

BSSH Essay:

'How can we make hand surgery carbon neutral?'

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Introduction:

At the present moment, it is difficult to consider the issue of carbon neutrality for hand surgery, independently of the wider impact of the covid-19 pandemic on healthcare delivery. As with many areas, a precarious sort of opportunity presents itself. On the one hand, the current cohort of healthcare workers, who personally witnessed the onslaught of single-use plastics that arrived with the pandemic, might be seen to be perfectly primed to champion the goal of a carbon-neutral NHS. On the other hand, as services scramble to tackle mammoth waiting lists and struggle with ongoing uncertainty, it is all too easy to imagine the issue of sustainability remaining side-lined in lieu of more 'pressing issues'. In this essay I maintain that hand surgery is extremely well placed to deliver significant reductions in carbon emissions, outlining exciting areas of opportunity. However, piecemeal improvement and innovation cannot be the prevalent mechanism for achieving carbon neutral hand surgery. Instead, I argue the key to achieving this vital aim will be shifting perspectives to raise the profile of carbon neutrality in hand surgery from worthy-but-fanciful afterthought to principle marker of quality care at every stage of the patient journey.

Where are we now?

A casual glance across any ward in the UK would lead you to conclude the NHS is positively oozing carbon. Where other industries have been busy over the past decade green-washing the most obvious offenders of environmental destruction from the customer's view, the NHS cannot at least be said to be hiding its sins. From the orange bins terminally piled high ready for incineration, to the ever-present plastic cup on patient tables, to the computers blinking out in a state of permanent readiness, every turn seems to reveal another careless source of waste. And yet the numbers tell a different story. Against this backdrop, quietly but determinedly, the NHS has been explicitly addressing carbon emissions since 2008. It is estimated that as of 2020 it had managed to reduce its carbon footprint by 62% from a 1990 baseline, while being lauded by the Lancet as a world-leader in its carbon-measuring methods. (1,2) Building on this success, in 2020 the NHS produced the 'Delivering a 'Net Zero' NHS' report, which aims for the NHS to be completely carbon-neutral by 2045. (1) According to this report, as an acute service, mainly delivered in the secondary setting and heavily dependent on medical equipment, hand surgery sits within the area identified as having greatest potential for realising a reduction in carbon emissions. This report offers a comprehensive eight-point framework for achieving carbon-neutrality. Therefore, instead of rehashing every point in the report for a hand surgery context, I have sought to elucidate the five most pertinent points of the report where hand surgery stands to make significant carbon reductions. I have excluded the following three points 'our hospitals,' 'our heating and lighting' and 'our adaptation efforts.' While all these areas will undoubtedly have an impact on hand surgery carbon emissions, it seems inevitable that co-ordination of these efforts would fall outside the remit or influence of specific hand surgery bodies, therefore detailed discussion of them did not seem pragmatic.

NHS Net Zero Priority 1: Our Care

The first and most obvious step towards carbon neutral hand surgery would be to understand how much carbon is emitted currently. This aligns with the first point of the NHS Net Zero plan that sets out developing a 'framework to evaluate carbon reduction' as a priority. A vacuum of information currently exists on the contribution of hand surgery to the overall NHS carbon footprint. In this respect we are not unusual as a specialty but are certainly trailing behind examples like anaesthetics who, having assessed the contribution of anaesthetic gases as being 5% of the total NHS carbon footprint (3), are much further along in their consideration and implementation of how to tackle their contribution to climate change (4-6). Developing a carbon footprint calculator specific to hand surgery would fit well with the current mixed bottom-up/ top-down approach used by the NHS to assess carbon footprint (7). A 2013 article (8) outlines how an ophthalmology department in Wales assessed the carbon footprint of cataract surgery for one patient, and certainly a similar approach would be easily reproducible for common hand operations. I would argue for simplicity of inputting data over pain-staking accuracy to begin with to encourage uptake and to treat such a calculator as a national benchmarking tool subject to refinement with use. The BSSH would be well placed to develop such a calculator that could be administered via the UK Hand Registry.

NHS Net Zero Priority 2: Our medicine and supply chain

Medicines, equipment and the supply chain account for 62% of the total NHS carbon footprint, rising to 67% if anaesthetic gases and inhalers are included. Though it has seldom been conceptualised as such, the recent dissemination of Wide Awake Local Anaesthetic No Tourniquet (WALANT) surgery represents a unique opportunity for hand surgery to make significant inroads into reducing carbon emissions. Again, without baseline analysis of current carbon emissions within hand surgery, it is difficult to approximate the potential reduction. However, given anaesthetic gases have been identified as a substantial contributor to carbon emissions, as WALANT is increasingly adopted, hand surgery units are likely to see sizeable reductions in carbon emissions. Additionally, WALANT offers the chance to streamline service. As outlined in a recent paper from a major trauma centre in London, contextualised within the covid-19 pandemic, WALANT surgery necessitates fewer staff, fewer hospital visits and shorter inpatient stays, all of which would serve to reduce the carbon footprint of hand surgery (9).

A more considered approach to equipment use in theatres also presents a potentially highly impactful measure to reduce carbon emissions. Certainly, as anyone who has spent any time in an operating theatre could tell you, the amount of plastic produced from a single procedure can be alarming. This really need not be the case. A 2011 prospective, multicentre trial of 1504 consecutive carpal tunnel release surgeries (CTRS) found that performing this procedure with 'field sterility' (using a single drape, single sterile tray of equipment and with surgeons wearing gloves and mask but not gowned) resulted in a superficial infection rate of 0.4% and deep infection rate of 0% (10). With around 53,000

carpal tunnel decompressions performed annually in the UK, adopting field sterility in CTRS as a national approach could truly result in significant reductions in carbon emissions.

If WALANT and field sterility provide refreshingly straightforward examples of measures that could have immediate national impact, addressing supplier chain contributions to carbon emissions in hand surgery presents a much thornier issue to tackle. In England medical goods are purchased centrally (11). The NHS has committed to ensuring by the end of the decade all of its 80,000 suppliers have carbon-neutral supply chains (1). This seems an ambitious aim given currently only 27 suppliers have signed up to a pilot programme to voluntarily share their plans on carbon reduction(1). For hand surgery specifically it is very likely the contribution to emissions from the supply chain is substantial given most NHS suppliers outsource production of items like gloves, surgical instruments, needles and syringes to Asia (13). There is the additional ethical issue of workers in international factories being exposed to high risk of workplace injuries in the production of items for UK patients (13). I think this is not an issue to be shied away from in hand surgery. And while feasibly addressing it undoubtedly presents a logistical headache, as an initial step I would propose that organisations like the BSSH aim to investigate supplier chains for commonly used hand surgery equipment. As a national body, the NHS does have considerable negotiation power with suppliers. Ultimately, I would propose working towards a system of BSSH approved suppliers that would balance both quality, carbon footprint and ethical production concerns.

NHS Net Zero Priority 3: Our Transport and Travel

One area where positive implications of the covid-19 pandemic on carbon emissions are likely to be maintained is in travel and transport. It has been estimated that at any given time in the UK 3.5% of travel relates to NHS staff, patients or suppliers and estimates from the 2020 lockdown experience suggest that 58,000,000 miles of travel could have been saved by moving appointments online over 3 months (1,14). Experience from the pandemic suggests both patients and staff found telephone consultations acceptable means of follow up (15). However, establishing the extent to which new digital technologies were employed for hand surgery follow up is less clear from current evidence. I would suggest more robust national enquiry as to how different hand units managed follow up during the lockdown periods. This would likely produce rich data from which follow up protocols could be developed for specific conditions, identifying high yield opportunities to reduce patient and potentially staff travel while maintaining a good standard of care.

NHS Net Zero Priority 4: Innovations

The NHS net zero plan sees innovation as key to driving exponential gains towards achieving carbon neutrality. This report naturally makes reference to the move towards digital health as a means of reducing carbon emissions, particularly in combination with moves towards cleaner energy sources(1). For hand surgery though the area that to my mind is most exciting and high yield will be in materials innovation. Materials research from other industries, emphasising 'circular economy' principles – whereby the linear 'take-make-waste' process of production is eschewed in favour of systems where all products within a system are constantly re-used/ recycled or regenerated at the end of their lifespan – is an area of underestimated potential for hand surgery both in terms of product optimisation and reducing carbon emissions. Recent research into novel biopolymers includes examples of products from the shells of crustaceans and brown algae that are not only biodegradable but have intrinsic properties for promoting wound healing (17). I would encourage continued interest in this area and explorations of how novel, sustainable materials can be leveraged within hand surgery.

NHS Net Zero Priority 8: Our Values and Governance

Underpinning any of the specific measures outlined in this essay must be a paradigm shift in the appreciation of the symbiotic relationship between healthcare provision and climate change. For specialties like respiratory medicine the link between carbon emissions and health may be more tangible while in the imagination of both patients and healthcare providers the link between hand surgery and climate change may feel more tenuous. This needs to be addressed directly. The recent BBC radio 4 programme 'A Show of Hands' richly explores how we use hands for 'manipulation, creativity, gesture, communication and touch.' Hands contribute richly to the experience of life and as such hand surgery is ultimately directed at improving quality of life. This aim cannot be set in juxtaposition to that of achieving carbon neutrality as the overall disastrous consequences for human health and quality of life from climate change are well documented (17-19). Effective leadership will be key in communicating this relationship and shifting the status of carbon-neutrality up the priority list in hand surgery. Again, an organisation like the BSSH, having considerable sway over the agenda in British hand surgery, must take on the responsibility of setting carbon neutrality firmly on the agenda, following the example of American counterparts who established their own 'Lean and Green' surgery project in 2015 (20).

I would propose, in combinations with communication efforts, that direct lines of responsibility be set up within secondary care hand surgery services to manage the effort towards carbon neutrality. Where the NHS Net Zero plan advocates for a board level net-zero lead, I would suggest at departmental level clinicians and managers should be identified as leads on decarbonising hand surgery, with the responsibility to report to a centralised body on their outcomes. Without such an approach I cannot see how the

benefits of the various great opportunities to reduce carbon emissions in hand surgery can truly be achieved. The advantageous aspect of most endeavours to reduce carbon emissions is that they usually tend to reduce spending and as such efforts to reduce the carbon footprint of hand surgery may be the rare example of an endeavour where patient, clinician and manager priorities align.

Finally, in establishing carbon neutrality as a priority for hand surgery, it is essential that efforts be made to avoid this becoming another bureaucratic hurdle for healthcare workers and patients. At all times efforts to reduce carbon emissions must align with real-world practice and of course the best interest of patients. In this endeavour, along with good top-down leadership, I would advocate for the incorporation of principles of designing for behaviour change, whereby solutions are developed with real-world context at the forefront and care taken to 'nudge' both healthcare workers and patients towards carbon-reducing behaviours.

Conclusion:

Hand surgery is extremely well placed to deliver significant reductions in carbon emissions over the coming years. The covid-19 pandemic has set in motion many practices that if continued could contribute significantly to reducing carbon emissions. Additionally, moves towards reducing the use of general anaesthetic and unnecessary consumables as well as exciting new material innovations represent unique opportunities for hand surgery to achieve carbon neutrality. The success of all available practices and innovations will ultimately hinge on effective leadership, communication and agenda setting from both national and local levels. As a traditionally innovative and forward-looking specialty, I am very optimistic about the ability of hand surgery to establish itself as a leader within the NHS in achieving carbon neutrality.

References:

1. NHS England. Delivering a Net Zero NHS. 2020. Available from: <https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2020/10/delivering-a-net-zero-national-health-service.pdf> (Accessed June 2021)
2. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Belesova K, Berry H, Bouley T, Boykoff M, Byass P, Cai W, Campbell-Lendrum D. The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come. *The Lancet*. 2018 Dec 8;392(10163):2479-514.
3. NHS Sustainable Development Unit. Carbon Hotspots report. <http://www.sdu.nhs.uk/corporate-requirements/measuring-carbon-footprint/nhs-carbon-footprint.aspx> Date: 2012 (accessed June 15, 2021).
4. Hare S, Fowler A, Rattenbury W, Scott S, Tripurneni V, Earl M, Pearse R. The environmental impact of commonly used anaesthetic agents: a systematic literature review and qualitative evidence synthesis protocol.
5. Andersen MP, Nielsen OJ, Wallington TJ, Karpichev B, Sander SP. Assessing the impact on global climate from general anesthetic gases. *Anesthesia & Analgesia*. 2012 May 1;114(5):1081-5.
6. Charlesworth M, Swinton F. Anaesthetic gases, climate change, and sustainable practice. *The Lancet Planetary Health*. 2017 Sep 1;1(6):e216-7.
7. World Business Council for Sustainable Development, World Resources Institute. The Greenhouse Gas Protocol: a corporate accounting and reporting standard (revised edition). 2015.
8. Morris DS, Wright T, Somner JE, Connor A. The carbon footprint of cataract surgery. *Eye*. 2013 Apr;27(4):495-501.
9. Hobday D, Welman T, O'Neill N, Pahal GS. A protocol for wide awake local anaesthetic no tourniquet (WALANT) hand surgery in the context of the coronavirus disease 2019 (COVID-19) pandemic. *The Surgeon*. 2020 Dec 1;18(6):e67-71.
10. LeBlanc MR, Lalonde DH, Thoma A, Bell M, Wells N, Allen M, Chang P, McKee D, Lalonde J. Is main operating room sterility really necessary in carpal tunnel surgery? A multicenter prospective study of minor procedure room field sterility surgery. *Hand*. 2011 Mar;6(1):60-3.
11. NHS Digital. *Hospital Episode Statistics 2011/12*. Leeds: Information Centre NHS; 2012.
12. Institute for Government. NHS Procurement. 2020 (Accessed June 2021) Available from: <https://www.instituteforgovernment.org.uk/explainers/nhs-procurement>
13. Trueba ML, Bhutta MF, Shahvisi A. Instruments of health and harm: how the procurement of healthcare goods contributes to global health inequality. *Journal of Medical Ethics*. 2021 Jun 1;47(6):423-9.
14. NHS Sustainable Development Unit. Reducing the use of natural resources in health and social care. 2018.
15. Vusirikala A, Ensor D, Asokan AK, Lee AJ, Ray R, Tsekis D, Edwin J. Hello, can you hear me? Orthopaedic clinic telephone consultations in the COVID-19 era-a patient and clinician perspective. *World Journal of Orthopedics*. 2021 Jan 18;12(1):24.
16. Suarato G, Bertorelli R, Athanassiou A. Borrowing from nature: biopolymers and biocomposites as smart wound care materials. *Frontiers in bioengineering and biotechnology*. 2018 Oct 2;6:137.

17. Paavola J. Health impacts of climate change and health and social inequalities in the UK. *Environmental Health*. 2017 Nov;16(1):61-8.
18. ASC U. Climate Change Risk Assessment 2017 Synthesis Report: priorities for the next five years. Adaptation Sub-Committee of the Committee on Climate Change, London. 2016.
19. Williams ML, Lott MC, Kitwiroon N, Dajnak D, Walton H, Holland M, Pye S, Fecht D, Toledano MB, Beevers SD. The Lancet Countdown on health benefits from the UK Climate Change Act: a modelling study for Great Britain. *The Lancet Planetary Health*. 2018 May 1;2(5):e202-13.
20. Van Demark Jr RE, Smith VJ, Fiegen A. Lean and green hand surgery. *The Journal of hand surgery*. 2018 Feb 1;43(2):179-81.

