SUSQI PROJECT REPORT

Ditch the Incopad: Greener Anaesthesia

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Team Members:

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Background:

Perioperative services are a major contributor to the NHS carbon footprint, with anaesthetic practice accounting for a significant proportion of single-use clinical waste. At NNUH, incontinence pads ('incopads') are widely used in theatres, including by anaesthetists for purposes other than continence management — for example, padding for patient positioning or protection of trolley surfaces. While these practices are well-intentioned, they represent unnecessary use of high-impact single-use plastics.

A local review suggested that, in emergency theatres, anaesthetic teams were using on average three incopads per patient. In the last 12 months, there were 4,631 emergency theatre cases, equating to an estimated 13,893 pads used unnecessarily. Each disposable incopad carries a carbon footprint of approximately 0.24 $kgCO_2e$ per pad, meaning a potential annual environmental burden of over 3.3 tonnes CO_2e from emergency theatres alone.

This problem is important both strategically and locally. The NHS has committed to achieving net zero by 2040, with perioperative care identified as a high-impact area for carbon reduction. Locally, staff within anaesthesia and theatres have expressed frustration at wasteful practices, and an early staff survey indicated consensus that incopads are often used inappropriately. Our team is well placed to tackle this: as anaesthetists embedded in daily practice, we can influence colleagues across emergency theatres, and we are supported by the departmental sustainability lead and the Trust's Green Team initiative.

Specific Aims:

To reduce inappropriate use of incontinence pads within emergency theatres at NNUH by:

- Identifying current patterns of incopad use and sources of waste.
- Implementing alternative, reusable positioning and protection strategies.
- Engaging theatre staff to ensure sustainable practice becomes routine.

Our overarching aim is to reduce the environmental impact of emergency theatre anaesthetic practice while maintaining patient dignity, comfort, safety, and staff efficiency.

Methods:

Interventions considered:

We explored multiple options to reduce inappropriate incopad use, particularly for arm positioning during anaesthesia. Alternatives trialled included:

- Reusable gel pads – already available in emergency theatres, requiring no additional purchase.
- Pillowcases and sheets – considered as a lower-impact option, with the associated carbon footprint compared.
- Direct disposal of extubated endotracheal tubes – incopads were often used to contain soiled tubes; by placing a clinical waste bin within easy reach, this use was eliminated without the need for a pad.

Data collection:

We began by quantifying baseline incopad usage in emergency theatres, using local case numbers (4,631 cases per year, ~3 pads per patient). Staff surveys were conducted to explore attitudes, perceptions, and suggestions for alternatives. A bottom-up carbon footprint analysis was performed for disposable incopads and potential alternatives.

Implementation strategy (planned):

The project is currently pre-implementation. We have completed baseline measurement, disseminated a staff survey, and undertaken modelling of impacts.

Given the continuous workload in emergency theatres (including during governance days), we designed a tailored education and engagement programme to support change. Planned actions include:

- Tea trolley teaching sessions delivered in theatres.
- Appointing champions among ODP and nursing staff.
- Visual prompts such as posters in theatre areas.
- Governance presentation at the departmental anaesthetic meeting.

A small number of colleagues have informally adjusted their practice following the initial engagement and awareness raised through our baseline survey, but there has been no formal rollout yet. This however indicates the above implementation strategy will be well received by staff.

Resources required:

No additional purchases were needed, as gel pads were already available in emergency theatres. Therefore, the intervention is primarily a behavioural change. For wider rollout, resource implications will need consideration.

Challenges encountered:

Some staff expressed concern that gel pads might increase the risk of skin maceration or lesions. This was addressed by engaging the Tissue Viability Nursing Team, who confirmed gel pads remain appropriate.

Measurement:

Patient outcomes:

Patient safety, dignity, and comfort are maintained. Care will continue to be safe and while there have been no adverse outcomes reported with the use of incopads, using a reusable item designed to prevent pressure injuries may be more appropriate and dignified. No measures were required.

Population outcomes:

The use of multi-use, reusable products reduces reliance on fragile single-use supply chains, making the system more resilient during shortages. Equity of access in this context refers to ensuring consistent availability of safe positioning aids for all patients.

Environmental sustainability:

The GHG emissions associated with incopad has been taken from a previous CSH project where it has been estimated using a bottom-up process-based approach.

For the GHG emissions associated with the reusable gel pad, a single gel pad was selected for carbon footprinting rather than assessing the different types available. It was therefore assumed that this pad is representative of those used across the Trust. Emissions were estimated using a bottom-up, process-based approach. The pad weighs 775g and was assumed to be made entirely of synthetic rubber. End-of-life disposal was assumed to be through clinical waste.

According to manufacturer information, the pads are produced in the US and transported to the UK via sea freight. Material and transport emission factors were sourced from the 2025 UK Government database and the ICE database, while disposal emission factors were taken from Rizan et al. (2021). Between uses, the pads are cleaned with a large clinical wipe.

Economic sustainability:

At £0.07 per pad, the baseline cost of incopads is ~£972 annually. Additional savings come from reduced waste disposal and less staff time spent ordering, storing, and disposing. No investment is needed as gel pads are already available.

Social sustainability:

Perceptions and potential impacts on staff were explored through a staff survey.

Results:

Patient outcomes:

Patient safety, dignity, and comfort are maintained through the use of reusable gel pads. These pads are specifically designed to reduce pressure injuries and are widely used across perioperative care settings without reported adverse outcomes. Validation by the Tissue Viability Nursing Team confirmed that their use is appropriate and safe for patient positioning, countering concerns about skin maceration. By removing inappropriate incopad use, patients are not only kept safe but also benefit from dignified care, with disposables reserved for their intended purpose of continence management. In future, patient feedback will be actively sought to confirm these outcomes and ensure that changes remain patient-centred.

Population outcomes:
Reusable products improve resilience and reduce supply chain reliance however this was not measurable within the scope of the project.

Environmental sustainability:

- Clinell wipe: 0.063 kg CO2e per wipe
- Disposable incopad: 0.24 kg CO2e per pad
- Reusable gel pad (embodied): 2.96 kg CO2e per pad (lifespan of 2-5 years).

Baseline impact: Anaesthetic teams in Emergency Theatres were using an estimated 13,893 incopads per year, equating to 3,334.3 kgCO2e.

With reusable practice: Cleaning one existing gel pad per case with one Clinell wipe adds 291.7 $kgCO_2e$ per year. This increases to 583.4 if two clinell wipes are used. Allowing for the embodied footprint of the theatre's gel pads (e.g., 10 pads total), the addition per year is 15 $kgCO_2e$ - 6 kg CO_2e per year depending on lifespan (ranging from an assumption of a 2-year or 5-year upper-bound lifespan. Pads are replaced only if torn/damaged.

The savings may range from 2,736.1 kgCO2e per year (assuming a 2 year lifespan and 2 clinell wipes used) to 3,036.7 kgCO2e per year (assuming a 5-year lifespan and one clinell wipe is used). Taking the midpoint figure, this is an annual saving of **2,886.4 kgCO2e**, equivalent to driving 8,492 miles in an average car.

Economic sustainability:
£972 saved annually in pad procurement, with further unquantified savings in staff time and waste disposal. No investment costs.

Social sustainability:
Staff engagement has been strong, with the majority of survey respondents recognising that incopads were often used inappropriately and expressing support for change. Comments included frustration with wasted disposables and enthusiasm for contributing to sustainability. By reducing unnecessary tasks such as ordering, stocking, and disposing of large volumes of incopads, the intervention improves workflow efficiency and frees staff time for direct patient care. Importantly, this project has provided an opportunity for staff to feel empowered in making a positive environmental impact, which can improve morale and team cohesion. Maintaining patient dignity through appropriate use of resources also supports staff in delivering care they feel proud of, linking clinical practice with wider NHS values.

Discussion:

Our project has demonstrated that inappropriate use of incopads in emergency theatres represents both a significant environmental burden and financial cost. By promoting reusable gel pads and waste process changes, the project offers a safe, cost-neutral, and scalable intervention. Staff surveys indicate support, suggesting high adoption potential.

Barriers included staff concerns around gel pad safety, addressed by the Tissue Viability Nursing Team. Limitations include that data so far are baseline and projected, not post-implementation. Next steps include implementing changes via tea trolley teaching, theatre champions, and governance engagement, followed by expansion to all NNUH theatres.

Conclusions:

This project highlights that inappropriate incopad use contributes significantly to avoidable environmental and financial costs without patient benefit. By focusing on behaviour change and existing reusable alternatives, reductions in CO_2e and costs can be achieved safely with no investment. Key success factors included staff engagement, leadership support, and validation from Tissue Viability Nurses. Next steps include embedding change in emergency theatres and scaling across the Trust, with potential for national replication.

References

- Centre for Sustainable Healthcare (CSH). Sustainable Quality Improvement (SusQI) Toolkit. Available at: https://www.susqi.org
- UK Government GHG Conversion Factors Database (2025). https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting
- Chantelle Rizan, Mahmood F. Bhutta, Malcom 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.
- Inventory of Carbon and Energy (ICE)
- Database.https://circularecology.com/embodied-carbon-footprint-database.html
- NNUH procurement data for incopad costs (2025).

Critical success factors

Please select one or two factors that were most essential to ensure the success of your project changes.

People	Process	Resources	Context
☐ Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention ✓ Staff engagement ☐ MDT / Cross-department communication ☐ Skills and capability of staff ☐ Team/service agreement that there is a problem and changes are suitable to trial (Knowledge and understanding of the issue) ☐ Support from senior organisational or system leaders	☐ clear guidance / evidence / policy to support the intervention. ☐ Incentivisation of the strategy – e.g., QOF in general practice ☐ systematic and coordinated approach ✓ clear, measurable targets ☐ long-term strategy for sustaining and embedding change developed in planning phase ☐ integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation	☐ Dedicated time ☐ QI training / information resources and organisation process / support ☐ Infrastructure capable of providing teams with information, data and equipment needed ☐ Research / evidence of change successfully implemented elsewhere ☐ Financial investment	☐ aims aligned with wider service, organisational or system goals. ☐ Links to patient benefits / clinical outcomes ☐ Links to staff benefits ☐ 'Permission' given through the organisational context, capacity and positive change culture.