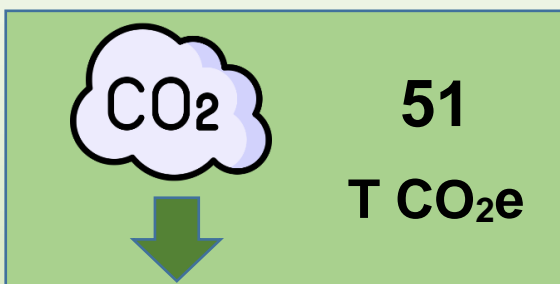


# National Green Theatres Programme

Prògram Nàiseanta Lannsaireachd Uaine

## Implementation of Reusable Surgical Caps Date: November 2024



## 1. Description of action

- 1.1 It is the intention of this opportunity for change to evidence the environmental and financial benefits of using reusable surgical caps instead of single use theatre caps. Evidence has also been considered around staff and patient experience.

## 2. Background

- 2.1 It is common practice across NHS Scotland for single use theatre caps to be used within operating theatres. Extrapolated figures have identified that over 2.4 million single-use caps were ordered across NHS Scotland between September 2022 and September 2023<sup>1</sup>. This equals over 12.8 tonnes of waste entering Scottish waste streams annually. The majority of theatre hats are composed of a combination of cotton or polyester. Polyester can take up to 200 years to decompose in landfill and often ends up being disposed of through clinical waste streams<sup>2</sup>. During manufacturing of the materials there is an embodied carbon footprint of approximately 62 tonnes of Co2e annually. This calculation is based on 1 manufacturer's product which has a material composition of 55% cotton and 45% polyester. By making the change to reusable caps, the associated carbon footprint would reduce to just under 11 tonnes of Co2e over a 3-year period (table A) equating to over 90% reduction in associated emissions.
- 2.2 NHS Fife embedded reusable surgical caps into practice in 2019 and are a good example of this action being implemented successfully. This change was accelerated largely due to the Covid-19 pandemic to help humanise staff wearing personal protective equipment (PPE). The reusable hats play an important safety role within the theatre environment as the person's first name and role is embroidered onto them. Staff can easily identify the role that each colleague is there to fulfil and communicate any issues to the correct person quickly and efficiently. A recent study reinforced this position, identifying that 30-50 per cent of people forget their colleagues' names after the surgical briefing and staff using theatre caps with embroidered names and roles increased levels of communication during the operation.<sup>3</sup> Included within Appendix 2 is a case study showcasing the work in NHS Fife. Appendix 3 also showcases the reusable cap cleaning chart implemented within NHS Fife.
- 2.3 NHS Greater Glasgow & Clyde and NHS Highland have also implemented similar initiatives. The results have been overwhelmingly positive, with no reported increase in infection rates. This widespread adoption highlights the effectiveness of transitioning to reusable theatre caps.
- 2.4 In addition to the work across Scotland, similar work has been successfully implemented within trusts in NHS England. The Theatre Caps Project at Royal Liverpool University

<sup>1</sup> Figures identified using confirmed single-use cap figures from NHS Golden Jubilee and extrapolated to all health boards in NHS Scotland. Appendix 1 details this information in further detail.

<sup>2</sup> [Sustainable Scrubs, How Long Does it take Different Materials to Break Down?](#)

<sup>3</sup> [Birnbach DJ, Rosen LF, Fitzpatrick M, et al. Introductions during Time-outs: Do Surgical Team Members Know One Another's Names? Jt Comm J Qual Patient Saf. 2017;43\(6\):284-8](#)

Hospital was implemented during the Covid-19 pandemic and expanded across the entire trust from January 2022. This project significantly reduced the carbon emissions produced by the hospital. Prior to the project, each large hospital within the trust discarded approximately 100,000 disposable viscose theatre caps annually. However, the implementation of reusable theatre caps led to a reduction of over 1 tonne of clinical waste annually in Royal Liverpool University Hospital alone.<sup>4</sup> A lifecycle assessment published in July 2024 by the Journal of Surgical Research concluded that reusable cotton caps have lower CO<sub>2</sub>e emissions compared to single-use caps. Local guidelines should recommend reusable cotton caps to reduce the environmental impact of delivering surgical services across NHS Scotland.<sup>5</sup>

- 2.5 Further to the environmental and staff benefits, there has also been positive feedback collected from patients. Within NHS Fife, patients found that the embroidered hats provided a level of comfort during what can be a stressful time. A recent survey from Queen Elizabeth Hospital Birmingham<sup>6</sup> asked 129 patients 3 questions based on their experience. 95% of patients who participated answered 'yes' to all questions.

Patients were asked if:

- they felt that reusable and personalised surgical caps were a good idea,
- the caps helped them understand who is looking after them, and
- they found this reassuring.

- 2.6 Reusable surgical caps have a 3-year average lifespan, depending on the manufacturer and washing/maintenance guidelines being adhered to. By implementing this action and changing to reusable from single-use, a carbon saving of 51 tonnes would be achieved in the first year across NHS Scotland, the equivalent of planting 1,964 trees.<sup>7</sup>

- 2.7 The use of reusable surgical caps in theatre settings has been reviewed by Antimicrobial Resistance and Healthcare Associated Infections Scotland (ARHAI) and the Scottish National Infection Prevention and Control Forum (SNIF). They are acceptable provided that guidelines on local implementation are followed, including relevant documented risk assessments. The ARHAI position is detailed in their 'Statement on Operating Theatre Headwear for Scottish National Infection Control Forum', published in November 2024<sup>8</sup> which states the following:

"The choice of headwear should be made, based on local policy, by the interdisciplinary team at the healthcare facility and may include headgear made up of a disposable or launderable reusable, lint free material which provides full

<sup>4</sup> [Theatre caps provide eco-friendly way to improve communication - Royal Liverpool University Hospital \(March 2022\)](#)

<sup>5</sup> [A Life Cycle Assessment of Reusable and Disposable Surgical Caps - Journal of Surgical Research](#)

<sup>6</sup> [Patient Safe Network: Theatre Cap Challenge - Where is the evidence?](#)

<sup>7</sup> [Calculation of CO<sub>2</sub> | Encon](#)

<sup>8</sup> [ARHAI Statement on Operating Theatre Headwear - November 2024.pdf](#)

hair and scalp coverage. There is therefore no reason not to allow the use of reusable theatre headwear if this fits with local policies and risk assessment.”

The importance of local risk assessment and early consultation with local Infection Prevention and Control teams is crucial before implementing the use of reusable surgical caps.

- 2.8 If Health Boards are looking to consider home laundering of reusable theatre caps, ARHAI Scotland recommend the following to assist with this implementation:

“ARHAI Scotland is aware that some health boards are considering home laundering of reusable theatre headwear.... any such proposal should be subject to a local risk assessment for each surgical specialty, balancing perceived risks of cross contamination against perceived advantages such as staff being able to more easily retain personalised items. All risk assessments should be documented and regularly reviewed. Robust systems for surveillance of surgical site infections will assist in monitoring the effects of any changes in practice.”

- 2.9 The successful implementation of this action will require the support of Finance and Procurement colleagues. The average cost of a single use cap is £0.06, depending on the supplier. Across NHS Scotland it is projected that there is a national spend of over £147,000 annually<sup>9</sup>.
- 2.10 Reusable surgical caps can vary in cost, averaging around £5.99 per cap. Table B estimates the cost savings if reusable surgical caps were introduced. This estimate assumes that all NHS Scotland theatre staff adopt reusable caps and accounts for a 13% annual staff turnover, which is about 394 staff changes each year. Each new employee would ideally be provided with 5 reusable caps. In this best-case scenario, switching to reusable caps could reduce costs from just under £148,000 to £94,402.40 in the first year and reducing to £11,800.30 in the second and third years.

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<sup>9</sup> September 2022 –September 2023.

Table A: Project Carbon Saving

	Reusable Carbon Impact (tCo2e)	Single Use Carbon Impact (tCo2e)
Y1	8.34	62.3665
Y2	1.04	62.3665
Y3	1.04	62.3665
<b>Total</b>	<b>10.42</b>	<b>187.0995</b>

Table B: Projected Financial Saving

	Reusable Cap Cost (Annual)	Single Use Cap Cost (Annual)	Projected Financial Saving
Y1	£ 94,402.40	£147,705.12	£53,302.72
Y2	£11,800.30	£147,705.12	£135,904.80
Y3	£11,800.30	£147,705.12	£135,904.80
<b>Total</b>	<b>£118,003</b>	<b>£443,115.36</b>	<b>£325,112.32</b>

### 3. Who needs to be involved in this change locally?

3.1 It is recommended that the following groups should be consulted and involved to implement this action:

- Anaesthetists
- Surgeons
- Theatre Staff / Managers
- Finance colleagues
- Local Procurement staff
- National Procurement staff
- Infection Prevention and Control staff

### 4. Boundaries

4.1 The table below identifies the boundaries for this action:

In scope	Out of scope
<ul style="list-style-type: none"> <li>• All theatres in Scotland</li> </ul>	N/A

### 5. What is the change and how will it be implemented?

5.1 Replace single-use surgical caps with reusable surgical caps, ideally with embroidery stating the colleagues name and role. This document will be shared with all relevant colleagues and will be implemented with the support of key stakeholders.

## 6. What are the potential co-benefits of this change?

Outcome	Potential Benefits
Carbon savings	51 tco2e annually
Cost savings	£325,112.32 after 3 years
Patient outcomes	Evidence suggests a positive outcome for patients including reduced anxiety as they can more easily identify who is looking after them in theatre
Staff experience	Evidence suggests a positive outcome for staff with significant reductions in miscommunication and misidentification

## 7. Risks and Issues

7.1 As part of the development of this action a number of risk and issues have been identified.

Description of risk or issue	Mitigation / Action Plan
NHS Boards will not implement this action	A letter will be sent to Board CfSD Champions and Non-Executive Sustainability Champions to endorse the action and liaise with local colleagues to solve barriers to implementation
Manufacturer delay in producing and distributing reusable caps	Discussions ongoing to identify a potential national contract under the uniform policy

## 8. Implementation Guidance

8.1 The opportunity for change highlights the importance of implementing this action. This change will help your site and NHS Scotland achieve net-zero emissions by 2040 as stated in NHS Scotland's Climate Emergency and Sustainability Strategy 2022-2026.

8.2 The National Green Theatres Programme has provided guidance on how you can implement this change within your area.

Local Sustainability or Green Theatre Group:	
1.	Review opportunity for change and validate what this means locally.
2.	Provides National Green Theatre Programme Team with validated information/local targets.



**Local Sustainability or Green Theatre Group:**

3.	Convene a discussion with the staff who need to implement it and those who are impacted by the action.
4.	Understand what the opportunity is for implementing the action locally: work already undertaken and challenges.
5.	Agree a local implementation plan.
6.	Implement local plan.
7.	Provide data as per measurement plan.
8.	Monitor implementation of action.

If you require any further information or guidance, please contact the National Green Theatres programme team on: [cfsdgreentheatres@gjnh.scot.nhs.uk](mailto:cfsdgreentheatres@gjnh.scot.nhs.uk)

## 9. Measurement

Name of measure (carbon, cost, staff experience and patient outcomes)	Type of measure (Outcome, Process, Balancing)	Concept being measured?	Where is the data available from?	Who is collecting the data?	Frequency of collection?
Carbon	Outcome	Savings accrued from the reduction in single-use cap orders	National Procurement	NGTP team	Quarterly
Financial Savings	Outcome	Savings accrued from the reduction in single-use cap orders	National Procurement	NGTP team	Quarterly
Patient Experience	Outcome	Patient satisfaction	Verbal / Written Survey	Clinicians who then feed back to the NGTP SDG	Quarterly
Staff Experience and Engagement	Process	Staff reluctance	Verbal	NHS Boards who then feedback to NGTP during measurement validation meetings	Quarterly

	Average Purchase Cost (per cap)	Average Carbon Emissions (per cap)
Reusable Surgical Cap	£5.99	0.00052 tco2e
Single-use Surgical Cap	£0.06	0.00002 tco2e



## 10. Evidence

### Appendix 1: Extrapolated Single-Use Data across Health Boards

The below data shows the estimated number of caps ordered using confirmed figures from NHS Golden Jubilee (taken from NHS GJ Theatre Clothing Design Project Document) with the assumption of similar ordering patterns across all health boards in NHS Scotland.

Single-use Figures				
Health Board	Number of Theatres	Number of Staff*	Caps Ordered <sup>^</sup>	Cost**
NHS Ayrshire & Arran	17	136	106,216.00	£6,372.96
NHS Borders	6	48	37,488.00	£2,249.28
NHS Dumfries & Galloway	10	80	62,480.00	£3,748.80
NHS Fife	23	144	112,464.00	£6,747.84
NHS Forth Valley	18	184	143,704.00	£8,622.24
NHS Golden Jubilee	20	160	125,000.00	£7,500.00
NHS Grampian	40	320	249,920.00	£14,995.20
NHS Greater Glasgow & Clyde	112	896	699,776.00	£41,986.56
NHS Highland	18	144	112,464.00	£6,747.84
NHS Lanarkshire	30	240	187,440.00	£11,246.40
NHS Lothian	61	488	381,128.00	£22,867.68
NHS Orkney	2	16	12,496.00	£749.76
NHS Shetland	2	16	12,496.00	£749.76
NHS Tayside	33	264	206,184.00	£12,371.04
NHS Western Isles	2	16	12,496.00	£749.76
<b>Total:</b>	<b>394</b>	<b>3,152</b>	<b>2,461,752.00</b>	<b>£147,705.12</b>

\* Number of staff assumed on an average of 8 staff per theatre team<sup>10</sup>

<sup>10</sup> [Eco Ninjas: A first-time experience in a hospital theatre \[December 2023\]](#)

## Appendix 2: NHS Fife Case Study

# Implementation of Reusable Surgical Caps in NHS Fife

Lindsay Quinn, Operating Department Practitioner, Queen Margaret Hospital – NHS Fife

**26 September 2023**

### Background

An Operating Department Practitioner (ODP) within theatres at NHS Fife, who has been working there since qualifying in 2005, participated in an in-house four-day leadership course in late 2019. As part of this course, participants were required to identify and present a clinical improvement. At that time, this individual had recently attended the AFPP conference in Harrogate, where a lecture on the #theatrechallenge had garnered global interest. Although the initiative was trending worldwide, only two or three hospitals in the UK had implemented it. This practitioner proposed a presentation on personalised theatre hats for NHS Fife, an idea that received full support from the Director of Nursing.

### Proposed Change

Shortly after this proposal, the onset of COVID-19 presented new challenges, as facemasks and other PPE obscured staff appearances. This issue became particularly evident when two theatre departments at NHS Fife merged, making it more difficult for staff to identify one another. Additionally, patients faced challenges in differentiating staff members while visiting theatres.

To address these issues, the practitioner reached out to the charity endowment fund within NHS Fife, which agreed to fund the roll-out of personalised theatre hats for staff in both the Victoria and Queen Margaret Hospitals. Quotes were obtained from three companies and shared with the Senior Charge Nurse and theatre manager, both of whom were fully supportive of the initiative.

The hats, which display the wearer's name and role, were personalised, allowing each individual to choose two colors. Surgical colleagues were also assigned specific colors to represent their specialties.

### Challenges

A key consideration was ensuring that hats, like scrubs, were changed if they became soiled. Full-time staff were issued an appropriate number of hats—10 per individual—to accommodate these needs. Under standard circumstances, hats are worn for a single shift and then laundered.

### Outcome / Results

Cleaning rotas were established for all theatre staff, and there was no observed impact on infection rates resulting from the use of personalised reusable hats. While most staff chose to launder their hats at home following guidance on wash temperature and segregation from other laundry, the hospital laundry department also provided a washing and return service for labelled hats.

Patients frequently commented on the clarity provided by the name and role displayed on the hats, which also prompted inquiries about staff responsibilities. The initiative provided a morale boost during the COVID-19 pandemic, with staff enjoying the opportunity to select their hat colors. Delivering the hats and witnessing the positive reactions from colleagues added to the success of the project.

Although initially daunting to implement, the initiative received overwhelmingly positive feedback from both staff and patients. The personalised hats clearly identified each staff member and their role, enhancing teamwork and communication. Additionally, the initiative contributed to cost savings by reducing disposable hat usage and aligned with the objectives of the green theatre initiative.

The project's success led to recommendations for similar initiatives to be implemented across NHS Scotland.

Reusable caps were incorporated into NHS Fife's Standard Operating Procedure (SOP) for Theatre Etiquette. The guidelines specify:

- Personalised theatre hats should be worn unless handling infected cases, where disposable hats are required, or when clean personalised hats are unavailable.
- Hats can be laundered at home or through the hospital laundry service.
- Staff must ensure all hair, including fringes, is tucked inside the hat, especially in the theatre environment.
- Both hats and shoes must be cleaned regularly, with the cleaning documented on a weekly record. Contaminated footwear should not be worn, nor should staff walk around the hospital in contaminated shoes.



