# Enhancing Sustainability in Ophthalmic Theatres: the single-use sharps perspective

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## Introduction

- The NHS produces 156,000 tonnes of clinical waste annually, generating a carbon footprint of 100,000 tonnes of CO2**[1].**
- Surgical waste is a significant contributor (70%), especially in ophthalmology. **[2]**
- Carbon footprints associated with hospital waste disposal are highest when disposed of via high temperature incineration (1074kg CO2/tonne): an over-tenfold increase from when waste is recycled **[3]**
- Single-use disposable sharps have a higher carbon footprint than reusable sharps**[4]**. Unfortunately, reusable sharps dull with time, necessitating single-use sharps for highly precise oculoplastics procedures.
- Poor staff awareness meant these were usually disposed of in the more familiar and ubiquitous yellow sharps containers for high temperature incineration, as opposed to grey recycling sharps containers
- This project aimed to improve utilisation of **recycling sharps containers** (fig.1) for metallic waste recycling in ophthalmic theatres over **10 weeks**, and therefore reduce the carbon footprint associated with single-use surgical sharps disposal

## Methodology

- Surgical sharps waste tracked over a period of 10 weeks
- **Weekly weight measurements** of 6 grey recycling sharps bins, across 4 ophthalmic operating theatres
- Initial **baseline period of 2 weeks**, to establish typical waste disposal habits as a starting point
- An **awareness campaign** was introduced after the baseline measurement period:
  - Face-to-face presentations with theatre teams
  - **Posters** (Fig.2) **& signage** placed near sharps bins
- Post-intervention measurements over 8 weeks
- **Data analysis** to compare pre/post-intervention recycling bin utilisation
- **Carbon footprint** reduction estimated using the **Inventory of Carbon & Energy (ICE)** database **[5]**



Figure 1: A "grey" sharps recycling bin




Figure 2: Poster used for awareness

## Results

**Total Waste Collected: 79.5kg** of **metallic sharps** ♻

**Baseline Usage (Before Intervention):** 0.683kg per theatre per week *(Range: 0.1 - 1.4kg, SD: 0.534)*

**Post-Intervention** (After Awareness Campaign): 1.639kg per theatre per week *(SD: 1.333) (Fig. 3)*

**2.4× Increase** in recycling rate 📈 *(p = 0.0906)* (Fig.3)

- Waste collection steadily increased following awareness campaign, peaking at 14.5kg in week 8. (Fig.4)
- Week 5 saw a slight decline due to missing data from one theatre, but overall trend remained upwards.

**Carbon Emission Reduction**:

- Using ICE database factors (**4.18 kg $CO_2$ per kg of stainless steel** [5]), the estimated carbon emissions offset was **332.31 kg $CO_2$**, averaging **33.23 kg $CO_2$ per week**.

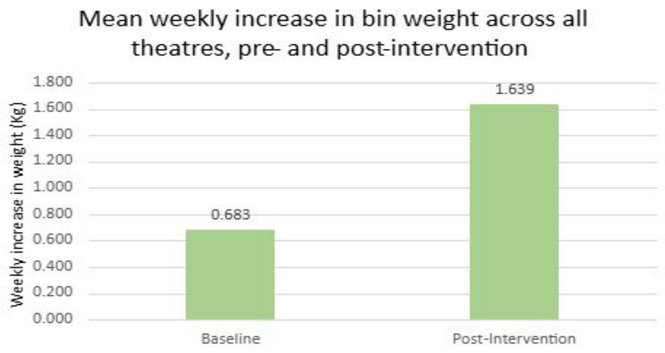



Figure 3: Mean weekly increase in bin weights (kg) across theatres: baseline and post-intervention




Figure 4: Weekly increase in bin weight over the 10 weeks

## Conclusions

- **Key Findings**:
  a. Simple interventions, such as awareness campaigns, can significantly improve waste disposal practices.
  b. **79.5 kg** of predominantly surgical stainless-steel waste was recycled, offsetting **332.31 kg $CO_2$**.
  c. A decline in waste collection during final 2 weeks suggests staff may have eased up on proper disposal habits over time.
- **Implications**:
  a. Financial benefits align with carbon reductions, as NHS data shows waste disposal costs mirror carbon footprints.
  b. This study highlights the environmental impact of metallic waste in surgical settings and the potential of improved waste segregation.
- **Future Steps & Improvements**
  a. **Reinforce consistency** by implementing a weekly quota for surgical waste recycling
  b. Conduct longer-term baselines & studies to confirm statistical significance
  c. **Expand grey** recycling bins across more surgical departments
  d. Develop hospital-wide policies for improved waste segregation.

**References:**
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