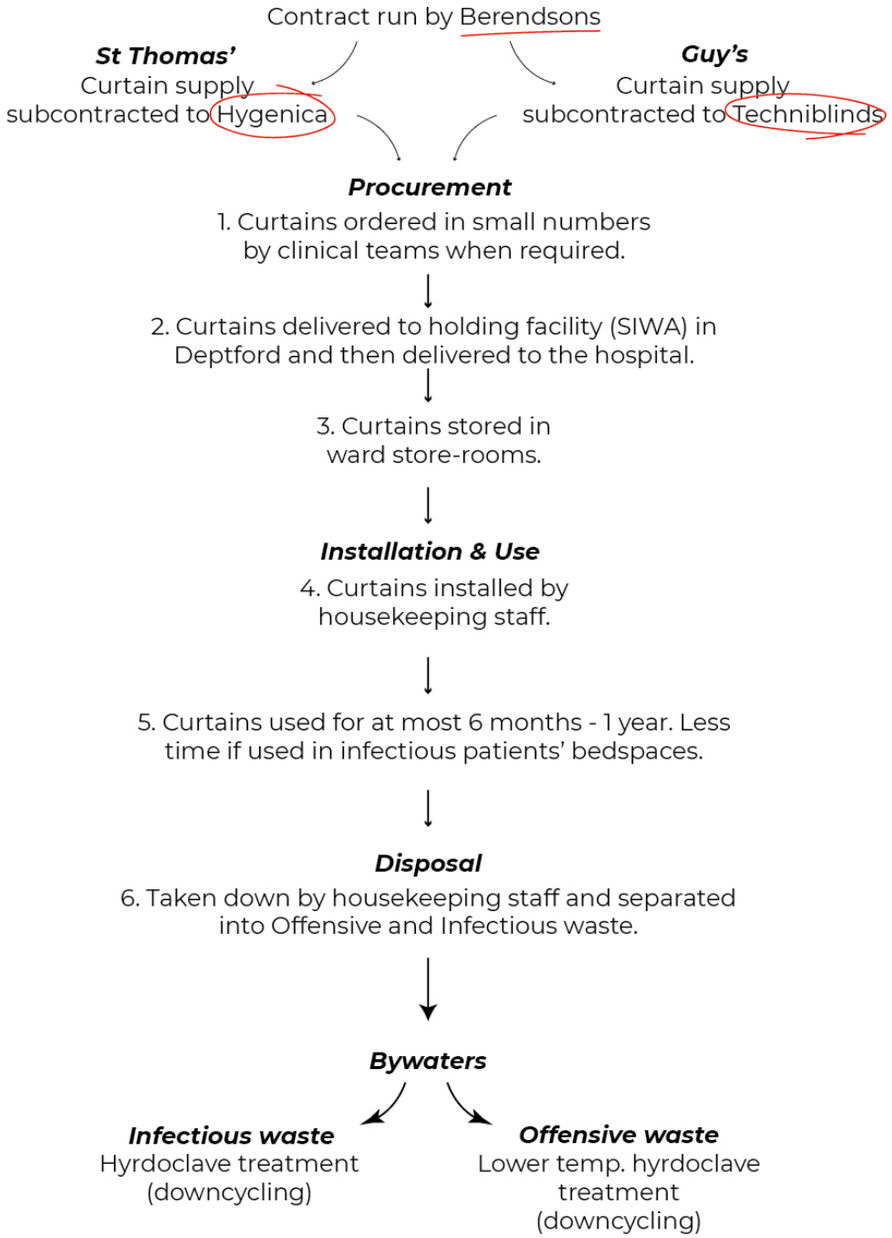


Figure 5, The process map of disposable curtains within GSTT.

Identifying Alternatives

It was clear that the disposable system could be improved upon and there were already alternative system in use in the NHS. The most viable alternatives were identified (see figure XX) and an SLCA was performed for each possible combination of options. These options and their data was then presented to 17 members of staff in 4 staff engagement workshops.

Base system

1. Washable curtains

Washable polyester curtains.
Lifespan - 5 years
Price - £127.50
Antimicrobial - Varied

Additional technologies

2. CurtainMelt

Disposable curtain recycler. Recycled curtain material is sold back to manufacturers.
Price - £85.8k

Hidden due to Intellectual Property concerns

3. Amelio system

Reusable panel that clips onto cubicle curtains and magnetically seals the curtains closed. Improves privacy, usability and (possibly) extends lifespan.
Price - £45/bedspace.
Lifespan - 5 years

Figure 6, Alternatives to the disposable curtain system.

Option	Privacy	No. of Curtains	Lifespan	Cost per cubicle	Antimi-crobial?	CO2 Produced	Energy Consumed	IPC rating
Disposable	3.57/7	10	6 months	£150	Varied	110	2,580 MJ	—
Washable	—	1.33	5 years	£127.50	Varied	20.3 kg	377 MJ	—
Disposable + CurtainMelt	—		6 months	£172	Varied	111		—

Table 2, Comparisons of LCA data for alternatives.

By carrying out the SLCAs it was clear from the data that the best option available was a washable curtain, in terms of number of curtains used, lifespan of the curtain, cost per cubicle, CO2 produced, and energy consumed.

After presenting these options to staff, they were asked to choose between using washable or disposable curtains or a hybrid system (where disposables are only used in high risk areas). It was found that 75% of participants preferred washables, 19% preferred the hybrid system and 6% couldn't decide. 0% preferred disposables.

When asked to rank their top three criteria to consider when choosing the new curtain system. Overwhelmingly, sustainability was mentioned the most and ranked the highest. This shows that there is an appetite for sustainable practices within the Trust and a desire to improve, however, there were many operational barriers to change pointed out during the workshops, namely the difficulty in setting up and running a laundry service for the curtains and the cost of switching to a washable curtain system, which is likely to require different curtain rails.

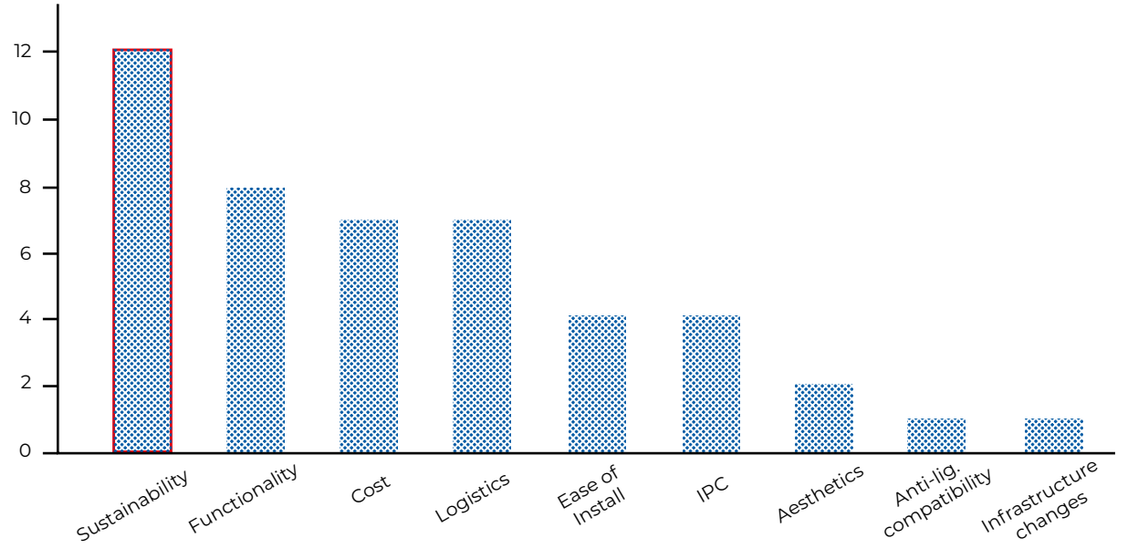


Figure 7, Priorities of workshop participants.