



HEALTH INNOVATION
North West Coast

NHS

England

A Health Innovation North West Coast report for the NHS England Net Zero and Sustainable Procurement Team:



**UNDERSTANDING THE BENEFITS
OF A SWITCH FROM SINGLE-USE
TO REUSABLE SURGICAL AND
ISOLATION GOWNS**

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1 EXECUTIVE SUMMARY

The 'Delivering a Net Zero National Health Service' report has set an ambitious target to reach a Net Zero NHS Supply Chain by 2045.

The NHS England Sustainable Procurement team are working towards this goal in partnership with the supply chain to create world-leading sustainable procurement practices and support the wider system to understand and embrace the changes required to deliver it.

In support of the net zero ambition, trusts and integrated care systems (ICSs) should have green plans in place, which set out their aims, objectives, and delivery plans for their carbon reduction strategy. These plans will be signed off at the board-level and 'net zero leads' will be responsible for overseeing delivery.

One significant change that will help the NHS deliver its net zero ambition is a shift away from single use gowns to reusable gowns. The Net Zero and Sustainable Procurement team are leading a project to review options available when making this switch and suggest ways to initiate the change. They have commissioned Health Innovation North West Coast (NWC) to collaborate and to capture any realised sustainability, cost and clinician benefits. Health Innovation NWC are part of a national health innovation network and they work to improve health and generate economic growth across the region through accelerating the spread and adoption of innovation.

Rizan et al. 2021 study¹ identified that gowns are one of the most carbon-intensive PPE items, with considerable opportunity to realise both carbon and financial savings through increased uptake of reusable gowns.

Research says that reusable gowns not only meet the same protection standards as single use, and there is evidence that reusable gowns outperform in key safety test areas when combined with good-practice guidance for wearers (AAMI PB70 performance specifications).

Currently, the scale of uptake for reusable gowns is variable across the NHS. Several trusts increased the use of single use isolation gowns because of the surge in demand and shortages of reusable during the Covid-19 pandemic. Free single-use gowns were also made available through the Department of Health and Social Care and isolation gowns are still available as of September 2023.

A report from the Textile Services Association (TSA), which represents the UK's commercial laundry industry, highlighted its central role in the government's strategy to replace single use gowns with reusable to deliver a permanent long-term, cost-effective and sustainable solution to the entire healthcare sector².

¹ Chantelle Rizan, Mahmood F. Bhutta, Malcolm Reed, Rob Lillywhite, The carbon footprint of waste streams in a UK hospital, Journal of Cleaner Production, Volume 286, 2021, 125446, ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2020.125446>, (<https://www.sciencedirect.com/science/article/pii/S0959652620354925>)

² [The-Case-for-Reusable-Gowns-2.pdf](#)

NHSE modelling of savings based on the published research by the University of Sheffield³ and Rizan et al⁴ found that sterile reusable gowns saved a hospital site with 35 operating theatres and over 1,000 beds, annually approximately:

- **100 tonnes of carbon dioxide equivalent (CO₂e)**
- **20 tonnes of waste**
- **500m³ water**
- **£100,000 in procurement and clinical waste costs**

Overall, another NHS data source shows that switching to sterile reusable gowns can result in 45% cost savings (data on file NHSE data sources).

The NHSE Net Zero and Sustainable Procurement team has worked with three trusts that are using reusable gowns as case studies to understand the realised benefits. The three trusts operate different laundry service models and offer a broad insight into the opportunities to expand the use of reusable gowns:

- **Individual trust agreement with local supplier**
(Case Study 1: Royal Papworth Hospital NHS Foundation Trust)
- **Collaborative regional approach**
(Case Study 2: North Tees and Hartlepool NHS Foundation Trust)
- **Outsourcing to a third-party service under a commercial managed service agreement**
(Case Study 3: University Hospitals of Derby and Burton NHS Foundation Trust)



³ Life Cycle Assessment of Elis' Reusable Hospital Gowns, Department of Chemical and Biological Engineering, University of Sheffield, Grantham Centre for Sustainable Futures, University of Sheffield

⁴ Lifecycle assessment study by Chantelle Rizan, Malcolm Reed and Mahmood F Bhutta published in 2021

2 RECOMMENDATIONS

Health Innovation NWC recommends organisations should:

Undertake a mapping exercise to understand your organisation's baseline usage of single-use gowns and the potential opportunity to switch to reusable gowns using the NHSE Sustainable Procurement team resources and tools.

Local procurement teams should be able to generate detailed utilisation data for their single-use surgical and isolation gowns and the current access to, and provision of, laundry services across their sites and business units. The analysis will support the organisation to determine the size of the opportunity and map the carbon and financial benefits to build a compelling case for change.

Sources of information may include laundry frameworks to source reusable gown rental services (CCS RM6154 Lot 2 and Linen and Laundry Dynamic Purchasing System⁶),

Organisations should engage early with all key internal stakeholders to ensure the potential benefits of reusable gowns are fully embraced. This should surface user concerns about safety or appropriateness, which may delay implementation. Clinical champions should also be identified from across the organisation to support the process and encourage colleagues to embrace change.

Staff engagement events should be set up with access to samples of proposed reusable gowns to:

- **Deliver simple and clear messages to address concerns about switching.**
- **Present the benefits of switching whilst providing reassurance about protection levels.**
- **Provide clinical staff with the opportunity to touch and feel the proposed products.**

It is also important to collaborate with both clinical leads and front-line staff to determine the preferred reusable gowns and the laundry delivery model that best serves everyone's needs. Involving them in decision making will also help to ensure successful and lasting change.

Organisations should develop Standard Operating Procedures (SOPs) for gown donning and doffing, bagging and laundry collection to achieve a seamless switch from single use to reusable gowns, and avoid significant issues such as reusable gowns ending up in clinical waste.

- **Set out a clear SOP for all clinical housekeeping and cleaning staff to ensure compliance.**
- **Deliver training for staff on the new laundry processes.**
- **Agree what inventory levels of reusable gowns should be always held onsite by the organisation and the cleaning turnaround with the preferred laundry service provider.**
- **Track gowns across the service to manage loss reduction.**
- **Undertake site audits and staff awareness programmes post implementation to maintain lasting support for the change.**

⁶ (<http://pp.nhs.uk>) Linen and Laundry Dynamic Purchasing System

3 BACKGROUND

Surgical gowns help protect patients from exposure to micro-organisms and serve as personal protective equipment (PPE) for staff. Medical textiles, including surgical gowns, are available as reusable or single-use disposable products, with both adhering to the same product standards.

The Department of Health and Social Care published the Personal Protective Equipment Strategy in October 2020⁷ that embedded reusable gowns as part of its official PPE approach.

The report acknowledged challenges, including developing a comprehensive business model.

In published research, reusable gowns were found to not only meet the same standards of protection as single-use gowns but there is also evidence that they outperform single-use gowns in key test areas when combined with good practice guidance and awareness at the trust level⁸.

A study of Elis surgical reusable gowns conducted by the University of Sheffield found that the waste and off-site disposal costs of single use gowns had a significant impact with potential savings of 22%- 26% / £2,400.00 to £ 5,200.00 for a standard protection gown, and 16-20%/ £3,700.00 -£7,700.00 for high protection gowns (modelled on 1000 gown usage per week). The variation is accounted for by the laundry service model and logistics.

This analysis is supported by the research of Chantelle Rizan et al 2021⁹ who modelled carbon savings from reusable sterile gowns. Rizan found reusable gowns accounted for only a third of the carbon footprint of single-use gowns – a 69% carbon footprint reduction over its lifetime. The modelling assumed the reusable gowns achieved a reuse rate of 75 times.

⁷ www.gov.uk/government/publications/personal-protective-equipment-ppe-strategy-stabilise-and-build-resilience

⁸ (Am. J Infect Control VOLUME 49, ISSUE 5, P563-570, MAY 01, 2021)

⁹ p.10: journals.sagepub.com/doi/suppl/10.1177/01410768211001583/suppl_file/sj-pdf-1-jrs-10.1177_01410768211001583.pdf

3.1 SINGLE-USE VERSUS REUSABLE SURGICAL GOWNS

Single-use surgical gowns are typically a type of hospital gown that can be worn only once. They are made of a fabric like cotton or rayon and are often made to fit closely around the body. Single-use surgical gowns are free from potential contamination and most often used during surgery.

A recent study by McQuerry¹⁰ evaluated the performance of single-use versus reusable surgical gowns by assessing their ability to provide adequate protection across their expected service lifespan. This study included looking at gowns in three category levels:

- **Level I (minimal risk – basic medical care)**
- **Level II (low risk – minimally-invasive surgical procedures)**
- **Level III (moderate risk situations in the emergency room or surgical procedures)**

These were tested for water resistance and hydrostatic pressure, along with other durability assessments (breaking, tear and seam strength, pilling resistance, dimensional stability, air permeability, and colour fastness). Data was collected when the gowns were new for the single-use gowns and after 1, 25, 50 and 75 industrial launderings for the reusable gowns.

Notably, all Level I and II single-use gowns tested did not meet the US AAMI performance specifications for impact penetration water resistance. All three levels of disposable gowns also failed to meet the American Society for Testing and Materials performance requirements for breaking strength in the crosswise direction.

In the UK, surgical gowns are classified as 'medical devices' and must comply with EU MD legislation and the harmonised standard EN 13795-1:2019 Surgical clothing and drapes – Requirements and test methods – Part 1: Surgical drapes and gowns.

This evidence demonstrates a higher wear tolerance and can provide critical assurance to the user that a switch to reusable gowns is safe and secure.

Reusable gowns may be guaranteed for up to 100 uses¹¹ when used in accordance with the manufacturer's instructions and can be shredded and repurposed for a range of useful products. Reusable gowns are available either through wholesale providers or through commercial laundry services under a managed service agreement operating to national sterilisation standards.

Research from Sheffield University highlights the need to support clinical teams to ensure gowns re-enter the reuse cycle.

Typical best practice should include the reprocessing of reusable gowns after use to ensure gowns are not entered into recyclable waste.

¹⁰ McQuerry, et al Disposable versus reusable medical gowns: A performance comparison Meredith Published: October 19, 2020 DOI:<https://doi.org/10.1016/j.ajic.2020.10.013>

¹¹ Life Cycle Assessment of Elis' Reusable Hospital Gowns Department of Chemical & Biological Engineering, University of Sheffield, Grantham Centre for Sustainable Futures, University of Sheffield

4 METHODOLOGY WHEN SWITCHING TO REUSABLE GOWNS

Organisations should engage their procurement teams to generate detailed utilisation data for their single-use surgical and isolation gowns and the current access to, and provision of, laundry services across their clinical sites and business units to help build the business case to switch to reusable gowns.

Sources of information may include:

- **Laundry frameworks to source reusable gown rental services (CCS RM6154 Lot 2 and Linen and Laundry Dynamic Purchasing System¹²),**
- **Direct procurement of gowns.**

Procurement will be able to map the capacity across the organisation's laundry services to identify any requirement for a variation of an existing contract or to source additional capacity. Laundry service models may include:

- **Individual trust agreement with local supplier**
- **a collaborative regional approach across multiple organisations**
- **outsourcing to a third-party service under a commercially managed service agreement.**

Clinical champions should be identified from across the organisation to support the process and encourage colleagues to embrace the change.



¹² ([lpp.nhs.uk](http://pp.nhs.uk)) Linen and Laundry Dynamic Purchasing System

Staff engagement events should be set up with access to samples of proposed reusable gowns to:

- **Deliver simple and clear messaging to end users to address key concerns about switching.**
- **Present the benefits of switching whilst providing reassurance through evidence about protection levels.**
- **Provide clinical staff with the opportunity to touch and feel the proposed products**

In collaboration with the clinical champions and users, estates services should determine the preferred reusable gowns and agree the preferred laundry delivery model that best serves those needs and meets the capacity demands.

Organisations should develop Standard Operating Procedure (SOP) for gown donning and doffing, bagging and laundry collection to mitigate reusable gowns ending up in clinical waste and achieve a seamless switch from historical single use to reusable gowns.

Organisation should consider the following activities to ensure the service runs smoothly:

- **Set out a clear SOP for all clinical housekeeping and cleaning staff to ensure staff comply with requirements.**
- **Train all affected staff on the new laundry processes.**
- **Secure agreement on inventory levels of reusable gowns held by the organisation and the inventory turnaround with the preferred laundry service provider.**
- **Track gowns across the service to manage loss reduction.**
- **Undertake site audits and end user awareness programs post switch to maintain advocacy.**



4.1 GOWN SWITCHING PROCESS MAP



5 CASE STUDIES

The NHSE Sustainable Procurement team engaged with three trusts who have implemented a switch to reusable gowns to review their processes, challenges and benefits and express those benefits in their carbon and cost calculations.

The methodology for calculating carbon savings based on different laundry service models developed by NHSE was applied to each case study.

5.1 CASE STUDY 1: ROYAL PAPWORTH HOSPITAL NHS FOUNDATION TRUST

The Royal Papworth uses on average 2,200 gowns per week in ICU. To support the trust during the pandemic the trust piloted the purchase of 50,000 reusable splashproof non-sterile gowns.

Staff had historically had negative experiences with the performance of single-use gowns around sizing, comfort and damage, that were considered as part design of the new gowns and service. To implement the switch the trusts focussed on:

- **Strong communication to allay concerns from staff about gown availability and protection levels, through product trials and information sessions.**
- **Staff SOPs and training on gown use and collection procedures at implementation to limit damage or loss.**

The switch achieved the trust since 2021 savings of:

- **133 tonnes CO₂e,**
- **31 tonnes of waste, and**
- **£110,000**

The service agreement includes repairs and additional splash proofing treatment to extend the life of the gowns. The trust also identified that additional time would be needed for the collection of used gowns, which is worth considering when scoping out resourcing and contract requirements.



5.2 CASE STUDY 2: NORTH TEES AND HARTLEPOOL NHS FOUNDATION TRUST

At the start of the pandemic NTH Solutions launched its Reusable Gown Service, designed with the North Tees and Hartlepool NHS Trust to manage supply issues and to support its sustainability agenda. They offered a fully managed sterilisation and laundry service for reusable gowns only.

Gowns were provided with a 12-month sterility guarantee. Each gown was covered for up to 100 uses when used in accordance with manufacturer's instructions.

Modelling savings on the use of 7000 gowns every week it is estimated participating trusts saved in a year:

- **223 tonnes CO₂e,**
- **51 tonnes of clinical waste,**
- **1,237,000 litres of water, and**
- **£382,000**

The trust is piloting further innovation around the use of:

- **the reuse of rinse water,**
- **moving to RFID tagging for enhanced monitoring,**
- **process automation e.g., folding.**

5.3 CASE STUDY 3: UNIVERSITY HOSPITALS OF DERBY AND BURTON NHS FOUNDATION TRUST

Derby adopted a privately financed initiative (PFI) using a managed service agreement for reusable gowns to drive its green sustainable agenda.

Over its 50 elective theatres, the trust uses over 100,000 surgical gowns and 4,000 isolation gowns annually.

Their gowns are tested to achieve a safe utilisation rate of up to 80 washes. Through staff training and the bagging policy, stock losses are minimised. Full accountability and responsibility for stock is maintained at theatre level.

Using the methodology described by NHSE, switching to reusable gowns has saved:

- **94 tonnes CO₂e,**
- **22 tonnes of clinical waste annually,**
- **520,000 litres of water, and**
- **£92,000 in procurement and clinical waste costs.**

Under the switch the trust has reduced the demand for single-use surgical gowns to 7% and 1% for isolation gowns.

The trust reinforces the need to maintain a strong relationship with potential commercial suppliers and to ensure robust SOPs are fully adopted to ensure reusable gowns don't enter the wrong recycling pathway.

6 QUALITATIVE INSIGHTS

Health Innovation NWC conducted semi-structured face to face interviews at each of the pilot sites to better understand the challenges, benefits, and opinions on a switch to reusable gowns. The interviewees were asked to review and validate a proposed NHSE SOP.

The following insights were obtained:

- **All three sites had used both types of gowns and all agreed that reusable gowns offered better protection and were more durable and comfortable than single-use gowns.**
- **There was unanimous agreement that reusable gowns are a sustainable solution. The difference between single-use and reusable in environmental footprint was highlighted as being significant. The reusable gowns can be recycled once they have been used 75 times (which they are currently licensed for).**
- **One trust felt the pandemic had driven the switch to reusable gowns as prices of single use gowns increased and access decreased as supply issues affected the market. The benefits of switching to reusable gowns have endured.**
- **The trusts addressed concerns from staff that reusable gowns could increase infection rates by ensuring there were robust procedures in place for cleaning and retreating them, and that these procedures were well communicated to, and understood by, the whole team.**
- **Successful gown schemes should include:**
 - A robust laundering process, with regular re-splash proofing of the gown every time they are sent to the laundry,
 - Secure packaging,
 - Access to all the sizes and styles you need.
- **One team found the benefit of working with a single supplier who also makes the gowns built a strong relationship, with good communication and a high quality of service. An agreement with the supplier to undertake repairs helped to prolong the longevity of the garments.**

- A collaborative approach across multiple trusts could lead to economies of scale and offset the significant initial outlay for gowns. Alternatively, a managed service may offer the trusts the opportunity to spread the cost over the lifetime of the gown.
- Obtaining the gowns and, if necessary, on-site equipment, can take time so plan well ahead.
- Early engagement with clinical teams led to significant benefits. One team worked with surgeons to improve the design of gowns as much as possible, updating the design so they closed fully at the back and didn't have restrictive elasticated wrists. The trust made sure the gowns were compliant and collaborated with the MHRA to sign off the gowns. Even when these bespoke adjustments weren't made it was agreed they were softer and more comfortable to wear than single use.
- There needs to be a tracking system to minimise the loss of gowns. This can be done with a tagging system. One trust uses a locator pellet sewn into the hem of the gowns. Another trust uses a large, brightly coloured cage to collect used gowns to ensure they aren't mixed in with other laundry before being sent offsite for processing.
- Infection control's involvement in drafting SOPs for donning and doffing of gowns and the design of the PPE station was essential. This also ensured all staff were trained on the SOP and correct way to don and doff at all sites.
- All three trusts representatives reviewed and ratified the SOP recommended by NHSE's 'How To' guide. Please refer to the guide for further information on implementing a successful reusable gown scheme or contact the team at NHSE or Health Innovation NWC.



7 APPENDIX: SAVINGS PER GOWN USE

NHSE has estimated the potential carbon savings related to switching to reusable gowns from single-use surgical and PPE gowns using the findings from the University of Sheffield and Rizan et al. lifecycle assessments.

Savings can be estimated based on a gown usage levels:

- 0.000613 tonnes CO₂e per each reusable gown use
- 0.14056 kilogram waste per each reusable gown use
- 0.00340 cubic metre of water per each reusable gown use

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