

Research Letter

Enhancing urology theatre waste management: impact of a 'Green Moment' in daily surgical practice

Climate change is poised to significantly impact public health in the coming years, both directly and indirectly. A 2023 report from *The Lancet* emphasised the gravity of this issue, identifying climate change as the greatest global health threat of the 21st century [1].

Paradoxically, the healthcare sector itself is a major contributor to climate change, whose global environmental impact ranges between 1% and 5% of total global impacts [2]. Within healthcare, operating theatres (OTs) are particularly resource-intensive environments, reliant on large volumes of disposable equipment, energy-demanding sterilisation processes, as well as heating, ventilation and air conditioning requirements [3]. In acute care settings, OTs generate approximately 70% of general waste and 20% of healthcare risk waste [4,5].

Recognising this, the Health Service Executive (HSE) in Ireland has committed to achieving net-zero emissions by 2050 [6]. The guidelines outlined by the HSE are extensive, reflecting the scale of the challenge. In OTs, the Intercollegiate Royal Colleges of Surgeons have developed the 'Green Theatre Checklist and Compendium of Evidence', which provides a framework for implementing sustainable practices in OTs across hospitals in Ireland and the United Kingdom [7].

Building on the principles of the Green Theatre Checklist, we introduced a 'Green Moment' initiative in the urology theatre of our hospital. This initiative follows a checklist-based approach, consisting of three key questions to ask before each surgical case and one after (Fig. 1). These questions incorporated some key aspects of the Green Theatre

Checklist, including reviewing and rationalising equipment ('Is this equipment necessary?'), recycling where possible ('Has this waste been contaminated?'; 'Can it be recycled?'), and reducing water and energy consumption ('Can I scrub with hand rub?').

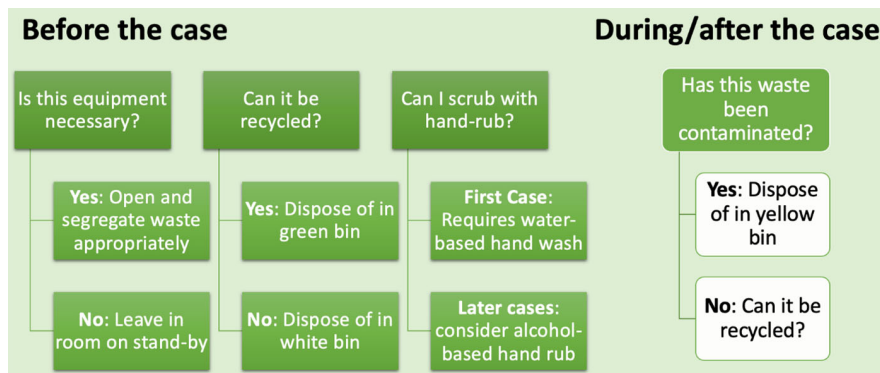
We implemented the Green Moment in daily morning surgical huddles and during the 'sign-in' and 'sign-out' processes for each case, ensuring comprehensive engagement from the surgical team, anaesthetic staff, and theatre nurses.

A closed-loop audit was conducted in the urology theatres and anaesthetic rooms (ARs) of our centre, with the aim of evaluating the correct disposal of recyclable waste in accordance with Environmental Protection Agency guidelines and hospital waste disposal policies [4]. Materials (once clean) that were suitable for inclusion in mixed recycling bags in theatre included: plastic and paper composite packaging; rigid plastic packaging; paper packaging; plastic containers from surgical kits; and cardboard. Data were collected both before and after the implementation of the Green Moment initiative, which was incorporated into our daily surgical practice.

Prior to data collection, we consulted with the hospital's waste management team to identify which waste materials were recyclable and categorise these.

To assess waste disposal practices in the OT, general waste bins from both the AR and OT were inspected after each surgical case. The contents of these bins were analysed to determine the proportion of waste that was correctly placed in the general waste bin vs waste that could have been recycled.

Fig. 1 Questions asked as part of the 'Green Moment'.



In addition to waste data, we recorded other variables, including the type of procedure performed and the position of the case on the operating list. A paired *t*-test was used to compare groups, with a *P* value of less than 0.05 taken to indicate statistical significance.

Data were collected from 40 elective urology cases, evenly divided into two groups: pre-intervention (*n* = 20) and post-intervention (*n* = 20). The cases were selected from the urology theatre list over a 3-week period. Procedures were categorised as follows: (i) major procedure; (ii) transurethral resection of bladder tumour/transurethral resection of prostate; (iii) rigid cystoscopy ± ureteroscopy; (iv) transperineal biopsy; (v) circumcision or other peno-scrotal procedures.

Before the introduction of the Green Moment, the average amount of mismanaged waste in the AR waste bin per case was 506.15 g, accounting for 68.07% of the total waste collected in the AR's general waste bin. In the OT, the average amount of mismanaged waste per case was 729.2 g, representing 56.02% of the waste collected from the OT's general waste bin.

Following the Green Moment intervention, there was a reduction in mismanaged waste. In the AR, the average amount of mismanaged waste per case decreased to 353.43 g, which accounted for 66.95% of the waste collected in the AR's general waste bin. In the OT, the average mismanaged waste per case was 740.24 g. While this represents a higher total volume of mismanaged waste, it accounted for only 31.63% of the total OT waste. This reduction in inappropriately disposed of waste was statistically significant (*P* = 0.029). This higher volume of mismanaged waste likely reflects the increased proportion of major procedures (30% of cases post-intervention vs 20% of cases pre-intervention), which generated the highest average waste per case (Fig. S1).

There was no statistically significant correlation between the amount of mismanaged waste and the order of the case on the theatre list (*P* = 0.34) or the type of procedure performed (*P* = 0.61).

The climate crisis presents an increasingly urgent challenge and, as healthcare professionals, we must consider how we can contribute to meaningful solutions within our areas of influence. OTs, being among the most resource-intensive settings in healthcare, require a focused and sustained effort to improve their sustainability.

In Ireland, the Royal College of Surgeons in Ireland has taken a leadership role by developing and promoting the Green Theatre Checklist to support operating theatres nationwide in enhancing their sustainability. This comprehensive and ambitious roadmap provides hospitals with clear guidance for reducing the environmental footprint of their surgical practices [7].



Behavioural research demonstrates that consistent reminders – such as verbal cues, posters, or advertisements – are effective in changing behaviour, including improving recycling habits [8]. Inspired by this evidence, our department sought to create an initiative that would act as a regular prompt for theatre staff, enhancing awareness of sustainable practices and improving waste management. The 'Green Moment' was thus conceived, drawing from the principles of the Green Theatre Checklist that could be most easily integrated into daily surgical practice. It offers a focused, accessible summary of sustainable actions that can be integrated seamlessly into daily routines, without disrupting the critical sign-in and sign out process.

The significance of the Green Moment lies in its ease of implementation and its positive reception among theatre staff. By cultivating a culture of mindfulness toward environmental impact, this initiative serves as an important first step in fostering lasting behavioural change. Encouragingly, its success within our department has led to plans for expansion across other theatres in our hospital.

Nevertheless, to fully realise the potential of such an intervention, it should be implemented alongside broader sustainability initiatives, such as the use of reusable gowns and drapes, and environmentally sustainable anaesthetic practices. By taking a multifaceted approach, we can work toward making our theatres as 'green' as possible, setting a precedent for sustainable healthcare practices that others can follow.

Disclosure of Interests

There are no conflicts of interest to disclose.

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Abbreviations: AR, anaesthetic room; HSE, Health Service Executive; OT, operating theatre.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Fig. S1. Operating theatre waste per case, grouped by procedure category.