

9. Recommendations

Patients

Patients can be key supporters of sustainable surgery, and we invite patients to work alongside healthcare professionals in transitioning towards sustainable models of care which do not harm the health of future generations through impacts of climate change.

We recommend that patients:

- ◇ Engage in conversations with their health provider about the link between human and planetary health (Recommendation R1.1)
- ◇ Have open conversations with healthcare professionals to understand the benefits, risks and alternatives of any intervention, and what would be likely if nothing were done (R2.3); improving the sustainability of surgery involves making sure the right high-quality care is provided to patients at the right time, and in the right place
- ◇ Consider ways to optimise their health and wellbeing, in particular in the run up to any planned surgery; this may include exercising more (especially where this involves accessing nature, and where walking or cycling can be used in place of using vehicles), improving diet, optimising weight, stopping smoking, and reducing alcohol (R3.1).

Healthcare professionals

Transitioning towards green surgical care will require engagement and action from all members of the surgical team, including surgeons, nurses, operating department practitioners, and other allied health professionals. We encourage every healthcare professional to consider their scope of clinical care and to think about the one thing they can do tomorrow to improve sustainability, and to communicate that commitment to someone else.

We recommend that members of surgical and anaesthetic teams:

- ◇ Raise awareness of the links between human and planetary health, and sources of greenhouse gas emissions in surgery, have conversations with colleagues, and share this report (R.1.1)
- ◇ Develop quality improvement projects, audits, and research projects relating to sustainability, and that consider environmental, financial, and social sustainability for all (R1.2)
- ◇ Identify modifiable risk factors during every patient encounter, have conversations and point patients in the direction of further support and resources (R2.1)
- ◇ Use shared decision making and 'choosing wisely principles' in every patient encounter, ensuring intervention is the right option for the individual patient (R2.3)
- ◇ Design, implement, and evaluate interventions to streamline patient pathways where clinically appropriate (R3.1)
- ◇ During pre-operative consultations identify modifiable risk factors, and point patients in the direction of support and resources (R3.2)
- ◇ Use enhanced recovery after surgery protocols and early discharge planning where appropriate (R3.3)
- ◇ Develop and use shutdown checklist (plus safety protocols) to prompt turning off equipment (R4.1)

- ◇ For each patient consider whether local, regional, or intravenous techniques are appropriate (R5.1)
- ◇ Where inhaled anaesthetics are clinically necessary, opt for lowest carbon inhaled anaesthetic gas that is clinically appropriate, and minimise fresh gas flows (R5.2)
- ◇ Work with facilities and estates to decommission desflurane and decommission centrally piped nitrous oxide, substitute with portable cylinders, introduce nitrous cracking technologies (R5.2,5.3)
- ◇ Minimise pharmaceutical wastage through only opening what is needed, and disposing medicinally contaminated waste appropriately (R5.4)
- ◇ Ask industry representatives whether air freight is used at any stage of product supply chain (R6.2)
- ◇ Shift culture away from urgent delivery requests (reducing reliance on air freight) through adequate planning, sufficient stocks (R6.2)
- ◇ Only open packaged surgical items when required (R6.3)
- ◇ Rationalise unnecessary equipment and investigations (e.g. avoid gloves where hand-washing is appropriate) (R6.3)
- ◇ Opt for reusable equivalents where currently stocked and available (R6.4)
- ◇ Explore whether reusable alternatives are currently available on the market and trial/purchase (R6.4)
- ◇ Use appropriate waste streams (R6.7)
- ◇ Become a green champion in local trust (or equivalent, where scheme exists) (R7.2)
- ◇ Look to existing resources including collegiate sustainability strategies and the Intercollegiate Green Surgery Checklist¹¹⁰ (R7.2)
- ◇ Act as ambassadors or leaders for change (R7.2)
- ◇ Join local sustainability network (where these exist) (R7.2)

We recommend that public health practitioners:

- ◇ Develop public health initiatives to prevent the need for surgical interventions, targeted at high-risk populations (R2.1)
- ◇ Design population level interventions around health optimisation, targeted at high-risk groups (R3.2)

Healthcare organisation leadership

Leadership is required at the healthcare organisational and departmental levels.

We recommend that leadership teams:

- ◇ Consider sustainability at all stages of surgical care delivery, including upstream supply chain and supporting services (R1.2)
- ◇ Develop outpatient department treatment rooms and increase day-case lists where appropriate (R3.1)
- ◇ Develop infrastructure change to support day-case theatre lists or outpatient settings where appropriate (R3.3)
- ◇ Provide a forum for shared learning and to celebrate successes (R7.1)
- ◇ Develop sustainability champions locally within each department (R7.2)

- ◇ Identify a named champion with protected time and budget to lead on sustainable healthcare initiatives (R7.2)
- ◇ Invite representatives from surgical teams to be part of organisational decarbonisation planning processes (R7.2)
- ◇ Identify individuals at risk of eco-anxiety and signpost appropriate existing resources and support groups (eco-anxiety), develop support services for those with eco-anxiety (R7.5)

Wider hospital teams

We rely on wider hospital/healthcare provider teams to assist in transition to sustainable healthcare systems.

We recommend that Facilities and Estates teams alongside theatre managers:

- ◇ Develop initiatives to encourage green patient transport (R2.1)
- ◇ Install motion sensors to control lights, temperature control, and ventilation in theatres (R4.1)
- ◇ Install automatic/pedal-controlled taps for surgical scrub (R4.1)
- ◇ Opt for renewably sourced electricity (R4.2)
- ◇ Install energy efficient appliances and machinery (R4.2)
- ◇ Opt for clinically appropriate ventilation system with lowest energy consumption (R4.2)
- ◇ Use ventilation systems with lowest energy requirements while meeting clinical need (R4.2)
- ◇ Decommission desflurane (R5.2)
- ◇ Decommission centrally piped nitrous oxide, substitute with portable cylinders, introduce nitrous cracking technologies (R5.2)
- ◇ Opt for contracts with waste handling companies which enable recycling and recovery of energy from waste where possible (R6.7)
- ◇ Facilitate appropriate waste segregation (R6.7)

We recommend that Procurement teams alongside theatre managers:

- ◇ Ask suppliers if they have a carbon reduction plan (R6.1)
- ◇ Ask industry representatives whether air freight is used at any stage of product supply chain (R6.2)
- ◇ Shift culture away from urgent delivery requests (reducing reliance on air freight) through adequate planning, sufficient stocks (R6.2)
- ◇ Streamline single-use pre-prepared sets (R6.3)
- ◇ Explore whether reusable alternatives are currently available on the market for a given product, and trial/purchase (R6.4)
- ◇ Explore opportunities for repair and remanufacturing (where such contracts are not in place) (R6.6)

We recommend that Infection prevention and control teams:

- ◇ Work alongside surgical groups to consider opportunities for improving sustainability whilst addressing IPC concerns (R7.6)
- ◇ Use evidence-based approaches to IPC and avoid acting on hypothetical risk (R7.6)

We recommend that instrument and textile reprocessing providers:

- ◇ Work with NHS and healthcare provider management to model increase in demand for reprocessing of reusable equipment, plan to increase capacity accordingly (R6.4)
- ◇ Switch off idle machines (R6.5)
- ◇ Run decontamination machine test-runs loaded with sets (R6.5)
- ◇ Prepare instruments as sets (R6.5)
- ◇ Use renewable energy sources, environmentally preferable detergents (R6.5)
- ◇ Maximise loading of decontamination machines, whilst minimising standby time (R6.5)
- ◇ When an item is damaged find out if it can be repaired (R6.6)

We recommend that pharmaceutical teams:

- ◇ Work alongside surgical teams to optimise and rationalise medication, minimising polypharmacy (R3.1)
- ◇ Support the decommissioning of desflurane (R5.2)
- ◇ Support the decommissioning of centrally piped nitrous oxide, and its substitution with portable cylinders (R5.3)
- ◇ Minimise pharmaceutical wastage through encouraging surgical and anaesthetic teams to only open what is needed, and to dispose of pharmaceuticals in medicinally contaminated waste appropriately (R5.4)
- ◇ Evaluate ways to integrate environmental impact into healthcare product and pharmaceuticals procurement decisions (R7.8)

We recommend that diagnostic services teams:

- ◇ Work with surgical teams to standardise and consolidate peri-operative investigations (R3.1)

National representative bodies

We encourage national representative bodies to provide leadership, including Royal Colleges, Specialty Associations and other clinical national groups.

We recommend that national representative bodies:

- ◇ Develop initiatives to minimise unwarranted variation (R2.2)
- ◇ Increase time and investment in leadership (R7.1)
- ◇ Develop sustainability strategy, including for sub-specialties, focusing on what members can do to improve sustainability of clinical practice (R7.1)
- ◇ Work collaboratively across national organisations to minimise duplication and to learn from one another (R7.1)
- ◇ Advocate for sustainability, both signalling the demand for sustainable products and services from industry, encouraging wider systems change towards disease prevention and health promotion, alongside equitable access to high quality care (R7.1)
- ◇ Develop sustainability champions for each specialty and region nationally (R7.2)
- ◇ Develop sustainability networks for scaling of initiatives and dissemination of knowledge (R7.3)
- ◇ Integrate sustainability into postgraduate specialty curricula and examinations (R7.4)
- ◇ Develop resources to teach principles of sustainable surgery (R7.4)

- ◇ Develop centralised national case study repositories enabling shared learning and scaling of sustainable practice (R7.4)

Educators

We call upon NHS and NHS education bodies (Health Education England, NES Education for Scotland, and Health Education and Improvement Wales), to provide training for the existing surgical workforce. Colleges, the General Medical Council, Nursing and Midwifery Council, Health and Care Professions Council, and universities may all play a role in integrating sustainability within the core undergraduate and postgraduate curricula.

We recommend that educators:

- ◇ Raise awareness of links between human and planetary health, and sources of greenhouse gas emissions in surgery (R1.1)
- ◇ Draw on existing resources when teaching, including the SusQI model, Intercollegiate Green Theatre Checklist (R7.4)
- ◇ Integrate sustainability into undergraduate postgraduate specialty curricula and examinations for the entire surgical workforce including for nurses, ODPs, and surgical and anaesthetic trainees (R7.4)
- ◇ Develop case study repositories, and feature within specialty conferences enabling shared learning (R7.4)
- ◇ Develop resources to teach principles of sustainable surgery (R7.4)
- ◇ Develop educational opportunities including leadership programmes, fellowships (R7.4)
- ◇ Address the capacity of educators and trainers to teach knowledge, skills, and dispositions for sustainable surgery using a train the trainer approach (there is a wider requirement that the NHS, NHS education bodies, and universities do this) (R7.4)

Government

To bring about transformational change, there are a number of systems changes required. Given the globalised nature of healthcare supply chains, collaboration with international partners is required.

We recommend that government:

- ◇ Shift resource allocation towards disease prevention, and initiatives that support equitable access of high-quality healthcare (R2.1)
- ◇ Develop initiatives to minimise unwarranted variation (R2.2)
- ◇ Develop unified international action towards whole chain stewardship across globalised supply chains (R7.7)
- ◇ Develop regulations and policies for medical device and pharmaceuticals (end to end full life cycle processes) (R7.8)
- ◇ Evaluate likely requirements for expansion of appropriate infrastructure to support the use of higher volumes of reusable equipment, including reprocessing facilities (including sterilisation, linen laundering, and repair) (R7.8)
- ◇ Evaluate ways to integrate environmental impact into healthcare product and pharmaceuticals procurement decisions (R7.8)

Academics and research funders

Research and innovation is required to deepen understanding of evidence-based approaches to sustainable surgical care.

We recommend that academics:

- ◇ Design research questions targeted towards major contributors of environmental impact (R8.1). Examples may include:
 - ◆ Improve understanding of unwarranted variation in surgical care (R2.2)
 - ◆ Develop research on personalised medicine, to better understand likelihood of success and impact of a given intervention for an individual (R2.3)
 - ◆ Evaluate environmental impact of different anaesthetic techniques (R2.4)
 - ◆ Develop research to evaluate evidence-based infection risk associated with reusable equipment (R7.6)
 - ◆ Evaluate likely requirements for increase in capacity of reprocessing facilities and plan to meet this demand (R7.8)
 - ◆ Evaluate ways to integrate environmental impact into healthcare product and pharmaceuticals procurement decisions (R7.8)

We recommend that research funders:

- ◇ Develop targeted funding opportunities to support identified research gaps (R8.1)

Industry

Industry can play a key role in innovation towards sustainable surgical products and solutions. We encourage industry to collaborate openly and transparently to accelerate sustainable innovation, and that where environmental claims are made this is founded on verifiable data.

We recommend that industry:

- ◇ Innovate towards energy efficient devices (R4.2)
- ◇ Apply principles such as Circular Economy, Design for the Environment framework, Green Engineering and Green Chemistry in their operations (R6.1)
- ◇ Develop a carbon reduction plan (if not already in place) (R6.1)
- ◇ Opt for renewable energy sources (R6.1)
- ◇ Seek to eliminate air freight from distribution, electrify vehicular fleet (R6.2)
- ◇ Eliminate unnecessary packaging (R6.3)
- ◇ Design products for safe reuse (R6.4)
- ◇ Design products that are modular, facilitating repair (R6.6)
- ◇ Design products with the end-of-life in mind, recycling component materials wherever possible and using as few materials as possible, aligning with extended producer responsibility, and circular economy principles to facilitate recycling (R6.7)
- ◇ Design products using maximal recycled content (R6.7)
- ◇ Design products enabling safe decontamination, with clear instructions for reprocessing (R7.6)
- ◇ Develop unified international action towards whole chain stewardship across globalised supply chains (R7.7)