

Time for change: Compliance with RCS green theatre checklist - facilitators and barriers on the journey to net zero.



Bradford Teaching Hospitals

NHS Foundation Trust

Westwood E¹, Walshaw J^{2,3,6}, Boag K^{1,4}, Chua WY⁵, Dimashki S¹, Khalid H¹, Lathan R^{3,6}, Wellington J⁷, Lockwood S¹, Yiasemidou M^{6,8}

¹Bradford Teaching Hospitals NHS Foundation Trust. ²Department of Health Research, University of York. ³Hull University Teaching Hospitals NHS Trust. ⁴University of Leeds. ⁵University of Nottingham. ⁶Clinical Sciences Centre, Hull York Medical School. ⁷School of Medicine, Cardiff University. ⁸Oxford University Hospitals NHS Foundation Trust.

Background

Climate change is an era-defining health concern, with healthcare emissions paradoxically compounding negative impacts. The NHS produces 5% of the UK’s carbon footprint, with operating theatres a recognised carbon hotspot.

NHS England intends to become Net Zero by 2045, with various governing institutions of specialist practice producing guidance and practical tools to facilitate this transition.

We aimed to comprehensively assess the environmental impact of baseline surgical practice, and subsequently measure impacts of sustainable change with the intention of moving closer to this national goal at a local level.

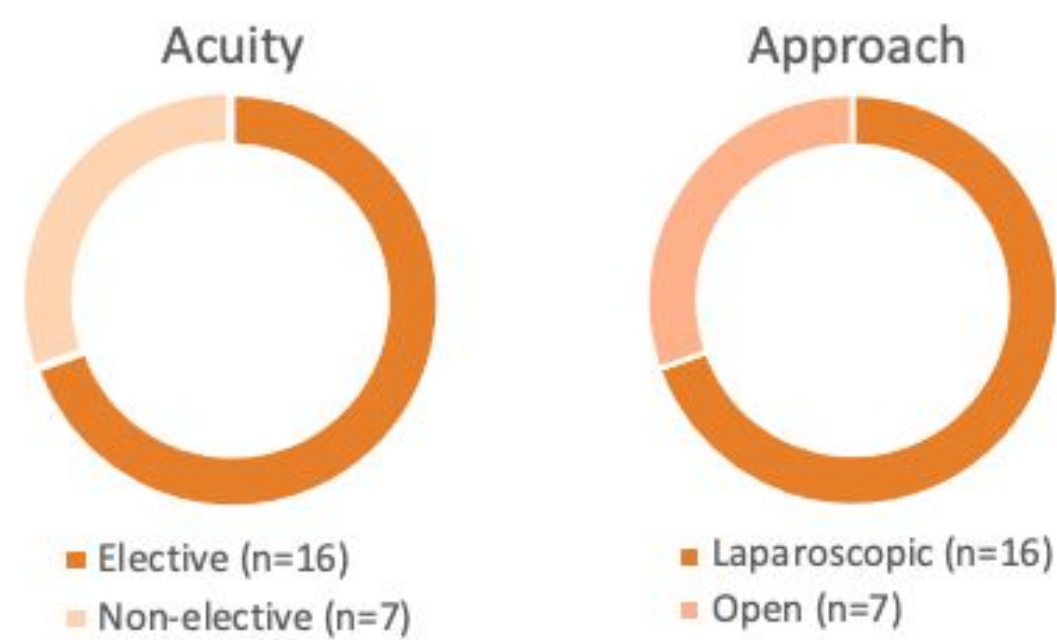
Methodology

- A single-centre quality improvement project was undertaken. The UK Royal Colleges of Surgery collaboratively published “Green Theatre Checklist” was used as an audit standard, focusing on the role of the surgeon by looking specifically at the “preparing for surgery” and “intraoperative equipment” subsections.
- Any general surgical procedure was eligible for inclusion.
- Usage of reusable textiles, non-sterile gloves, catheters, antibiotics, alcohol vs water-based scrub techniques, skin sterilisation choices, and skin closure materials were recorded.
- A carbon footprints were derived from UK based datasets using bottom-up, life-cycle analysis approaches for most items, with top down financial analogies used when no alternatives existed. Other measures such as water usage or total % change in resource use are used where appropriate.
- Baseline data collection occurred over a 3 week period, followed by dissemination of results locally via clinical governance meetings and poster displays.
- A re-audit of practice was subsequently conducted using the same methodology and duration.

Results - Demographics

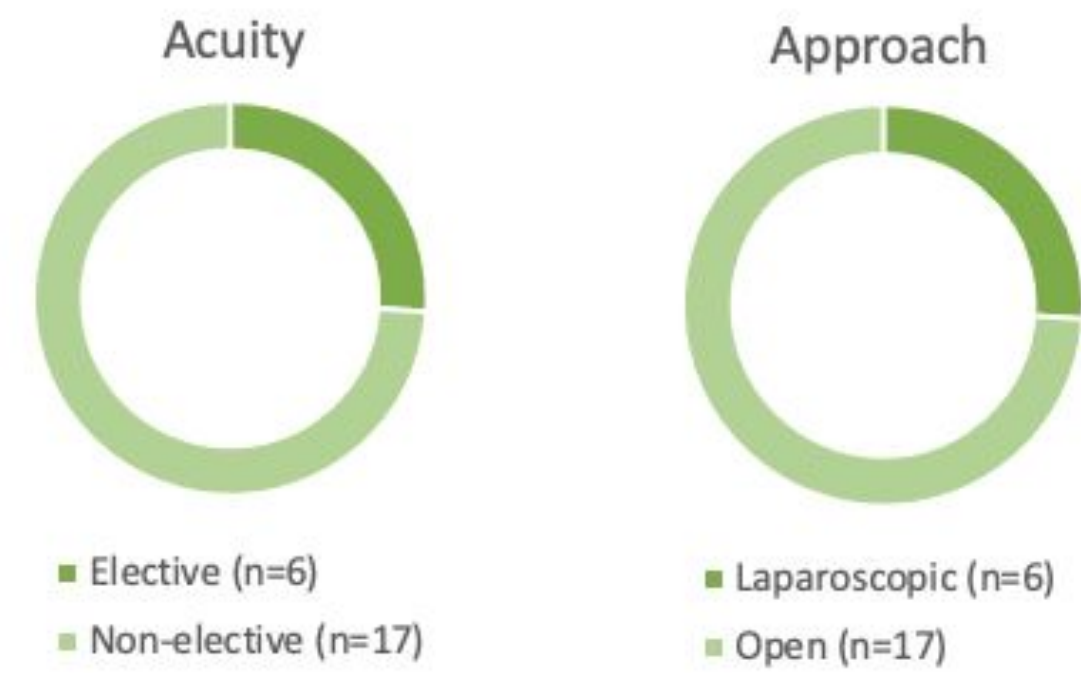
Dataset 1

- Cases (n=23)
- Consultants (n=8)
- Mean scrubbed staff per case - 4 (range 3-6)
- Most frequent procedure – laparoscopic cholecystectomy (n=8)



Dataset 2

- Cases (n=23)
- Consultants (n=7)
- Mean scrubbed staff per case - 3 (range 2-5)
- Most frequent procedure – incision and drainage of abscess (n=8)



Results – Environmental Impact

Reusable textiles

The majority of trolley covers and drapes were reusable, however reusable gown use was affected by procurement issues during Dataset 2, resulting in a higher associated carbon footprint. Reusable hat use was low, however due the comparatively small carbon footprint this made little difference to overall environmental impact.

	Dataset 1		Dataset 2	
	% (reusables)	kgCo2e (total)	% (reusables)	kgCo2e (total)
Trolley Covers	96	-	78	-
Drapes	100	3.20	92	5.50
Gowns	90	27.04	46	32.97
Hats	2	0.38	18	0.35

Table 1. % usage of reusable textiles and total carbon footprint (reusables and disposables) for each Dataset

Reduce water consumption and energy consumption

Water consumption was 1573L (2.12 kgCO2e) and 1203L (1.64 kgCO2e) in Datasets 1 and 2 respectively. Uptake of the alcohol scrub was 15% (8/53) in Dataset 1 and 17% (6/35) in Dataset 2, equating to 148L and 111L water savings respectively compared to traditional soap and water scrub.

Avoiding clinically unnecessary interventions

No unnecessary catheter use was identified. In Dataset 1, 80% (8/10) of antibiotics used had a clear indication. Similarly in Dataset 2, 78% (7/9) of antibiotics used had a clear indication. Eliminating the 4 instances of non-indicated antibiotic use would reduce carbon footprint in each Dataset by 2.17kgCO2e.

Review and rationalise

Open but unused equipment accounted for 0.25kgCO2e in Dataset 1 compared to 26.63kgCO2e in Dataset 2. This difference was due to opening of a single large item (automatic purse string clamp).

Reuse

Aside from 1 procedure all kidney dishes and gallipots were re-usable. Most laparoscopic instruments were hybrid, however scissors and ports were single use. Hybrid equivalents would have saved an estimated 56.36kgCOe and 16kgCO2e over Datasets 1 and 2 respectively.

Replace

Loose skin prep was used across all cases (rather than higher impact plastic prep wands). Sutures were used for skin closure in 48% (7/21) of Dataset 1 cases and 54% (7/13) of Dataset 2 cases with associated footprints of 4.23kgCO2e and 2.34kgCO2e respectively. The carbon footprint of a stapler (0.37kgCO2e) was 20 times that of an absorbable monofilament suture (0.018kgCO2e).

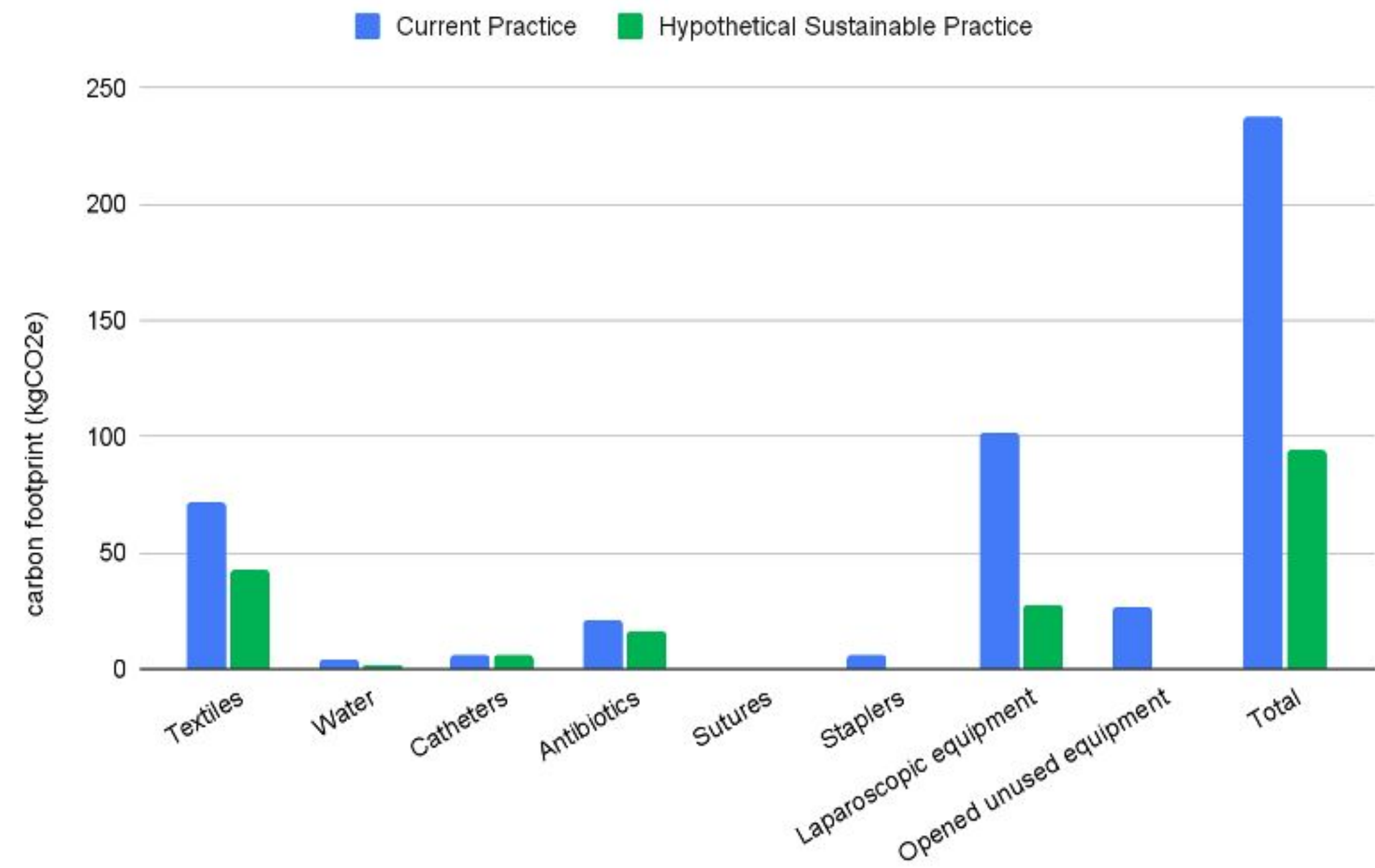


Figure 3. Carbon footprint in current vs. hypothetical sustainable practice

Total carbon footprints were 128.27 kgCO2e and 117.71 kgCO2e in datasets 1 and 2. 432 miles and 396 miles respectively in an average petrol car. If we fully optimised all potential sustainable changes currently available total carbon footprint could be reduced from 246 kgCO2e to 101 kgCO2e. A switch to procurement of hybrid laparoscopic scissors and ports would account for most of this saving (Fig.3).

Conclusion

High impact changes like adopting hybrid laparoscopic instruments are highlighted, however progress would be best made through a multifaceted approach combining waste avoidance, standardised procurement of reusable textiles and normalising low carbon clinical choices.

Successful implementation improved awareness and education, clear local and national leadership, access to supporting evidence at supply chain level and a sustained cultural shift within the healthcare community.

Quality improvement processes can engage healthcare staff to guide a workable and clinically relevant transition. This said, already stretched clinical teams will need the support of dedicated personnel with adequate time, knowledge and resources to ensure change comes at the scale and pace required.