A survey of UK and Irish surgeons' attitudes, behaviours and barriers to change for environmental sustainability

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Title: A survey of UK and Irish surgeons' attitudes, behaviours and barriers to change for environmental sustainability.

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ABSTRACT

INTRODUCTION

Surgery is a major contributor to the large environmental impact of healthcare, demanding urgent attention. To date there are no data on the attitudes and behaviours of surgeons towards climate change, or perceived barriers towards sustainable practice.

MATERIALS AND METHODS

We invited surgeons and surgical trainees in the UK and Ireland, to participate in an online survey (developed in accordance with the CHERRIES checklist) conducted between June-November 2020 and disseminated via the Royal College of Surgeons of England, Edinburgh and Ireland, the Association of Surgeons in Training, and through local communication.

RESULTS

We received 130 responses, across 14 surgical specialties. The majority of respondents (122/130; 94%) were concerned about the threat of climate change. Most respondents had instigated more sustainable practices in their personal lives (113/130; 87%), and to a lesser extent at work (73/130; 56%). Surgeons were willing to make changes to their clinical practice (107/130; 82%), but the main perceived barrier to improving sustainability was a lack of leadership (92/130; 70%). Surgeons welcomed greater leadership and guidance from national bodies (118/130; 91%) and more monitoring and regulation (113/130; 87%).

DISCUSSION

The surgeons who responded to our survey are concerned about climate change and willing to engage in efforts to transition to more sustainable practice, but would welcome greater support, guidance and leadership.

INTRODUCTION

Climate change has been recognized as the greatest threat to population health in the 21st century, (1) yet paradoxically the provision of healthcare is itself a major source of greenhouse gases contributing to global warming and climate change. The UK National Health Service (NHS) generates the equivalent of 24.9 million tonnes of carbon dioxide (CO_2) each year (4% of England's carbon footprint) and has recently set the ambitious target of reaching net zero by 2040. (2)

The operating theatre is a particularly resource intensive area of the hospital, (3) with a typical operating department in a large UK hospital generating over 5,000 tonnes CO_2 per year (4) and a single operation 6-814 kg CO_2. (5) Opportunities to improve surgical sustainability traverse the surgical pathway and include disease prevention and peri-operative optimization (6-7) , reducing use of consumable items (8) for example through switching to reusable linens (9) or instruments (10), and applying circular economy principles including maintenance, repair and recycling. (6)

Translating such initiatives into practice will require engagement, leadership and change to attitudes and behaviours amongst individuals and institutions involved in surgical care, yet little is known about the task ahead. Here we report on the first survey to explore the current attitudes and behaviours of surgeons and surgical trainees towards environmental sustainability and perceived barriers to change.

MATERIALS AND METHODS

We devised an open survey to evaluate three key domains of environmentally sustainable surgery: 1) current attitudes and personal behaviours, 2) current practice and education within the surgical workplace, and 3) engagement with sustainable surgery and perceived barriers to change. The survey was developed in collaboration with experts in the field of healthcare sustainability and in accordance with the CHERRIES checklist (11), and built on previously published questionnaires exploring sustainability attitudes amongst healthcare professionals .

(12-14) Questions were further refined following feedback from a pilot study conducted on 14 local surgeons.

The survey featured twenty-two questions over five pages, with attitudes evaluated using five-point Likert scales, binary yes/no options for other questions, and space for free text at the end of the survey inviting participants to provide other comments. The survey was available via the online survey platform *google.docs* (Google, California, USA), and completion was voluntary and without incentive. Details regarding the purpose of the survey, data retention and use of data were explained on the first page of the questionnaire, and participants advised this should take less than five minutes to complete. Responders were required to confirm that they had read the participant information and gave consent prior to participation. Following the UK policy framework for health and social care research tool, this project did not require formal ethical approval. (15)

We invited participation from surgeons and surgical trainees from the UK and Ireland from any surgical specialty. The survey was open from May- November 2020 and disseminated by the Royal College of Surgeons England, Royal College of Surgeons in Ireland, Royal College of Surgeons of Edinburgh, and Association of Surgeons In Training (ASIT). who advertised the survey via a variety of publicly available social media posts, website postings and direct emails to members. In addition, we sent the survey directly to surgeons within our local surgical departments (University Hospitals Sussex NHS Foundation Trust). Only fully completed surveys were included in the analysis.

RESULTS

We received 130 responses from 14 surgical specialties, including respondents across all grades (72 consultants, 35 specialist trainees, 22 core trainees and one clinical fellow) and age categories, with a male majority (78; 60%) (Supplementary Table 1). We received responses from members or fellows of all four UK and Irish surgical colleges, and 13% were a member of the Association of Surgeons in Training.

Current attitude and personal behaviours

The majority of respondents agreed or strongly agreed that they were concerned about the threat of climate change (122/130; 94%) and that surgeons have a responsibility to be aware of the environmental impact of surgical services (116/130; 89%) (Figure 1, Supplementary Table

2). A minority (≤5% across all categories) held opposing views because of: concerns that patient care may be compromised (7/130), a perceived lack of knowledge (5/130), a perceived inability to make a difference (3/130), or a feeling that climate change is not their responsibility (2/130). One respondent indicated they did not believe climate change to be a real problem.

Most respondents reported that concern for climate change had led to changes in their personal lives (113/130; 87%), and the majority practiced recycling (123/130; 95%) and reducing single-use items (110/130; 85%), with a smaller proportion reducing consumption of red meat and dairy (76/130; 58%), or using public and/ or active transport (74/130; 57%). A minority owned an electric/ hybrid car (19/130; 15%) or were a member of (27/130; 21%) or volunteered or donated to (27/130; 27%) an environmental group.

Sustainable practice and education in the surgical workplace

Around half of respondents (73/130; 56%) reported that they had seen changes at work to improve sustainability, but a smaller proportion (≤42% across domains evaluated) felt they worked within NHS Trusts or surgical departments which encouraged and supported measures to improve sustainability. In general surgeons perceived they made greater efforts towards sustainability in their workplace at an individual rather than institutional level, through recycling, eliminating single-use items, switching to reusables, or support for maintenance and repair of reusable equipment (Figure 2).

A minority of respondents reported having received education or training on environmental sustainability, which was via their trust (12/130; 12%), a local environmental group (11/120; 8%), a regional event (4/130; 3%), or at a conference (20/130; 15%). Of those who reported that such education was unavailable, the majority said they would welcome such training (64/72; 89%).

Engagement with sustainable surgery and perceived barriers to change

Most respondents were willing to engage in training and education in sustainability (110/130; 85%), and to dedicate some of their research, audit or quality improvement projects towards this topic (82/130; 63%) (Supplementary Table 3). The majority were willing to make changes to their personal clinical practice (107/130; 82%), and around half to become 'green champions', or to join a focus group (both 70/130; 54%).

With regards to education, 67/130 (51%) agreed or strongly agreed they had the appropriate knowledge to improve surgical sustainability at work, whilst 35 (30%) disagreed or strongly disagreed. Less than half of surgeons felt that they had the support of their department (51/130; 39%), colleagues (65/130; 50%), or NHS trust (46/130; 44%). Most respondents welcomed more guidance from national bodies on how they could improve sustainability of their own surgical practice (118/130; 91%), and would also welcome monitoring and regulation from local or national bodies in this regard (113/130; 87%).

The main perceived barriers to improving sustainability in surgery were a lack of leadership (92/130; 70%), individuals feeling they lacked authority to make change (86/130; 66%), and inadequate training and information (78/130; 60%). Around half of respondents reported perceived additional barriers of cost (74/130, 57%), staff attitudes (75/130, 58%), time (73/130, 56%), or facilities (70/130, 54%). A minority of respondents were concerned that safety (30/130, 23%) or lack of support from colleagues (41/130, 32%) were barriers.

The final survey component was a white space question, open to opinions and comments, and received 27 responses (27/130; 21%). The majority described difficulties in implementing change at an individual level, which participants attributed to poor facilities, limited options, and unavoidable waste generated by single-use items (Supplementary table 5). In general, responses called for greater leadership and national guidance.

DISCUSSION

This is the first survey to specifically explore the attitudes of the surgical workforce towards environmental sustainability. We were unable to accurately quantify the response rate (recommended by the CHERRIES checklist (11)) because we lack data on the number of people who viewed the invitation to the survey. We recognise that responder bias may mean our sample is not representative of the broader surgical community, but that does not mean our survey is not of value.

First, we have no reason to believe our data are misrepresentative of attitudes amongst surgeons. Our finding that most were concerned about climate change (and feel they have a responsibility for the environmental impact of surgical services) aligns with a survey by the NHS Sustainable Development Unit (SDU) which in 2017 found that 98% of 6,214 NHS staff believe that the healthcare system should be acting more sustainably, (16) and a survey of 489

international members of the American Thoracic Society which found in 2016 that the majority of respondents agreed climate change is relevant to patient care. (17) We found that a similar sense of responsibility was shared by surgeons across all ages, grades, specialities and gender (Supplementary Table 3). Our finding that behaviour towards sustainability was further ahead in respondent's personal lives than the healthcare workplace also aligns with the SDU survey findings, (16) and that the majority (82%) of respondents were willing to make changes in their clinical practice mirrors surveys of ophthalmologists in New Zealand, (12) disease control and prevention specialists in China, (13) and anaesthetists in Australia and New Zealand. (14)

If our sample is in fact biased towards representing surgeons with a particular interest in environmental sustainability, then it nevertheless provides insight into the behaviours and perceived barriers to change for such individuals (who are likely to be thought leaders in this field). At an individual level the most common reported sustainable practice was to reduce unnecessary use of single-use surgical items, which is important because such items are responsible for up to two-thirds of the carbon footprint of an operation. (18) Using circular economy principles of maintenance and repair to extend the lifespan of reusable items will also be important, but less than one-fifth of our respondents reported this was being encouraged within their institutions. Less than half of individuals reported that they recycled at work, (whereas almost all recycled at home), which is similar to findings of other studies. (13) Some departments (42%) were engaging in streamlining of surgical services, which may include the use of virtual clinics (with potential to save around 20 million miles of travel per month in England). (2) Previous surveys have documented other actions to promote sustainability in healthcare, include donating medical equipment, and turning off theatre equipment in the evening. (19)

Our survey indicates that surgeons are motivated to improve surgical sustainability, but according to the COM-B model of behaviour change, change in practice (/Behaviour) can only occur when Motivation is combined with Opportunity and Capability. (20) The desire and engagement of surgeons who responded to our survey therefore needs to be matched with greater education (capability), guidance, leadership and support (opportunity) in pragmatic actions to reduce environmental harm. The main perceived barrier to sustainability was lack of leadership (as has been reported elsewhere) (17), suggesting an urgent need for national level leadership. In 2020, NHS England committed to becoming the first national health system to reach carbon neutrality(2), with endorsement from the NHS Chief Executive providing top

level mandate for action. Since conducting our survey, the Royal College of Surgeons Sustainability in Surgery Strategy has been published,(21) committing to provide guidance to enable individual surgeons to embed sustainability into surgical practice. This should be coupled with education, building on the UK Royal College of Anaesthetists pioneering model of sustainability education, which incorporates environmental impact assessment within training, (22) and has been associated with a 50% reduction in the use of environmentally harmful gases each year since 2018. (2) Regional and bottom- up leadership from individual surgeons is also required, and could be fostered through the development of green champions and networks, supported by platforms for dissemination of best practice. (7)

Conclusion

The overwhelming majority of those who responded to this survey are engaged in issues of climate change and believe that they have a responsibility to make their practice more sustainable, and are willing to do so. However, and importantly, our survey also indicates that surgeons engaged in this agenda would welcome further education, guidance and support at local, regional or national level, on how to improve the environmental impact of their own practice, or of surgical systems more broadly. Given the urgency of the climate crisis, this seems an important topic to be addressed by relevant educational, regulatory or policy bodies in the very near future.

Word count: 2039

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Figure 1.

Title: Attitudes towards environmental sustainability

Legend: Bar graph showing extent to which respondents agreed with five statements in relation to their attitudes towards environmental sustainability, reported as percentage of total respondents

Figure 2

Title: Sustainable practice in the surgical workplace: action at individual and departmental level

Legend: Bar graph indicating proportion of respondents who perceived that their surgical department are encouraging sustainability efforts across five categories, and proportion self-reporting that they are seeking to improve these through individual action

Figure 3

Title: Surgeons perceived barriers to change

Legend: Bar graph demonstrating percentage of respondents reporting that they felt each that each of the points were potential barriers to sustainability