



The Carbon Footprint of Burn care: Strategies to Assess & Mitigate

FOR A GREENER NHS



Hamzah Iqbal, Laura Cappuyns, Umna Naveed, Dilnath Gurusinge, Kayvan Shokrollahi

Mersey Burn Centre, Whiston Hospital, Warrington Road, Prescot, Merseyside, L35 5DR



INTRODUCTION

A person or institution's "carbon footprint" is the aggregate of all greenhouse gases resulting from their activity, being released into the atmosphere. The impact on the environment related to all human activity is increasingly important and healthcare activity must also be taken into consideration. Only if the carbon footprint of healthcare activity can be identified is it possible to intervene to mitigate environmental impact - in this case related to burn care.

In 2019, NHS emissions totalled 25 megatons of carbon dioxide equivalent, with the overwhelming majority coming from the supply chain and direct delivery of care. Volatile anaesthetics (sevoflurane, isoflurane, and desflurane) and N2O are potent greenhouse gases that are routinely released unmetabolised into the atmosphere.

AIM: To determine & highlight the carbon footprint and wastage within burn care, and devise solutions aimed at abating this, focussing on PPE usage, travel and water wastage.

METHODOLOGY

1. We undertook an environmental and procedural overview to identify aspects of burn care that contribute most to the carbon footprint and wastage in our burn service; and explore interventions to assist in reduction.

2. We conducted a literature review to:

- a) **Estimate** the carbon footprint and wastage of burn care - inpatient, outpatient and outreach activity plus surgical intervention; extrapolating from other areas of healthcare as needed.
- b) **Estimate** the carbon footprint and wastage of all aspects of our service and what interventions are available to reduce it.

RESULTS

A. Literature search

We found that hospitals and surgical clinics are the second largest waste contributors in the UK. In 2018, the surgical field generated over 6600 tons of waste per day. Burns & Plastic surgery contribute to a significant proportion of this surgical waste, while theatre waste accounts for approximately 75% of healthcare waste. Current waste disposal practices including incineration, landfilling, and sterilization methods pose environmental threats.

B. Our Service

Ward waste example

During a typical burns ward round, a team of 10 healthcare professionals, all in PPE, utilizes 1.5 boxes of gloves (300 gloves) and up to 2 rolls of 75 plastic aprons. Annually, this amounts to 400 boxes of gloves and 500 apron rolls. Extrapolated to all burns services, it totals 15,000 rolls of aprons and 12,000 boxes of gloves. Across the NHS, it reaches 2 million boxes of gloves and 2.5 million rolls of aprons.

Annual Carbon emissions	Water Waste (KgCO2e)	Ward round PPE (KgCO2e)	Annual cost of ward round PPE (£)
Our service	70	5000	4000
All burns services	2000	142,000	120,000
The NHS	350,000	25,000,000	20,000,000

Water waste example

To prevent bacterial colonization of water systems by *Legionella* & *Pseudomonas*, protocols dictate that 70 faucets are run daily, at a rate of 6 l/min for 1 minute. We found that this is not accurately timed and tends to occur for 10 minutes. This results in between 150,000 - 1.5M litres of wasted water annually in the burns unit. Extrapolating across all burns services and the NHS this equates to at least 5-10M litres of waste in burns services & **1 BILLION LITRES OF WATER WASTE** across the NHS.



PPE CHAPERONE CONCEPT



Fig.4 Current daily burns ward round with 10 staff members

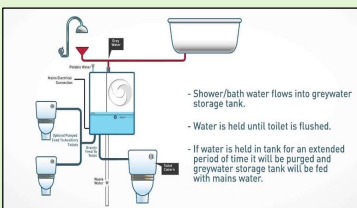


Fig.8 Technological innovations surrounding water pipes and tanks, filtration and decontamination, as well as, grey water recycling could all have a future role in reducing water waste. Environmental and nosocomial infection presents a huge but not insurmountable challenge in this arena

Our Proposed Interventions



Fig.5 PPE Chaperone



Fig.6 PPE Chaperone



Fig.9 Modifying faucets to include a water timer with an alarm system or automated cut off could prevent excessive water wastage

Our PPE chaperone proposal is that only staff in direct contact with / within 1 metre of patients, or touching surfaces are required to don PPE except masks. The PPE chaperone would open/close doors and position staff in a safe 'non touch zones'. This could reduce our waste and carbon emissions up to 80%. Extrapolating to 30 burn services will reduce waste of 12,000 rolls of aprons, 10,000 boxes of gloves and cut carbon emissions by more than 110 tonnes CO2e, saving over £100,000 in costs P/A. Across the NHS it would be 18,000 tonnes CO2 and £17M.

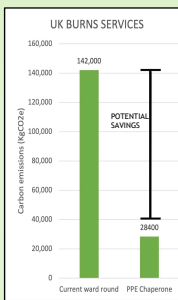


Fig.7 The PPE Chaperone proposal has the potential to significantly reduce carbon emissions and costs by 80%

Other proposals to reduce environmental impact and increase sustainability in burns care include: effective waste management practices, sustainable procurement, energy efficiency measures, water conservation, green building design, education and awareness programs, collaboration and partnerships, and continuous improvement efforts. By integrating these strategies, burns care services can minimize waste, conserve resources, promote eco-friendly practices, and actively work towards a more sustainable healthcare system.



Fig.10 Mersey Burns Centre Catchment area - 6 Million people

Transportation - Our Current Interventions

The Burns outreach team covers our entire catchment area providing burn dressing management thus allowing patients to remain in the community and eliminates the need to travel for outpatient dressings clinics. This lessens carbon footprint by reducing the return leg of each journey that would have been undertaken by an individual patient.

An outreach service can only reduce the carbon footprint in a major way by facilitating local clinics, as opposed to attending individual patient residences. We are looking into the feasibility of this.



Fig.11 Outreach services can reduce carbon footprint. We do not capture the positive environmental impacts of our interventions!

In one year, we converted to over 100 telemedicine appointments, saving countless return journeys. Estimating an average 30-mile journey and assuming all travelled by road reduced carbon emissions by more than 700 KgCO2e.

CONCLUSIONS

The carbon footprint of burn care in the UK is a matter of concern due to the substantial use of single-use plastics, wound care packs and instrument sets, as well as high consumption of dressings, among other factors. This not only contributes to environmental degradation but also has implications for public health and sustainability. It is crucial to address this issue urgently, considering the need for greener healthcare practices and to reduce healthcare's overall environmental impact. We have undertaken initial steps by demonstrating and calculating the carbon footprint generated by our service's PPE and water waste, and estimated similar wastage across burn care in the UK. Without undertaking our calculations and this preliminary 'proof of concept' work, we cannot look to innovate technological or practical solutions to mitigate waste and carbon footprint. Our simple proposals could have a huge impact, and further studies are planned. Our PPE Chaperone concept alone could save 80% on the cost of PPE and plastic waste; if implemented across all services as a QIP we could potentially save over £100,000 per annum in burn care nationally.

This ongoing work serves as a foundation for future collaboration among stakeholders to develop sustainable strategies that minimize waste, promote eco-friendly alternatives, and ensure the long-term sustainability of burns care while safeguarding the environment. We have added this important topic to our agenda and created a platform for collaboration. Do you want to collaborate on our 'greener NHS' project? Visit www.greenernhs.com and join us!

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