

How can we make hand surgery carbon neutral?

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*"I want you to act as if the house is on fire, because it is."
Greta Thunberg World Economic Forum, Davos, 24 January 2019*

Introduction

The argument for climate change action is urgent and compelling. Anthropogenic greenhouse gas emissions have increased atmospheric concentrations of carbon dioxide, methane and nitrous oxide, with levels of these gases unprecedented in the last 800, 000 years. From the mid 20th century the atmosphere and ocean have been observed to be warmed, amounts of snow and ice have diminished, and the sea level has risen. It is globally considered extremely likely that this observed change is due to the increased concentration of gases in the atmosphere(1). Climate change has a proven negative impact on health, and the burden of this will fall on the populations of lower and middle income countries(2). In the United Kingdom (UK), 40 000 deaths per year are attributable to outdoor air pollution, and £20 billion a year is spent on diseases associated with it(3). As clinicians we have a moral obligation to address climate change, and our own actions must be held accountable.

Healthcare systems are a significant contributor to greenhouse gas emissions, as they are typically more energy intensive than other commercial or service activities(4). The NHS is the largest single employer in the UK and produces 4% of England's total carbon footprint(5), despite its purpose to increase health and well being. Discussing carbon neutral within a healthcare setting can be overwhelming and feel impossible. The system boundaries of a health care system are blurred, and reducing activity appears impossible and unethical. However, the conversation is unavoidable. Climate change will be the true disaster of our lifetimes and we must do everything we can to meet it.

Carbon neutrality

The interaction between human beings and their environment is complex, and the evolution of the terminology used to describe our actions to mitigate it reflects the growing understanding of the diversity of this problem. Carbon neutral, the Oxford American Dictionary's word of the year in 2006, describes the achievement of net zero carbon dioxide emissions. This can be achieved through reduction of emissions or through carbon removal, typically with carbon offsetting.

Carbon offsetting is the practice of investing in an action designed to remove carbon from the environment to account for another carbon producing action, and has both voluntary and regimented markets. The investment can be in anything from planting trees to capturing methane gas at landfill sites, or investing in efficient cooking stoves. Carbon offsetting has been widely criticised - it relies on consequentialist ethics(6) as well as the principle of

additionality, and appropriate credibility and efficacy of the schemes it sustains(7). However, true carbon neutral is unlikely to be possible within our lifetimes, making carbon offsetting necessary. The Oxford Offsetting Principles outline best practice for net zero aligned carbon offsetting, and describe prioritising reduction of carbon emissions and shifting to carbon removal and long-lived storage(8).

The term “carbon net zero” is gaining popularity to describe a more comprehensive commitment to decarbonisation and climate change, looking at an organisation's entire footprint and value chain. In this essay I will use the principle of carbon net zero rather than carbon neutral to reflect the greater impact of this term, and the need to consider every action and its impact on this planet.

The green NHS position

The position of the NHS in the climate crisis is set out in the Greener NHS Strategy, developed throughout the COVID-19 pandemic of 2020. Simon Stevens, NHS Chief Executive, has committed to delivering the world's first net zero health service, aiming to bring the NHS Carbon Footprint to net zero by 2040 and the NHS Carbon Footprint Plus to net zero by 2045(9). The NHS Carbon Footprint Plus refers to the emissions the NHS has influence but not control over, such as the transport used by patients and visitors, and medicines used at home. This is in line with current UK law, with the Climate Change Act 2008 amended in 2019 to make the UK the first major world economy to have written into law a target of net zero carbon emissions by 2050(10).

The plan for ‘net zero’ by 2040 is wide ranging, with specific areas identified in estate and facilities, travel and transport, the supply chain focusing particularly on food and catering, medicines and research, innovation and offsetting. It is a bold plan that has been met with enthusiasm(11,12). The NHS has already shown itself to lead the world in carbon footprint reduction, reducing its greenhouse gas emissions by 18.5% from 2007 to 2017, at a time whilst clinical activity increased by 27.5%(5). To meet the target carbon net zero would be an achievement.

What can we do in hand surgery?

It is clear we must all play our part. In hand surgery we must centre sustainability within the many systems in which we work, re-examine our clinical model, and prioritise sustainability within research. We are unlikely to achieve carbon neutrality in isolation, but must work collectively and at all levels.

Within the hospital

Centering sustainability

The largest proportion of NHS carbon emissions is within estates and facilities, making up 15% of the total profile. A £50 million NHS Energy Efficiency Fund has been designated to building upgrades, focusing on 100% LED lighting, air conditioning and cooling, building fabric, space heating, ventilation and hot water. The use of building energy monitoring and control, and on-site renewable energy and heat generation will also decrease emissions. In theatre occupancy sensors have been used to reduce electricity use by over a third in one hospital in America(13).

As clinicians the way in which we use hospital buildings greatly impacts our carbon footprint but we rarely have responsibility for how these are run. For carbon neutral hand surgery we must work at a managerial level and demand an organisational commitment to sustainability, so that carbon net zero is written into trust policy and development. The creation of sustainability champions can ensure that trusts are held to account for their contribution to reducing emissions, and may encourage the development of new projects and targets within the trust. Creating trust links to the many ongoing sustainability projects such as the NHS Plastics Reduction Pledge(14) or the Sustainability in Surgery Strategy(15) will create networks of peers and develop further projects.

The re-examined clinical model

Anaesthetic gases account for 2% of all NHS emissions, and when specialties are compared the main areas for emissions in surgery are anaesthetic gases and the heating and ventilation requirements of theatres(12). Building protocols for best practice with the anaesthetic team can reduce this(16). Gases can be avoided completely with the use of regional blocks, wide awake local anaesthetic no tourniquet technique(17) and total intravenous anaesthesia with propofol. If gases are unavoidable then sevoflurane should be prioritised, low flow anaesthesia practiced and desflurane and nitrous oxide avoided(18). Gas disposal should be examined with estates, looking at effective capture and destruction or reuse of these gases(19).

During the COVID-19 pandemic the patient journey dramatically altered to reduce hospital contact, and these principles can be applied to decentralise healthcare and reduce unnecessary travel. The use of virtual clinics, patient led aftercare and the normalisation of see and treat models not only provides patient centric care but can reduce travel related emissions. 3.5% of all road travel in England is related to the NHS, and travel accounts for 14% of the NHS carbon emissions profile(9). Creating departmental guidelines will help maintain these practices and routine audit should be used to maintain patient safety.

Research

Trust led research and development will be crucial as the timeline to net zero progresses, and the 'simple' emission reductions have been made.

Within the department common procedures should be examined for the potential for emission reduction. This is known as a life cycle analysis - a "cradle to grave" assessment

that captures all emissions associated with a product or activity. Life cycle analysis has been shown to reduce emissions by 80% in certain procedures(13), and should become part of a routine activity built into a department's audit cycle. Similarly, operative sets should be routinely examined for usage, and reformulated to decrease unnecessary sterilisation or consumable use(20). More specifically to hand surgery the use of intraoperative splints and hand aids should be examined to reduce duplication and increase return.

Within the British Society for Surgery of the Hand

Centering sustainability

As the professional body for hand surgery in the UK the British Society for Surgery of the Hand (BSSH) should have a published sustainability strategy, and hold itself as well as its members accountable to a sustainable practice. This strategy should be fully transparent, disclosing the organisational emissions, targets and practices. A professional sustainability consultant should be employed to work alongside the elected clinicians to advise on organisational sustainability.

Conferences should be run as a hybrid virtual model, so that large scale travel is discouraged. Conferences should only serve vegetarian food - the most significant impact that can be made on a personal level(21). Member's fees should be held in banks that do not invest in fossil fuels(22), following in the footsteps of the Royal College of Emergency Medicine(23). The international relationships of the overseas committee can bring sustainability into the field of global surgery, with access to affordable green energy and technology a priority in the LMIC setting(24).

Research

BSSH must prioritise research into sustainability through its relationship with the Reconstructive Surgery Trials Network. A priority setting partnership should be developed with the James Lind Alliance on sustainability in hand surgery, to determine research priorities. A predictable priority would be the examination of unnecessary interventions in hand surgery(25). The RSTN model of using trainee networks to run prospective multi centre clinical trials facilitates timely recruitment, necessary with the NHS deadline of 2040. BSSH could further encourage research through 'green' prizes for research and small scale innovations.

Conclusion

How we are to make hand surgery carbon neutral is a timely and important question. It will require effort at every level - departmental, within the trust, and within our larger professional organisations. It is also not a problem that can be met by hand surgery alone, but includes the wider hospital. Climate change is a global community problem that will require collective

solutions. Ensuring it is centred in policy is key to this, it must be at the forefront of all agendas, at all levels, across all organisations. Inclusion of sustainability as a domain of the Care Quality Commission would prioritise sustainability to the board, lend urgency to change and ensure accountability(26).

With climate change a priority we must address our current clinical model to change bad habits and adopt new ones. The COVID-19 pandemic showed the NHS to be swiftly adaptable, and unexpectedly flexible. This must be built on. We have shown the ability to meet patients virtually in their homes, to use photography easily in referral systems, to use see and treat models to streamline the patient journey(27–29). We must now consider electronic patient information leaflets, paperless inductions, surgical kit reduction and banning of the non-sterile glove.

To maximise our ability to reduce carbon emissions research will be crucial. We need to identify how to make a maximal impact and develop new technology and practices that are sustainable. We must also begin to prioritise prevention as a research field in hand trauma surgery, as potentially the most sustainable of all interventions.

The Greener NHS Strategy is exciting and inspiring. However, net zero by 2040 is not a deadline to be met in the nick of time, but a target to work towards on a daily basis. Every action taken now is a moment saved for the future. To make a significant difference we must work collaboratively - to make hand surgery net zero we must start with the rest of the NHS.

2008 words.

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