Surgical Sustainability

Introducing our Guest Editor Miss Cleo Kenington

Cleo Kenington is a Consultant in Emergency General Surgery and Major Trauma at St. George's Hospital, London. She is the London Rep on the ASGBI council and has taken on the role of lead for sustainability at the ASGBI. She was the first Social media editor for the ASGBI in July and August of this year. Outside of work she is a campaigner for safe cycle infrastructure and established the Campaign group Prescription for Safe Cycling.

Contributors

Richard Smith

Richard Smith is Chair of the UK Alliance on Climate Change. Richard is a former Doctor, and worked in hospitals in Scotland and New Zealand before joining the British Medical Journal – where he was Editor-in-Chief from 1991 until 2004. He continues to blog for the BMJ, and to publish regularly. Until 2018, Richard was Chair of the Board of Trustees of the International Centre for Diarrhoeal Disease Research, Bangladesh, and until 2015 he was Director of the UnitedHealth Chronic Disease Initiative – a programme coordinated by the National Heart, Lung, and Blood Institute, which created 11 centres in low and middle income countries to conduct research and build capacity to counter non-communicable disease.

Scarlett McNally

Scarlett has been a Consultant Orthopaedic Surgeon in Eastbourne, since 2001. She is Elected Council member (2011 – 2021) of the Royal College of Surgeons of England, Deputy Director, Centre for Perioperative Care (www.cpoc.org.uk) and Council member of UK Health Alliance for Climate Change (representing RCSEng).

She was Trust Director of Medical Education 2008-2011. She has held committee positions in the STC, BMA, BOA, MWF, AoMRC and RCSEng. She has an MA in Clinical Education, an MBA in health service managment, a black belt (4th Dan) in Karate and Cambridge blue. She has 4 children and frequently speaks on behalf of Women in Surgery.

She aims for clarity and high standards, leading on an undergraduate curriculum for surgery and how to reduce bias and bullying. She was lead author for the Academy report: Exercise 'miracle cure', achieving institutional, community and personal change to improve health and fix the NHS, including active travel.

In 2018 she was diagnosed with Myeloma and cardiac amyloidosis. She has had almost continuous chemotherapy and built up her fitness with an electric-bike to be eligible for a stem cell transplant in September 2020. She is back at work part-time.

She uses her patient experience to challenge. She helped collate evidence showing dramatic reductions in complications with perioperative care interventions and pathways at the Centre for Perioperative Care where she is Deputy Director. More information on www.scarlettmcnally.co.uk, www.rcseng.ac.uk/study and www.cpoc.org.uk.

Contributors

Andrew Tan

Andrew Tan is a consultant obstetric anaesthetist at Kingston Hospital, with an interest in the sustainable delivery of anaesthesia and peri-operative care. He has a particular interest in collaborative improvement methods, patient experience and co-design of services. Outside of work he can usually be found out running, usually uphill.

Arthy Hartwell

Arthy Hartwell is the Head of International at the British Medical Association, and leads the BMA's international work on fair and ethical trade. She provides expert advisory support on global health and international development matters to international organisations such as the UN Sustainable Procurement in the Health Sector taskforce. Arthy sits on the editorial board for the BMA Global Health journal.

Andrew Gilliam

Mr Andrew Gilliam has been a Consultant Upper GI Surgeon at County Durham and Darlington NHS Foundation Trust since 2008. After Dundee University Medical School, he trained in Yorkshire, Trent and Northern regions. He is an Honorary Professor at Sunderland University and Senior Lecturer at Teeside University. He has served for over 30 years as an army reservist, deploying twice to Afghanistan.

Andrew is passionate about Sustainable Surgery and is engaged on a number of work streams covered in this article.

Introduction

Cleo Kenington, Consultant in Emergency General Surgery and Major Trauma at St. George's Hospital, London

I remember as a child learning about the concept of climate change. It seemed like something that might happen a long time in the future and seemed quite theoretical, and while I always tried to switch off the light as I left a room and take my bottles to the recycling. It did not seem like something that would be important to me.

However this all changed in my mind when I learned about the report of the intergovernmental panel on climate change in 2018. The predictions of the scientists from 30 years previously had been almost exactly right. By 2018 we had reached 1°C of warming, and the sea levels had started to rise. At the current rate of change, the expectation for reaching 1.5°C a temperature after which irreversible changes are likely to start happening is by 2030. At that time my children should be just doing their A levels.

I have made significant changes at home to reduce my carbon footprint, however as soon as I walk through the door at work, that is all irrelevant, I have no option but to follow the process within the hospital.

I joined the council of the ASGBI to change that, to raise the profile of the defining issue of our generation at a senior level. In this edition of JASGBI I have invited 5 prominent healthcare activists to write about how significant healthcare and especially the operating theatres are in the contribution to climate change, and how every surgeon can make a difference at work.

I am very grateful to the 5 contributors. Richard Smith gives an overview of how to achieve carbon neutrality in the operating theatres, and how the UK Health Alliance on Climate Change can support the ASGBI to achieve this. Scarlett McNally describes how perioperative care can be enhanced to reduce carbon emissions. Andrew Tan describes how anaesthetic gases impact on climate change and what else can be changed in the operating theatre. Arthy Hartwell describes the human cost of our wasteful healthcare system. And last but no means least for those who are convinced by the need to change, Andrew Gilliam describes how to make changes in your theatres and even impress the managers!

Finding the route to carbon net-zero surgery

Richard Smith

Change is difficult and is resisted. Making change happen is hard, and the bigger the change the harder it is to achieve. Changing the NHS, which accounts for about 5% of Britain's greenhouse gas emissions, to a carbon net-zero service, which means reducing emissions to as close to zero as possible and offsetting or sequestering the rest, will be hard. It will mean change in every part of the NHS, including clinical practice; and it means changing surgery, which is responsible for a substantial part of the NHS's carbon footprint, to net-zero.

Years ago I learnt a simple formula for achieving change, which I've found remarkably useful for thinking about change. The formula says that three things are needed to achieve change: "a burning platform," an understanding that it simply isn't possible to go on in the usual way; a vision of what a better future will look like; and a plan that starts this afternoon on how to achieve change. All three are necessary: if one is missing then change won't happen. I want to use this formula to help find a route to net-zero surgery.

Surgery's burning platform

At the moment, I suggest, it doesn't feel as if surgery is part of a burning platform. Recently I spoke at a meeting on the future of surgery, and those who had produced a report that came before the meeting had not considered climate change important when thinking about the future of surgery. This failure (and I think that it was a failure) might have two roots: a lack of appreciation of the gravity of the threat from climate change; and a thought that even if the threat is severe it's not surgery's problem. Both thoughts are wrong.

The Intergovernmental Committee on Climate Change (IPCC) has said that the world needs to reach net-zero by 2040 to avoid global temperatures rising more than 1.5 degrees Celsius above pre-industrial levels. Rises above that could result in catastrophic dangers, including not only deaths from extreme heat, fires, floods, storms, and spread of infectious disease but ultimately through water shortages, crop failures, forced migration, and war over resources. To achieve net-zero by 2040 we need to cut greenhouse gas emissions by 7% a year, year after year. Until recently emissions were increasing by 7% year, and even in this year of the pandemic—with much of the global economy shut down—there will be only a 4-7% reduction in emissions. This shows how hard it will be to achieve annual reductions of 7%.

Achieving the necessary change means change at every level—from the global to the individual. Surgeons need to change both as individuals and clinicians. Although the authors of the report on the future of surgery may not have considered climate change, surgeons are waking up to the importance and urgency of climate change—at least in the UK. All three surgical colleges (England, Edinburgh, and Glasgow) and the Association of Surgeons of Great Britain & Ireland (ASGBI) are now members of the UK Health Alliance on Climate Change (UKHACC), and all three have held meetings and published on surgery and climate change—with the Presidents taking the lead. Whereas surgeons might unkindly have been described as laggards on climate change among health professionals, they are now becoming leaders.

But to achieve the burning platform necessary for change it requires the majority (and preferably the totality) of surgeons in every branch of surgery to recognise the need. The colleges and ASGBI supported by UKHACC are well positioned to lead on reaching every surgeon.

The vision

NHS England has recently produced its detailed plan on how to reach net-zero as quickly as possible. No other health system has produced such a plan, and most health systems have rising not falling carbon footprints. The NHSE plan includes the present carbon footprint, showing how almost two thirds of the footprint arises from procurement (20% of the total being drugs, and 10% medical equipment, much of its used in surgery); anaesthetic gases and inhalers account for another 5%. The plan expects the NHS to reach net zero by 2040 with the carbon it directly controls (with 80% reduction by 2028 to 2032) and by 2045 with the total footprint, including everything it procures, much of it from outside Britain (with an 80% reduction by 2036 to 2039).

Although the plan is detailed and the targets realistic, there is a need for a more detailed plan for all parts of the health service, including surgery. This is where surgeons themselves need to take the lead, and the colleges, ASGBI, and other colleges, including the anaesthetists, nurses, and obstetricians and gynaecologists coordinated by UKHACC are forming a working party to produce a plan specifically for surgery.

We have an idea of what the plan will include, not least in that the Centre for Sustainable Healthcare (CSH) has laid out a broad route for reducing the carbon footprint of all clinical activities. One broad route is to avoid the need for surgery by encouraging prevention, patient empowerment, and recognising when surgery may not be the best option—for example, at the end of life—or not add enough value to the patient to justify the discomfort to the patient, the cost, and the carbon consumed. I've always been struck by the saying that "good surgeons know how to operate, better surgeons when to operate, and the best when not to operate."

The second route to reducing the carbon footprint of clinical activity identified by CSH is to reduce the carbon intensity of the surgery that does occur. This means, as with any improvement project, calculating the carbon footprint of clinical pathways, and then reducing step by step the carbon consumption. Measuring the carbon footprint is not an exact since, but an increasing range of methods exist and are being developed.

Much of the carbon footprint of operations results from anaesthetic gases, and switching from desfluourane to nitrous oxide reduces the carbon footprint of a total knee replacement by 58%. Further changes, including using regional rather than general anaesthesia and reducing waste, reduce the carbon consumption to 2.3% of the footprint using desflourane. The final step with the clinical team cycling rather than driving to work reduces it to 1.3% of the original carbon load. We need to go through this process for all surgical procedures.

The plan that starts this afternoon

The final necessity for successful change is to have a plan that begins this afternoon. Many surgical organisations are now working to reduce the climate footprint of surgery, and the role of UKHACC will be to coordinate the activity of those organisations through a working party on net-zero surgery. We have a plan on membership of the working party and how it will work (probably through several workstreams contributing to the whole), and are seeking funding. The two tasks of the working party will be to develop a plan, which will be shared as a report to all surgical teams describing what they can do to contribute, and to make the plan happen. The second task is the harder one; implementation is always hard, but surgeons are people of action who like to solve problems. Carbon net-zero surgery is coming, and that kind of surgery will be better not only for the planet but also for surgical patients.

Harnessing perioperative care, prevention and cycling to improve sustainability in surgery

Mrs Scarlett McNally

Actions to improve sustainability can be categorised as: reduce, reuse or recycle. Reducing ill-health through prevention uses far fewer resources than cure. By the time a patient has reached the need for surgery, it may be perceived that the time for prevention has passed. The current paradigm of NHS healthcare presumes patients with single-issue conditions undergo optimal surgery with no expense spared. Yet most surgical patients are older with multiple co-morbidities.[1] There are wide variations in surgical outcomes, operations undertaken, complications, re-admissions and re-operations.[2] Sadly, as Getting It Right First Time (GIRFT) reports "sometimes surgery is being offered in situations where successful outcomes are compromised".[2] Reduction in operations, complications or on-going ill-health reduces environmental as well as social costs.

After decades as a doctor, most surgeons can identify patient issues, potential complications and poor outcomes. Yet we may not realise that many risk factors are highly modifiable. Most complications are predictable. 10% of operations result in a complication.[3] There is clear evidence that pre-operative patient preparation, such as a daily exercise programme, reduces complications by 30% to 80%.[4] The best studies are in cancer surgery, with highly effective prehabilitation programmes showing results within 4 weeks.[4] Smoking cessation reduces complications by 20% - 50% over 4 to 8 weeks. There are a finite number of interventions that reduce complications at this 'teachable moment': nutrition, exercise, smoking cessation, alcohol reduction, psychological preparedness, practical preparation and medication review.[5] Surgeons should use their status as trusted professionals[6] to embrace the prevention agenda. Although others within the team may help patients with detail, unless surgeons verbalise actions these will not be considered important. With more attention to pre-operative preparation for surgery, far more patients will be eligible for day surgery – there is a three-fold variation in proportion of patients admitted for operation with overnight stay rather than as a day case between the highest and lowest decile of Trusts.[7]

Surgeons focus on each patient's viewpoint, but formal training on Shared Decision Making (SDM) shows where we could do better.[8]

The key is for the patient to be supported to explain their expectations. 14% of patients report regret after surgery.[9] Patients can be encouraged to ask 'BRAN' – what the Benefits, Risks and Alternatives or what happens if they do Nothing.[10] Many will feel empowered to try interventions that improve their outcome. With good discussion a proportion of patients do not proceed with surgery and others are more committed to their preparation.

Perioperative care is from the moment surgery is contemplated to full recovery. Effective perioperative care teams reduce length of stay by a median of 2 days.[11] There are multiple staff involved across different phases, but actively creating meetings and sharing goals, data and skills can be hugely beneficial. Paradoxically, a traditional approach lauding 'Multi-Disciplinary Teams' can create silos, with reverence paid to the specialty practitioners and gaps in skills if these personnel are not available. For perioperative teams crossing boundaries and including administrative, managerial and clinical staff, a new 'transdisciplinary' approach is suggested where staff share skills.[12] A perioperative team approach can be used for emergency surgical pathways as well as for elective surgery. Hip fracture care has been transformed by a standardised understanding. Even for emergency patients it is possible to create a generic pathway that has co-benefits of reducing waste, improving patient outcomes, giving good quality patient information and improving staff education and empowerment.

Operating theatres generate the most waste and use 3 – 6 times as much energy as the rest of a hospital.[13] A single operation has the carbon footprint of a trans-Atlantic flight (up to 814kg carbon dioxide equivalents).[13] Many items used in operations are now mandated as single use, with extensive environmental issues around procurement and disposal including incineration of plastics. Health organisations should collectively use their understanding of risks to challenge the poorly evidenced infection control policies that have led to a single-use culture.

Alternative processes, such as re-sterilisation, need organisational support.[14]

The NHS employs 1.4 million people and each should be a role model for sustainability and good health. 5% of traffic on UK roads is on NHS business. One third of the UK population does not achieve the minimum of 150 minutes per week of exercise for health. This amount reduces an individual's risk of dementia, depression and stroke by 30%.[15] A small modal shift from car and van use to active travel (cycling and walking) is the most consistent way to incorporate exercise into daily life.[15] This would have co-benefits of reducing fossil fuel usage, reducing pollution, increasing mental and physical health and reducing fuel or transport poverty. Pollution contributes to strokes, heart disease, cancer and respiratory diseases.[16] Less motorised traffic would also reduce road collisions. 160,597 people were injured on British roads in 2018, including 27,000 who were killed or seriously injured,[17] making road traffic collisions a larger health problem then many diagnoses. Public sector estates should include cycle lanes, pavements, secure cycle parking for staff, easy bike racks for visitors and storage space for wet equipment. Showers may be needed for those who cycle or run far or fast. Swapping from petrol or diesel to electric cars is insufficient since particulate pollution from brake and tyre wear, related to the weight of the vehicle, is a major contributor to ill health18 and the lifetime environmental cost of each car and battery is considerable.[19]

The impact of motorised transport on the environment and health cannot be overstated. The NHS should take on its mantle as an anchor institution. 34% of primary school children are driven to school[20] and one-third of children start secondary school overweight or obese,[21] with increased incidence of adult obesity and future worse health. 56% of car journeys are under 5 miles,[22] a distance highly amenable to cycling. 62% of UK adults describe roads as too dangerous to cycle in normal times.[23] Electric-cycles have transformed possibilities, allowing hills and distances to be tackled with ease. Older and disabled people get the same health benefits when starting using electric cycles as ordinary cyclists and voluntarily convert more car trips to electric-cycle journeys.[24]

In summary, surgeons can embrace sustainability at many levels, with individual patients, in their practice and in their lives. The most effective actions for sustainability are those that reduce waste, surgical complications and motorised transport (figure 1).

Figure 1: Actions surgeons can take to increase sustainability

By surgeon with patient	• Maximise preparation for surgery: daily exercise, nutrition, psychological preparedness. • Shared Decision Making with patients: Benefits, Risks Alternatives and doing Nothing 'BRAN'
With team	• Change expectations • Create a team from all staff across perioperative care and meet • Empower every staff member to understand other's roles, with 'transdisciplinary working' sharing skills rather than ' multidisciplinary working' which can reinforce silos. • Encourage motivational interviewing eg www.movingmedicine.ac.uk • Ensure good patient information • Create clear pathways
In community or workplace	• Support active travel (walking and cycling)
As surgical institutions	• Follow UK Health Alliance on Climate Change www.ukhealthalliance.org • Challenge 'infection control' policies that mandate single use items with alternative evidence and processes balancing risks • Highlight co-benefits for health: reduced pollution, increased exercise

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Climate change is real

Andrew Tan

We live on a planet that is hotter than ever, with more carbon dioxide in the atmosphere, and more extreme weather events than ever before. The climate crisis poses a major threat to our planet and to all us, with direct and immediate consequences for the public, patients and global health. Climate change and air pollution are linked to conditions like heart disease, stroke and lung cancer, contributing to around 36,000 deaths annually.

For many of us, 2019 was a year defined by our collective recognition for the need for climate action, crystallised in the actions of Greta Thunberg and the Extinction Rebellion groups. Almost all of us have taken some actions in our lives to mitigate our impact on the environment - be that recycling, reducing plastic usage, cycling or changes to our diet - but have you considered the impact that your professional practice has on climate change and the environment?

The NHS long term plan to 'net zero'

An increasing number of NHS trusts and royal colleges have declared a climate emergency, recognising the impact of climate change on our health. NHS England has committed to achieving a reduction in healthcare emissions to achieve 'net zero' by 2040, alongside the governments commitment to achieving UK net zero emissions by 2050.[1] However you feel about these commitments and the methodology laid out as a pathway to achieving them, the goals are admirable and the NHS becomes the first major healthcare service to fully commit to these goals. Currently, the NHS is responsible for around 5% of the UK's total emissions, figure 1 highlights the breakdown of NHS emissions.

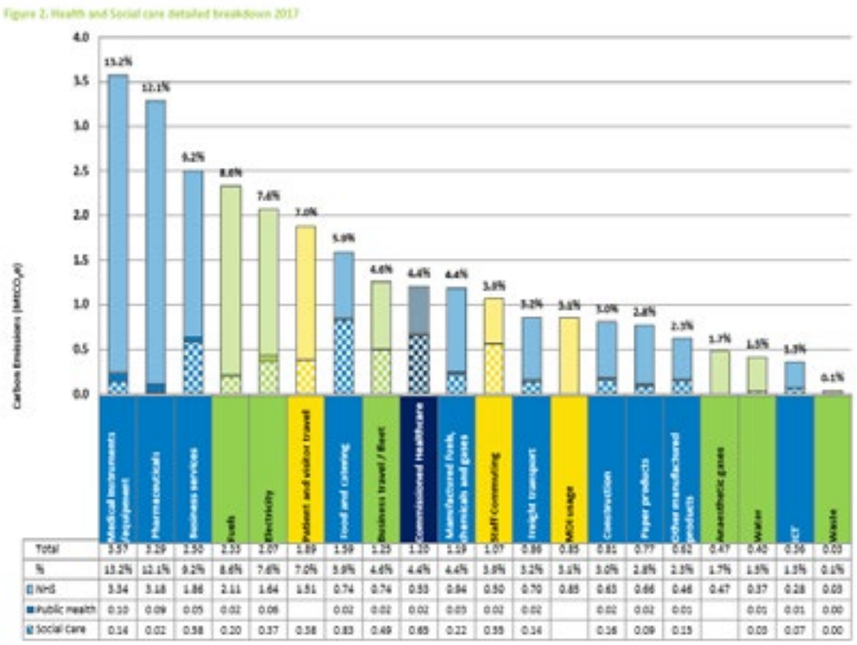

Figure 1. Health and social care emissions (2017) figures from NHS England / PHE report: "Reducing the use of natural resources in health and social care" https://www.sduhealth.org.uk/policy-strategy/reporting/natural-resource-footprint-2018.aspx