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2023 Net Zero Clinical Care Abstract Collection

Innovations that can reduce the impact of healthcare on the environment

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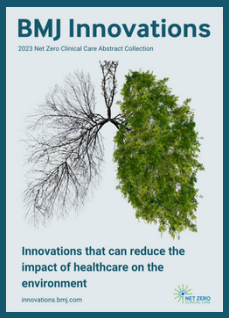
NET ZERO CLINICAL CARE



Welcome to this special BMJ Innovations abstract selection from the 2023 Net Zero Clinical Care Conference, jointly organised by BMJ and the UK Health Alliance on Climate Change (UKHACC), held on Tuesday October 10th.

Healthcare is one of the most polluting industries, responsible for nearly 5% of total global greenhouse gases and generating over a tonne of waste per hospital bed each year. The COVID-19 pandemic also greatly exacerbated the use of single-use plastics which have limited potential for recycling.

Addressing the broader issues of climate change necessitates a heightened embrace of innovative solutions to mitigate the environmental footprint of healthcare. This small selection of abstracts from the conference highlights novel innovations that can help to address this.

Our thanks to the authors of these initiatives for allowing us to share their work. They, along all others presented at the Net Zero Clinical Care Conference, provide practical examples that can be spread to other healthcare organisations and settings.

To achieve total Net Zero as healthcare professionals, we must continue to share evidence and examples of sustainable initiatives and collaborate within an environment that strives towards sustainable healthcare.

BMJ Innovations has launched a formal call for papers on innovations that can reduce the impact of healthcare on the environment, and encourage all to publish their initiatives and share their learnings. Find out more at innovations.bmj.com.

Kailun Shi
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NET ZERO CLINICAL CARE

Sustainable Skin Pathways

Ian Culligan, Sarah Dyson, Jo Stoddart

What problem were you addressing and why was it important?

In 2017, Bupa launched a self-referral service for cancer symptoms which involved telephone-triage based on NICE guidelines. NG12 - Suspected Cancer: Recognition and Referral. Where a patient described a suspicious mole or skin lesion over the telephone, or indeed presented to Bupa with a GP referral to a dermatologist, they were subsequently referred for a face to face consultation and examination.

Since 2019, between 23,000-26,000 Bupa patients / year have attended an initial consultation with a dermatologist or plastic surgeon regarding a concerning mole or skin lesion. A high proportion of patients referred to dermatology – either via the GP or self-referral process – did not require onward treatment or interventions. This raised the possibility that a number of referrals could have been avoided had there been an alternative triage process. Fewer referrals could in turn help to address the issue of unnecessary healthcare associated travel, resource consumption and financial costs associated with inappropriate secondary care referrals, and support the healthcare system with well documented consultant dermatologist shortages.

What did you do to understand the scale of the problem?

As part of the ongoing performance and service review process, referral volumes and activity were monitored for patients who went on to require treatment or further investigations, or who did not receive further intervention.

Internal Bupa data from 2019 showed that out of over 23,000 patients who had an initial consultation with a dermatologist/plastic surgeon in that year, approximately 70% required no further treatment. The average cost of this type of non-intervention pathway was £240, meaning that over £3.8m pa was being spent on appointments that served to offer reassurance.

At this point in time (2018) no carbon impacts were calculated, but retrospectively applying the figures from the Sustainable Healthcare Coalition care pathways calculator we calculated that these 16,000 pathways generated approximately 92,800 kgCO2e each year

What did you do?

In June 2020, we partnered with Skin Analytics to launch a nationwide, remote skin cancer triage service, providing Bupa patients with rapid access to specialist assessment from the comfort of their own homes. A number of remote dermatology / telederm providers were identified and considered, with Skin Analytics appointed as the partner.

Patients who contact Bupa via telephone and choose this service receive a remote assessment kit containing a dermatoscopic lens and smart phone in the post. They upload images of the suspicious mole/skin lesion and then return the kit via pre-paid post. The images are reviewed by a Dermatologist remotely. The average time from the patient registering for the service with Skin Analytics to receiving their outcome results is 3 working days.

The Skin Analytics pathway supports the use of efficient and effective primary care services, by reducing the burden on NHS primary care and helping to reduce premature dermatology referrals into secondary care settings.

What impact did your project have?

Since the Skin Analytics pathway was implemented in June 2020, 9,057 patients have accessed the service. Assessment outcomes for the service are:

- 49% given no onward referral, patients reassured that their lesion is not concerning from the comfort of their own home
- 10% referred onwards as urgent
- 38% referred onwards as routine
- 3% of patients did not complete their assessment for reasons such as the patient changed their mind and no longer needs/wishes to use the service

On average, patients using the Skin Analytics pathway have their mole/skin lesion assessed 29 days faster compared with a face to face consultation with a dermatologist

- Av time from the patient contacting Bupa to set-up a pre-authorisation to the patient receiving an assessment outcome
    - Skin Analytics = 3.8 days
    - Face to Face consultation with a Dermatologist = 33 days

In calculating the carbon footprint saving for the travel-related emission avoidance, we;

1. Multiplied the 3,492 patients who required no onward referral (49% of 7,128 total) by the emissions factor in the SHC calculator to give a CO2e reduction of 20,671kg.
2. Subtracted 442g CO2e per patient based on the Royal Mail average carbon footprint for small parcel delivery at 221g per delivery.

This gives a total carbon footprint saving of 20,671 – 1,543 = **19,128kg CO2e**

What lessons have you learnt?

- The Skin Analytics pathway has a patient satisfaction rating of 9.0 out of 10. Patient feedback includes:
    - "Excellent service. Quick and easy. Far quicker than trying to get in to see a doctor."
    - "Really easy to use and the consultant was really impressed (and surprised) with the quality of the images taken. She said it was comparable with the images she could see through her own dermatoscope."
    - "Very quick and efficient service"
    - "Incredible service and had my results within 2.5 days of raising the issue with Bupa (and the wait for an NHS GP in my area is 3 weeks)."

- The main challenges faced since launch have been related to delays in patients receiving their dermatoscopic kits due to:
    - Greater than expected interested following a marketing campaign – lesson learnt to stagger e-mail communications to test response rate
    - Royal Mail strikes – addressed through proactive communications with patients to set expectations

- The Skin Analytics pathway has now become a standard process across all patient segments contacting Bupa with a dermatology referral, either via the GP or self-referral process
- Given the success of the Skin Analytics pathway for suspected cancerous moles/skin lesions, we are now exploring a remote skin assessment pathway with Skin Analytics for non-cancer symptoms such as rashes.

Did your project have a social or financial impact?

The Skin Analytics pathway offers fast access to specialist care, a positive experience for patients and delivers savings which help to keep premiums affordable for our patients. Savings per pathway are driven primarily by lower intervention rate for the Skin Analytics pathway (20%) vs a traditional skin pathway which starts with a face to face consultation with a Dermatologist (42%). Lower volume of initial

consultations and diagnostics also contribute to pathway savings.

The remote Skin Analytics pathway supports removing health inequalities through improving patient choice for accessing care particularly for vulnerable patients, such as those who are less able to leave their home or attend a healthcare facility due to comorbidities or anxiety/stress.

Was your project innovative and original?

Remote dermatology assessment is not a new service, however we believe that at the time of implementation the postal delivery of a dermatoscope was an innovative feature. In addition to the environmental benefit through lower travel-related emissions, this project also demonstrated cost savings and high patient satisfaction.

Conflicts of interest

None

MCF Classifier - Measuring, benchmarking, and optimising the carbon footprint of medicines use

Haroon Taylor and Nazneen Rahman

What problem were you addressing and why was it important?

Medicines account for a quarter of the NHS carbon footprint, but our research has shown only 14% of Trusts are currently estimating the emissions of their medicines. There is an urgent need for standardised medicine-specific carbon footprint metrics to facilitate carbon-informed medicines use.

Historically expenditure on medicines has been used to estimate CO2e emissions. The utility of this method is hampered by large variation in spend on identical medicines in different parts of the NHS, and by large variation in spend due to the patent cycle. Furthermore, it is a high-level non-specific method that cannot be translated to CO2e optimisation strategies or to measurable reduction plans.

Medicine-specific carbon footprint estimates have been generated for anaesthetics and inhalers which together account for ~5% of NHS footprint. We found only 19 Trusts are using these data to calculate the footprint of their inhalers and/or anaesthetics.

The NHS has already committed to reducing the footprint of anaesthetics and inhalers and will need to address the footprint of other medicines to achieve net zero. However, our research showed that only a minority of NHS Trusts are currently calculating their footprint and that easily accessible, standardised data is urgently required.

What did you do to understand the scale of the problem?

We conducted comprehensive research to understand the scale of the problem of carbon footprinting medicines. Our research included analysing the data from the 'Delivering a net zero NHS' reports, which identified medicines as one of the biggest contributors to the NHS carbon footprint. We also sent a freedom-of-information request to all NHS Trusts in August 2022, which revealed that only 27 were currently measuring the carbon footprint of their medicines.

To gain further insight, we conducted one-to-one interviews with clinicians and pharmacists and organised a stakeholder roundtable with 36 participants to discuss the data needed to reduce the carbon footprint of medicines. Additionally, we conducted a PPIE survey with 314 respondents and received input from the AHSN net zero and medicines optimisation groups. An Advisory Group made up of national experts also provided valuable input.

By combining these research methods, we were able to obtain a comprehensive understanding of the challenges associated with measuring and reducing the carbon footprint of medicines in the NHS. This research informed the development of the Medicine Carbon Footprint Classifier (*MCF Classifier*), which provides a systematic and standardised approach for measuring, benchmarking, and tracking the carbon emissions of medicines at different levels within the NHS.

What did you do?

Based on our broad stakeholder research, we identified a need for accessible, standardised, medicine-specific carbon footprint metrics to facilitate carbon-informed medicines use. With funding from the Greener NHS SBRI Healthcare programme, we built the Medicine Carbon Footprint Classifier (*MCF Classifier*) to address this need. MCF Classifier integrates medicines carbon footprint data for anaesthetics, inhalers, and 2000 tablet formulations with national prescription and cost data within the British National Formulary framework. It provides dashboards of medicine carbon footprints at different organisational levels, from individual GP practices to Integrated Care Systems (ICS).

A key innovation of *MCF Classifier* is its adaptation of validated 'green-by-design' metrics used in new drug development to generate standardised carbon footprints for over 2000 small molecule drug tablet formulations, covering approximately 70% of prescription items. *MCF Classifier* creates a systematic, standardised framework that allows visibility, measurement, benchmarking, and tracking of medicines carbon emissions.

We are currently trialling the use of *MCF Classifier* in various use cases, including estimating and benchmarking annual medicines carbon footprints within different organisations in an ICS, measuring and benchmarking inhaler use, and quantifying the carbon impact of antibiotic reduction targets.

What impact did your project have?

To measure current practice we conducted a freedom-of-information study to evaluate how many Trusts are currently measuring their medicines carbon footprint and how they are doing this. We found only a minority are measuring the footprint, even with the easy to calculate spend-based method. With *MCF Classifier* we can directly generate the carbon footprint of medicines using the prescription data available from BSA and our MCF metrics enable us to drive change from 14% to 100% of Trusts having footprint data. Benchmarking will become possible as the data is standardised and generated in the same way for every Trust, practice, or ICS.

We are collaborating with doctors, pharmacists, organisations, and the AHSN to pilot ways to integrate clinical-effectiveness, cost-effectiveness, and carbon-effectiveness into prescribing decision making. As an example, ~20% of primary care antibiotic prescriptions are considered to be unnecessary. Using *MCF Classifier* we estimate a 20% reduction in primary care prescriptions of penicillins in England in 2021 would have saved £4 million and 31 ktCO2e in emissions which is equivalent to flying 22 times around the world.

This is a snapshot of the potential impact our research is having and can have.

What lessons have you learnt?

The *MCF Classifier* approach is generalisable by design and can be used to quantify the carbon footprint of medicines across all primary and secondary care organisations. We have performed extensive user research and have had strong positive feedback about the concept and design. The user research also highlighted three recurring questions/concerns:

1) Will optimising the carbon footprint of medicines compromise clinical care? 2) Will optimising the carbon footprint of medicines increase costs. 3) Will optimising the carbon footprint of medicines take too much time.

To address the first two concerns we articulated the Triple-C framework to be explicit that clinical-effectiveness is always the first priority and to show how we bring visibility and optionality to the cost and carbon impacts of medicines use. To address the third concern we have integrated all the required data directly within *MCF Classifier* and output the information in user-friendly formats such as the MCF Formulary which includes colour-coded RAG style MCF Ratings for medicines. This design has had strong positive feedback.

We have an engaged collaborative advisory group, who are designing and executing pilot use cases and strong engagement from Greener NHS and the SBRI and we anticipate that *MCF Classifier* will

be ready for routine use in 2024.

Did your project have a social or financial impact?

We use what we call the 'Triple-C framework' to consider and measure financial impacts. Triple-C is a health-focused adaptation of the triple-bottom-line. The classic framework often places profit at the forefront with health under the social pillar, whereas healthcare organisations must prioritise patient impact, with economic and environmental impacts assessed in relation to their influence on clinical outcomes. Additionally, application in healthcare must be grounded in the methods used to measure and evaluate healthcare interventions. The Triple-C framework implements by integrating clinical-effectiveness, cost-effectiveness, and carbon-effectiveness. The primary measure in the Triple-C framework must always be clinical-effectiveness. The relative merits of cost and carbon-effectiveness can be flexibly evaluated and weighted, as required.

In *MCF Classifier* we stratify medicine carbon footprints per tablet into a categorical scale presented in a user-friendly carbon-effectiveness RAG rating. The MCF Ratings are presented in an interactive web tool called MCF Formulary. MCF Formulary shows the rating of the searched medicine and the ratings of other medicines used in similar therapeutic indications, as defined by the BNF. For each medicine the most prescribed product is shown by default and ratings of other products for that medicine are available as a dropdown. In future iterations of MCF Formulary we plan to also integrate cost information, to facilitate prioritisation of triple-win interventions.

We define triple-win interventions as those in which clinical effectiveness is also cost and carbon effective, for example tackling overprescription of antibiotics.

Was your project innovative and original?

MCF Classifier is a systems approach which applies machine learning models used in process chemistry in the healthcare sector to estimate the carbon footprint per dose for over 2000 small molecule medicines. This information is combined with the Dictionary of Medicines and Devices and the British National Formulary structures to seamlessly integrate carbon footprinting data across the NHS.

To our knowledge this is an innovative and original approach and there is currently no equivalent tool available in the world.

Conflicts of interest

This research and our participation in the conference is funded by an Accelerated Access Collaborative grant through SBRI Healthcare NHS net zero scheme. Separately, Rahman is a Non-Executive Director and shareholder at AstraZeneca. AstraZeneca was not involved in the research.

How We Reduced PPE Successfully

Holly Slyne, Jasmine Lowdon

What problem were you addressing and why was it important?

Personal Protective Equipment (PPE) is items such as gloves and aprons, worn in the healthcare setting to protect the healthcare worker from exposure to blood, body fluids and infectious patients. The need for the 'be PPE Free' project was evident because from 25th February 2020 to 24 February 2021, over 8.7 billion items of PPE were distributed to health and social care services in England. This compares with approximately 2.43 billion items distributed between 1 January and 31 December 2019 (Department of Health and Social Care, 2022). Whilst due to the pandemic, this substantial growth in PPE comes with environmental, financial, and social costs including increased manufacturing, transportation waste disposal costs, increased communication barriers and skin irritation, and poor infection prevention and control (IPC) practice from overusing PPE rather than hand hygiene.

Despite these consequences of excessive PPE usage, it is essential that adequate PPE is provided to keep employees safe (Health and Safety Executive, 2022). However, IPC audits, observations and procurement data in our hospital identified continued PPE overuse by all clinical staff. Therefore, this project, led by the IPC team aimed at reducing inappropriate PPE usage.

What did you do to understand the scale of the problem?

The scale of the project, to reduce inappropriate PPE use, was measured in the following three ways:

1. Facebook survey to measure staff knowledge of appropriate PPE use pre and post intervention
2. Observational audit of a medical and a surgical ward pre and post intervention
3. Monthly procurement data of gloves and aprons

Baseline staff survey results found that out of 149 participants, only 12% demonstrated accurate knowledge of the appropriate PPE to use for a clinical task (taking a blood pressure).

Pre-intervention observational audits were completed on a Medical and Surgical ward and found, on average, 17 inappropriate uses of disposable aprons and 28 inappropriate uses of gloves in a 1 hour period.

Procurement data showed a monthly mean of 1,099,700 gloves used in the for months prior to the intervention and a mean of 216,163 aprons in the four months prior to intervention.

A baseline carbon footprint was not calculated but the raw data was analysed further to determine the carbon saving in kgCO2e.

What did you do?

Change implemented: An education package to reduce inappropriate PPE usage via visual videos, screensavers and social media posts to staff using PPE in the clinical environment with patients.

- The PPE policy was summarised on 1 page and emailed out to ward managers to reset PPE expectations
- Using the survey and observational audit results, 7 trends of PPE overuse were identified; wearing PPE to make a clean bed, to take patient's observations, transporting patients, transferring patients, wearing the same PPE between

patients and wearing to collect clean linen from the linen trolley.
- A weekly BE PPE Free focus was generated and complimentary videos and screensavers produced and cascaded to clinical staff.
- On the day allocated to the specific theme a short educational video was posted on the staff's Facebook page and on the wards Whatsapp groups. As well as a screensaver with the theme being posted on the staff's intranet and a poster of the screensavers being appropriately placed throughout the trust. Ward sisters and IPC team also educated staff on audits and huddles.
- Following the intervention the staff survey and observational audits were repeated and the procurement data continued to be monitored to determine the impact.

What impact did your project have?

- The staff knowledge of appropriate PPE use increased by 86%.
- The observational data showed a mean 80% reduction in inappropriate gloves use and mean 95% reduction in inappropriate apron use
- The procurement data showed a 4.3% reduction in inappropriate glove use and a 22.1% reduction in inappropriate apron use.

If the raw procurement data was extrapolated for a year this would be a minimum annual procurement cost saving of £22,687 and a environmental impact of 25,974 kgCO2e and it could be suggested that this would increase as less PPE is used as 'PPE free' campaign embeds further across the Trust.

Additionally the saving from waste disposal of the unused 47,100 gloves and 47,757 aprons where a glove weighs 0.0041kg per single glove and an apron weighs 0.0093kg equates to 193kg of gloves and 444kg of aprons, or 637kg in two months. Estimated over a year, this would equate to 3,833kg waste saving, or £800.

The feedback from staff on the social media platforms was overwhelmingly positive. They found the videos informative as they explained the cross-infection risk from overuse of PPE.

Number of cases of C.difficile reduced by 40% from the quarter before to quarter following the intervention.

What lessons have you learnt?

The barriers encountered centred around communicating the message clearly and widely. To overcome this a range of communication messages were used; social media, link nurses, Whatsapp, e-posters and screensavers. On discussing with staff anecdotally they reported having viewed at least one communication method which reinforced that a variety of platforms is essential in a workforce that are so varied.

Reinforcing the message due to staff turnover and fatigue from the pandemic are limitations, therefore it is hoped that the simple, visual, engaging approach used overcomes these potential limitations. Sustainability is achieved through a continued monthly focus video. Also Theatres and the Emergency Department have asked for bespoke videos for their departments. If we started again, we would include these bespoke areas from the start.

This is very transferrable to other settings. We implemented it across our integrated care system and showcased this project at a regional NHS England forum. They have since launched the Take Your Gloves Off Campaign across the region. The project was also shared nationally at the Infection Prevention Society Conference in October 2022. The video package has been shared with a number of other IPC Teams following this across the country to use in their settings.

Did your project have a social or financial impact?

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The costs presented here are just from our Trust, but since launching across the Integrated Care System for the county, the regional Take Your Gloves Off Campaign and other Trusts that implemented this following presentation at conference, the financial and social impacts could be significantly higher.

Was your project innovative and original?

Yes, the intervention offered a new approach to an age old IPC problem. Traditionally education packages have used posters to share messages but the team felt strongly that this was not a sustainable approach and wanted to explore other strategies especially electronic platforms. It was also innovative in that often IPC are seen as blockers to sustainability projects but this showed the Trust that IPC are passionate about our route to net zero too.

As detailed above, patient safety was improved as C.difficile infection cases reduced post intervention and procurement and waste costs were reduced. The project was effectively free to implement, just needed some of the IPC Team members' time and acting skills.

Conflicts of interest

None. This project was completed in the Trust's Green Team competition that was hosted by the Centre for Sustainable Healthcare.

Improved waste management in the Aga Khan Medical Centre, Gilgit in Northern Pakistan

Imtiaz Hussain, Ali Ahmed Jan, Rehmat Karim, Sajid Hussain, Syed Nadeem Husain Abbas, Muhammad Imran

What problem were you addressing and why was it important?

The Aga Khan Health Service, Pakistan (AKHS,P) operates clinical units and basic health centres in the mountainous region of Gilgit Baltistan in Pakistan. Arable land is scarce as is the potential for landfill given that much of the terrain consists of rock. Most habitable plots lie close to rivers upon which life of the region depends. The infrastructure for waste in this region is basic, such that AKHS,P has to be self-reliant to ensure that its operations do not present risks in terms of health or cause environmental degradation.

AKHS,P's facilities work on a hub and spokes basis, with a central clinical unit, the Aga Khan Medical Centre, in Gilgit town -- henceforth referred to as AKMC Gilgit. AKMC Gilgit has 46 beds which serves as a hub for three comprehensive health centres, and 26 basic health centres spread throughout the district in more rural settings. AKMC Gilgit has an incinerator for infectious waste and sends its general waste for disposal by the municipality.

Cognisant of the fact that local land is limited and that the region lacked recycling infrastructure, it has been a longstanding tradition to be conscious of the waste generated and to reduce volumes.

What did you do to understand the scale of the problem?

As the phase II, or baseline, anticipating expansion plans for the future of AKMC Gilgit, efforts to reduce waste began prior to the onset of Covid-19. Initial efforts focussed on improving waste segregation and standards for holding waste and incineration. The standard practice at the start of this initiative in 2020 was to use red and green plastic bags for infectious and general waste throughout wards, labs and in areas open to the public.

A focal point was appointed to collate and report waste volumes by quarter to senior management. For this, a log of incinerated waste was in place which recorded weights and dates of incineration. A dialogue was established with those handling and disposing waste to explore means for reducing volumes of waste, as well as incineration and reducing plastic waste in particular. This served as a measure to monitor and track generation of general and infectious waste.

For general waste, disposable crockery and cutlery within the cafeteria were replaced with reusable items and plastic bags within the dispensaries were replaced with biodegradable versions.

What did you do

The practice of maintaining an accurate record of incinerable waste served as a key measurement

to track progress that has continued from first quarter 2020 to date. As the pandemic hit in March 2022, the need to accelerate innovations became all the more pressing. Following the onset of Covid-19, and in response to increased volumes of waste assumed to be hazardous, a larger capacity incinerator was installed in AKMC Gilgit. Beds increased from 46 to 96 and an ICU ward was also established with increased waste. During the first few waves of Covid-19, besides the challenges presented by high volumes of disposable personal protective equipment (PPE), the inclination of staff was to treat everything as infectious.

Various corrective measures were identified and implemented. These included rationalising the use of PPE to specific areas designated as high risk and using masks and gowns for longer periods. Washable cloth gowns replaced disposable versions in all areas apart from the ICU. Earlier practices of using disposable laryngoscopes, with the various components in separate disposable packaging, were replaced with autoclavable versions. Further, observations that suction tubing came packed separately from the attachments resulted in discussions with the vendors and sourcing both in a single pack to reduce waste.

A detailed audit of the contents of red bags destined for incineration was conducted in March 2022. Random bags were collected and opened under a biological safety cabinet (class II hood) in the laboratory and the number and types of contents recorded. The contents were separated into those potentially infectious as well as those that were unlikely to be – all were weighed. The contents of waste in green bags destined for the municipality was examined with bags opened and contents scanned.

The audit of green waste was more casual, but also indicated high volumes of plastic. These included the bags used to collect waste, heavy duty plastic vessels for detergents and other chemicals, as well as food containers from the canteen. The latter items included cartons of milk, soft drinks, plastic bottles, and Styrofoam containers for take-away food. Kitchen waste in the form of vegetable peelings as well as cooked food was negligible as both are taken home by staff either for feeding animals or for home use.

What impact did your project have?

Under Phase I, as a result of standard waste segregation at source and maintaining accurate record of incinerable waste, the graph shows data on the infectious waste burned at site (Figure 1).

The onset of Covid-19 in Q2 2020, i.e. Phase II, prompted an increase in all waste types during Q3 and Q4 of 2020 and Q1 of 2021.

Improved waste segregation and measures to rationalise and reduce volumes of PPE, substituting single use laryngoscopes with autoclavable versions and changes in packaging combined to lower waste volumes to the extent that it became necessary to import waste from other centres to use the incinerator to capacity. Q2 and Q3 of 2021 saw reductions of waste of all types comparable to pre-Covid-19 levels despite importing waste from an additional 3 facilities.

Steps taken to reduce waste in general, included restricted placement of the red bags and greater availability of green bag bins to reduce unnecessary use of red bags destined for the incinerator. These changes were accompanied with staff training -- housekeeping staff and nurses in particular. Efforts to replace plastic bags in pharmacies for dispensing supplies began with paper bags. Following complaints that these sometimes broke, more sturdy biodegradable bags were found and satisfactorily introduced.

As a result of reduced volumes for incineration and in order to be able to fill the incinerator to the capacity required for ignition, AKMC Gilgit took on waste from 3 other facilities (two secondary care level hospitals and a diagnostic lab) to make up the volumes, spreading better waste management practices in the process.

Collaborations with government to introduce better waste management practice resulted in training 482 doctors and paramedics and hosting the studies of 6 interns.

While waste volumes increased again during Q4 2021 due to the Covid-19 Delta variant, this far the waste resulting has seen moderate increases compared to earlier waves.

The audit of incinerated waste from red bins collected on the wards conducted in Q1 2022, indicated that by weight, 75% of waste incinerated was not, in fact, infectious[1]. Packaging of single use items constituted the large share of items. Such packaging typically had paper backing with plastic see-through facing to make the contents visible to users. See Figure 1 to illustrate and table 1 for the most commonly used products.

The tracking has continued in 2022, where the incinerable waste has continued to be controlled and maintained below the levels of general waste.

What lessons have you learnt?

The process of getting senior staff across disciplines to work with waste management, and be responsible for tracking and reporting waste volumes resulted in kick starting innovations in reducing waste. While Covid-19 understandably resulted in an enormous spike of waste, weaning staff back to earlier practices was not simple – many wished to remain using disposable items, and that reusable gowns, in particular, would suffice outside high-risk settings. While initial changes to reduce general waste (moving towards biodegradable bags, reusable items and working with procurement for items involving less plastic packaging) were likely modest in their impact, these changes resulted in generating interest among staff to do more.

The audit of the items disposed through incineration proved eye-opening for all concerned. While this audit was conducted during a new wave of Covid-19 where items may have been more liberally considered infectious, staff discussions suggested that these results were likely not exceptional.

With respect to incinerated items, a discussion on the wrapping of medical single-use products containing plastic resulted with the procurement officer being charged to signal to suppliers that products packed in sterile paper pouches akin to those used for sterile gloves and bandages would be preferred (see figure 3).

Instead of see-through plastic, a diagram or written description of contents would suffice which would considerably reduce plastic volumes and make it simpler to discharge in general waste. A list of plastic wrapped items will remain under review until alternatives can be found. It is estimated that through better waste management and substitution of plastic for paper in these items, incinerated waste could be reduced by as much as 90% of the current volumes, with associated benefits in terms of energy use, carbon emissions and air quality.

The so-called ‘green waste’ contains substantial amounts of plastic. While some types of plastic are sorted and repurposed within cities in Pakistan, such practices are less common in this rural region. It is therefore imperative to find solutions to stop plastic waste at source.

Discussions with staff, personnel from the canteen, procurement, and observations of practices of a hotel within the region resulted in the resolve to change all green bin liners to biodegradable versions, work with the canteen to replace food containers for biodegradable versions which are available, as well as to renegotiate the contract with the entity that manages the canteen to move away from processed foods and drinks altogether in favour of locally sourced fresh alternatives and only to serve food for in house and take away purposes with reusable crockery and cutlery or biodegradable alternatives. Within this contract, the responsibility for the contractors to dispose of their own waste will also be explored.

A further initiative has begun to explore getting suppliers to take back all plastic containers, consider refill systems where appropriate and

[1] Items presumed infectious included gloves, tissues, diapers and sanitary towels, as well as tissue papers and cotton wool swabs. Items presumed non-infectious were wrappings for swabs, bandages, syringes, suction tubes, etc, as well as food items, ECG readings, bottled water, medicine containers and paper.

with that sending the signal that these vessels are not wanted and that environmentally-friendly solutions will be preferred.

Was your project innovative and original?

The initiative followed the best practices of adhering to best waste management practices in a resource constrained and remote area, and devised measures to track and reduce infectious and general waste. The staff identified areas of reducing infectious waste by introducing reusable alternates, consistently tracking waste volumes, and finding areas of reducing harmful waste.

Conflicts of interest

None

Additional Supporting Figures

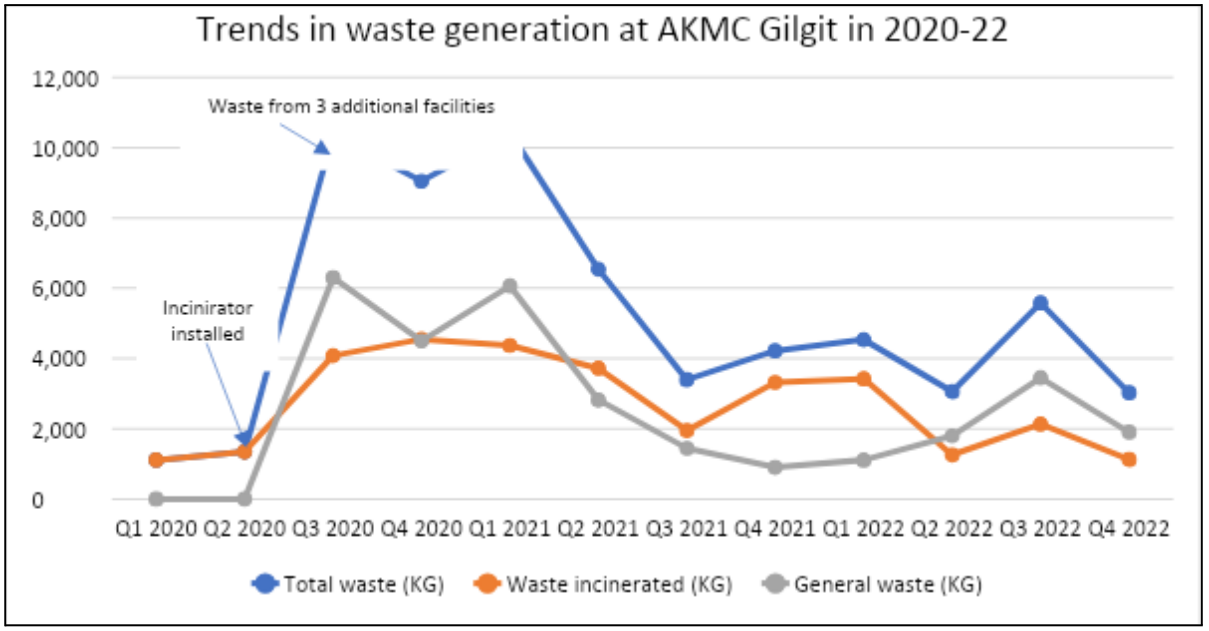


Table 1. Common single-use products and manufacturers

S.No	Item Name	Manufactured by
1	Normal Saline	Medi flow
2	Syringes (All sizes)	Nipro
3	Suction tubes	Changzhou medical devices
4	Foleys Cath	Nantong angel medical
5	OETT tubes	Chilecom medical devices
6	NG tubes	Feroz M sons
7	IV sets	Searle flow
8	IV cannula	Nipro
9	IV chambers	Changzhou medical devices
10	Dialysis supplies	Vital health
11	DLCs	Arrow international
12	Vent Tubing	R vent Medikal
13	Gauze	Carbon craft
14	Urine Bags/Urofex	Ningbo medical
15	Diathermy lead	Q med
16	Oxygen mask	Life care

Figure 3 Sterile paper packaging.

An innovative Planetary Health and Sustainable Healthcare curriculum adaptable for all health professions

SanYuMay Tun, Theresa Martin, Emma O'Neill, James Smith, Anna Jones, Felicity Connolly

What problem were you addressing and why was it important?

The climate and ecological crisis is already killing people across the world. Recognising this, health professionals and students are calling for urgent changes to their education so that it reflects the emergency we are in and equips them to address the crisis and practise sustainable healthcare. The NHS in England has set an ambition of reaching net zero carbon emissions by 2040, health professionals will be ill-equipped to support communities affected by climate change and transform the NHS to meet these carbon footprint targets without education about how to do this. In line with this, article 12 of the Paris Agreement commits countries to enhance education on climate change[1,2]. In 2018, the General Medical Council (GMC) incorporated sustainability into 'Outcomes for Graduates'[3,4]. In addition, development of the Planetary Health Report Card, an international student-led initiative, highlights student appetite for this change[5].

1.UN (2015). Framework convention on climate change. Conference of the parties: adoption of the Paris Agreement. U. Nations. Paris.
2.Madden, D. L., et al. (2020). "Why use indicators to measure and monitor the inclusion of climate change and environmental sustainability in health professions' education?" Med Teach **42**(10): 1119-1122.
3. GMC (2018). Outcomes for graduates 2018, London, General Medical Council.
4. Tun S. (2019). Fulfilling a new obligation: Teaching and learning of sustainable healthcare in the medical education curriculum. Med Teach. 41(10):1168-1177 DOI: 10.1080/0142159X.2019.1623870
5.PHRC (2020). "Planetary Health Report Card." Retrieved 18.04.23, from https://phreportcard.org/

What did you do to understand the scale of the problem?

Evidence suggests that in 2019-2020 only 15% of medical schools globally included teaching on climate change and human health in their curricula, although momentum is gaining[1]. The international student-led Planetary Health Report Card initiative gives us a useful baseline of where various medical schools around the world are in relation to inclusion of environmental sustainability in education. This includes scores for teaching on sustainable healthcare and suggests there is substantial room for improvement in most medical schools. Our own experience as topic experts working in medical education supports this finding and has illustrated the lack of knowledge on sustainable healthcare and planetary health amongst teaching faculty across the country[2].

1. Omrani, O. E., et al. (2020). "Envisioning planetary health in every medical curriculum: An international medical student organization's perspective." Med Teach **42**(10): 1107-1111.
2. Tun S, Wellbery C, Teherani A. (2020). Faculty development and partnership with students to integrate sustainable healthcare into health professions education. Med Teach. 42(10):1112-1118 DOI:10.1080/0142159X.2020.1796950

What did you do?

To answer these urgent calls, we developed a new curriculum for Education for Sustainable Healthcare (ESH). The Medical Schools Council (MSC) hosted a conference for all UK medical schools on Education for Sustainable Healthcare and Planetary Health in October 2021 and following this a working group of medical

educators from universities across the UK developed the curriculum through a series of consultations, discussions, and review processes. The curriculum aims to facilitate undergraduate integration of ESH and Planetary Health through detailing suggested items to cover, suggested pedagogies, assessments, and competencies which are all supported by a list of resources. The curriculum was reviewed by the Education Leads Advisory Group of the Medical Schools Council and then published as 'Education for Sustainable Healthcare - A curriculum for the UK' on the UK Medical Schools Council website in May 2022[1].

1. Tun S. and Martin T. (2022). Education for Sustainable Healthcare - A curriculum for the UK. Medical Schools Council, London, UK. https://www.medschools.ac.uk/media/2949/education-for-sustainable-healthcare_a-curriculum-for-the-uk_20220506.pdf

What impact did your project have?

There has been no formal assessment of the impact of this curriculum as yet. However, it has been sent by the MSC to every undergraduate medical education lead in the UK. The GMC has approved this as informing the implementation of its *Outcomes for graduates* and will use it as a reference point for future iterations of Outcomes for Graduates. Although initially intended for the UK, the curriculum is written so that it can be adapted for other countries and health professions, and all stages of the educational continuum. It is clearly and concisely structured so that educational institutions can draw up learning outcomes suitable to their own context. Indeed the curriculum is being applied to other health professions internationally such as nurse practitioners in Singapore[1]. It has been referenced in several academic publications on sustainable healthcare education as an example of good practice[2]. This curriculum will support the increased teaching on sustainable healthcare and planetary health and all those involved, both students and faculty, will be better equipped to contribute to the NHS's collective efforts to decarbonise as rapidly as possible.

1. Tun S, Martin T, Connolly F, Smith J, O'Neill E, Jones A. Education for sustainable healthcare: An innovative planetary health and sustainable healthcare curriculum adaptable for all health professions. *MedEdPublish* 2023, **13**:146 (slides) (https://doi.org/10.21955/mep.1115292.1)
2. Irlam JH, Scheerens C, Mash B. Planetary health and environmental sustainability in African health professions education. Afr J Prm Health Care Fam Med. 2023;15(1), a3925. https://doi.org/10.4102/phcfm.v15i1.3925

What lessons have you learnt?

Whilst completing the curriculum, some challenges faced were in the limited time of all colleagues involved in development, but this challenge was overcome by our passion and commitment to see it effectively and comprehensively through to completion. The MSC was extremely supportive and endorsed the curriculum with only minor amendments and with positive feedback. While developing this curriculum, we were mindful of the importance of navigating the barriers to the inclusion of ESH and planetary health into medical education. For example, one barrier to its inclusion is that medical curriculums are highly contested, therefore we advise that whilst discrete/stand-alone teachings are important in order to convey the complexities and interlinkages of planetary health, we also highlight where this teaching is applicable to each medical speciality and can be integrated into existing teaching in order to overcome this barrier.

Did your project have a social or financial impact?

The ESH curriculum highlights many social implications relating to planetary health throughout the document, including one section entitled "Health inequalities, environmental equity and ethical medical practice" which includes items to discuss such as climate and environmental injustices; the amplification of vulnerability of disadvantaged populations such as food and water insecurity, heat stress, forced displacements etc due to the climate crisis. Only when health professionals are made aware of these issues and are taught the skills to act can they be empowered to make change. The social impact of this curriculum may also be seen through the theory of Otto et al (2020) with regards to 'social tipping interventions', in which the author states that there are interventions which could tip social change to facilitate reduction in carbon emissions. One of these 'social tipping interventions' is education[1]. This once again underlines the urgency needed in

integrating Planetary Health into all medical curriculums to maximise time-dependent benefits.

1. Otto, I. M., et al. (2020). "Social tipping dynamics for stabilizing Earth's climate by 2050." Proc Natl Acad Sci U S A **117**(5): 2354-2365.

Was your project innovative and original?

We believe this to be the first curriculum for planetary health and sustainable healthcare that has been nationally endorsed. The NHS ambition for net zero clinical care can best be achieved through a workforce that is both educated on why it is necessary, and empowered to make transformational changes in the culture of practice. This concise but comprehensive curriculum helps to prepare health professionals to address these challenges in any specialty. It acknowledges the emotional resources required and addresses professionalism, leadership and achieving structural change. We hope that graduates from schools who have used this curriculum to inform their teaching will be able to not only help the NHS to urgently reduce its carbon footprint but to do so in a way which reduces financial costs and improves equity and above all, health outcomes.

Conflicts of interest

None declared. This work was unfunded.

Leading sustainable climate action in LMICs – A narrative report on decreasing carbon emissions from anaesthetic gases in AKHS East Africa operations

John Huho, Karen Mbaya, Patrick Eshiwani, Gloria K Kinasa, Sher Aziz, Zohair Khan

What problem were you addressing and why was it important?

Climate change is a well-recognized global threat and the healthcare industry has a substantial contribution to it. About 2-2.4 Gigatons of CO2 equivalent (CO2e) greenhouse gas emissions arise from healthcare every year representing 4-5% of global CO2 emissions. Achieving universal health coverage at the current carbon intensity of healthcare will result in rising emissions from Low and Middle-Income Countries (LMICs) which may swell the global carbon footprint of healthcare by a further 16 %. The projected expansion of health services in LMICs, requires exploring innovative and environmentally friendly services.

AKHS, which operates primarily in LMICs, initiated an effort to measure its carbon footprint back in 2019. Data is collected and reported on a quarterly basis. Carbon emissions from anaesthesia services were identified as a relatively low hanging fruit for immediate action in the AKHS Africa operations.

Many anaesthetics are known to contribute significantly to health care's carbon footprint. As well as being powerful greenhouse gases, some anaesthetic gases, particularly Halothane and to a lesser extent Nitrous oxide, are also ozone depleting substances.

What did you do to understand the scale of the problem?

AKHS operates multiple hospitals with surgical care in Africa. Across sites carbon emissions from operations are measured and documented on an in-house developed tool called the AKDN Health Carbon Management.

Anaesthesiologists within each hospital began to document types and volumes of gases being used on a quarterly basis. The amount of consumption of volatile anaesthetics and nitrous oxide was monitored 'retrospectively'.

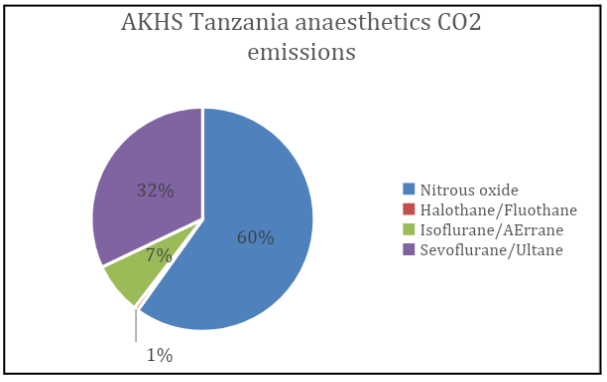
Isoflurane and Sevoflurane are stored as liquid in standard plastic bottles and are procured in bulk. Consumption of bottles was recorded each time anaesthesia machine vaporizers were refilled. Similarly nitrous oxide is stored in 16,560-litre capacity cylinders attached to a manifold supplying the main pipeline gas for each hospital. The amount of nitrous oxide consumption was recorded in cylinders each time a full cylinder was replaced in the manifold. Total emissions in CO2 equivalents was calculated by the Health Carbon Management tool based on consumption.

What did you do?

The process started with measurement of the carbon footprint from delivery of anaesthesia services. Strategies were developed to prioritise low-cost and high-yield interventions for quick and impactful results. These can broadly be categorised into the following domains
i) community engagement
ii) promotion and adoption of best practices
iii) efficient use of anaesthetic agents.

TANZANIA

The Aga Khan Hospital in Dar es Salam Tanzania is a 170-bed facility which caters to the need for surgical care in the area. A sizable proportion of this is obstetric care. Traditionally, most mothers and even obstetricians were inclined to pursue caesarean sections under general anaesthesia. Analysis in Q1 2021 identified that anaesthesia contributed to just over 12.6tCO2e which approximates to 1% of the total footprint of AKHS Tanzania. The low percentage was due to high carbon emission from the hospital's electricity consumption. Within the anaesthetic gases the largest contribution was of sevoflurane and nitrous oxide. A small volume of isoflurane also had a disproportionately high impact for its level of use.
Mothers were encouraged to pursue elective caesarean sections under spinal anaesthesia through community engagement and counselling during preoperative assessments. Spinal anaesthesia is a safer modality for caesarean sections and almost excludes the use of anaesthetic vapours.

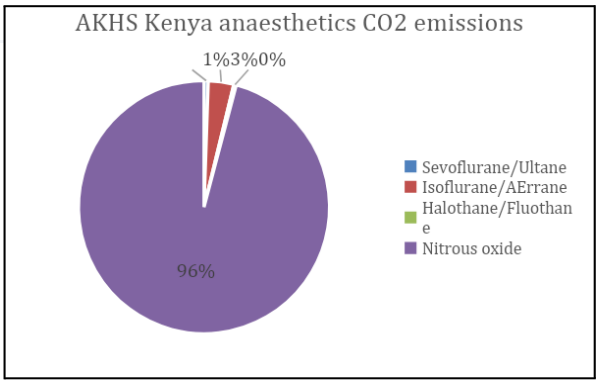


This best practice was promoted by taking obstetricians on board. Alongside neuraxial blocks, capacity to deliver anaesthesia through net zero emission techniques such as total intravenous anaesthesia (TIVA) and regional anaesthesia was also developed through training and assessment of financial sustainability. Our hospital management endorsed the endeavour to reduce emissions from anaesthesia and facilitated required changes in infrastructure and procurement. Despite being a costlier option, sevoflurane based anaesthesia was promoted over isoflurane due to its lower carbon burden. Nitrous oxide emissions were also minimised by using medical air instead.

Rationale use of anaesthetic agents through low-flow anaesthesia was made possible with the use of circular breathing systems and end-tidal agent monitoring. Anaesthesia machines with these features were made available at Dar es Salam for delivering low-flow anaesthesia and thus reducing anaesthetic agent release into the atmosphere.

KENYA

AKHS runs two hospitals in Kenya, one in Kisumu and the larger secondary care centre in Mombasa. By virtue of its bigger surgical set-up the latter hospital has a greater share in the total carbon footprint of anaesthesia services in East Africa.



Analysis in Q1 2021 identified that anaesthesia contributed just over 86tCO2e or 24% of the total footprints for the 2 operations. This was due to 2 key factors. Firstly, the very low carbon intensity of grid electricity supply in Kenya and secondly a relatively high contribution from nitrous oxide use. Isoflurane made the largest contribution

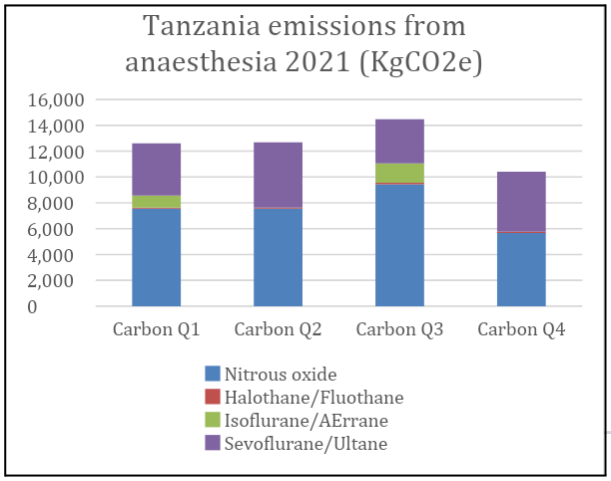
from the volatile agents with very small contributions from halothane and low carbon sevoflurane. Similar methods to those in Tanzania were adopted at the hospitals in Kenya. At the same time awareness was raised on the carbon footprint of anaesthesia by collaborative work with Kenya Society of Anaesthesia.

It was then noted that AKHS Mombasa's consumption vis a vis caseload was the highest in the network. A comprehensive audit was conducted on the use of nitrous oxide at the hospital. Data was initially evaluated by anaesthesiologists and the extraordinary consumption was flagged with the maintenance department who conducted further investigation. As with other centres nitrous oxide was procured in 16,560-litre capacity cylinders and the amount consumed was monitored 'retrospectively ' at the time of cylinder replacement. The audit revealed a significant leakage in the manifold connecting the nitrous cylinders to the main pipeline supply. The leakage used to cause a drop in pressure in the mains nitrous oxide supply and triggered a reflexive action of cylinder replacement before it was empty. The leak was repaired in June 2021 resulting in a drastic reduction in the number of cylinders used and nitrous emissions. AKHS Mombasa also began an active campaign to have low flow anaesthesia, regional blocks, and TIVA.

What impact did your project have?

TANZANIA

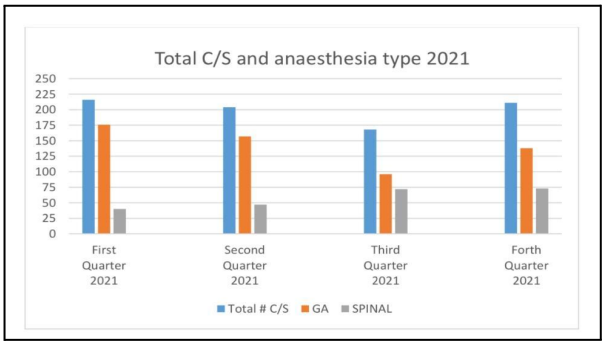
Figure 3 2021 quarterly anaesthesia carbon emissions Tanzania



Initially the emissions from anaesthesia in AKHS Tanzania showed a 15 % increase from Q1 to Q3. The visibility of this increase, afforded by quarterly monitoring, focused attention and efforts on controlling emissions from mid year onwards.

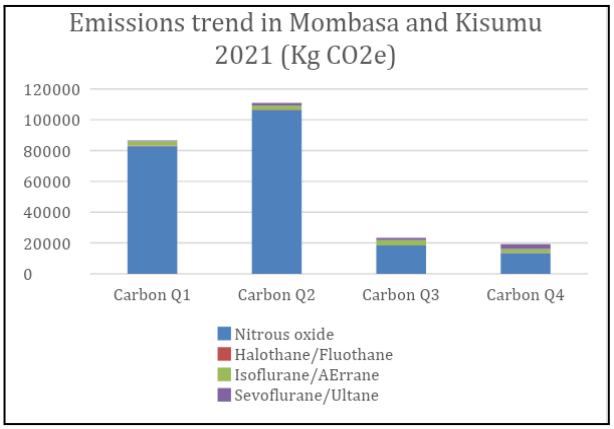
As demonstrated from figure 1, it took until Q4 2021 for the impacts of the methodologies adopted to yield results. A net 17% decrease in emissions was noted in Q4 reporting compared to Q1. Community engagement and promotion of best practices took time to be adopted.

Figure 4 shows the gradual and steady increase in the rate of caesarean sections being performed under spinal anaesthesia.



KENYA

Figure 5 (trend of quarterly emissions from Mombasa 2021)



As with Tanzania, the second quarter showed an overall increase in anaesthetics emissions from operations in Mombasa and Kisumu. Around this time the leak in the nitrous oxide

delivery system at Mombasa hospital was identified.

With the leaky manifold fixed a remarkable drop in emissions was observed from the third quarter onwards with a measured decrease of 75% and 74% in the last two quarters respectively.

While Sevoflurane can be more costly than other volatile agents, fortunately at Mombasa Isoflurane and Sevoflurane based anaesthesia cost the same. This favoured change to Sevoflurane which is less damaging to the environment. The department of anaesthesia also initiated advanced labour analgesia techniques such as labour epidurals which decreased the use of Entonox (A mixture of nitrous oxide and oxygen).

In Kisumu, reported emissions from anaesthesia fell substantially between Q1 and Q4, primarily from a 60% reported reduction in the use of nitrous oxide. From Q1 to Q4 there was also a 40% reduction in the use of Halothane. This was achieved by purchase of a new anaesthesia machine without a halothane vaporizer. Halothane is not used in Mombasa and is to be discontinued in Kisumu.

Throughout this period, it is important to note the relative contribution of the Covid pandemic in encouraging anaesthesiologists to adopt regional techniques over general anaesthesia thus minimising the need to control airway, reducing transmission of the disease and inpatient time.

In quantitative terms, the centres in Kenya showed the most significant decline in emissions and contributed to reducing AKHS East Africa anaesthesia emissions by 61%.

What lessons have you learnt?

Our effort to bring about a sustainable change in practice was supported by collecting and monitoring of data. Measuring carbon emissions and the use of gases allowed anaesthesiologists, facility teams and senior leadership to both identify and target early actions and plan forward to significantly reduce emissions.

Quarterly data reporting helped with managing emissions; this was particularly evident in AKHS' hospital in Mombasa where a leak was identified and resolved. Given the fact that Nitrous oxide is otherwise an inexpensive gas, the faulty manifold may not have been identified had operations not been tracking carbon emissions. Leak reduction is a simple intervention that is easily replicable across other healthcare operations.
Monitoring has also helped to identify the significant contribution that nitrous oxide makes to our anaesthetic's footprint, highlighting the environmental benefits of alternatives such as using oxygen and medical air as a carrier gas. Our results have allowed us to engage leadership in bringing about this change in future.

The emerging discourse on carbon emissions amongst anaesthesiologists at AKHS has identified the potential to shift from environmentally damaging volatile agents such as Isoflurane and Halothane to lesser damaging agents such as Sevoflurane. In some cases this can be achieved at no cost difference and with health benefits for patients.

The adoption of spinal anaesthesia for caesarean sections has been an important contributor to reducing carbon impacts from the use of both nitrous and volatiles. The delivery of obstetric care has been a priority of AKHS since its inception. Community engagement had been a particularly challenging endeavour as most of the maternal population was convinced to undergo caesarean sections under general anaesthesia. Involvement of obstetricians and midwives to counsel mothers was very effective and will lead to a more sustained change in practice.

Moving ahead we would like to see a greater increase in the number of caesarean sections done under spinal anaesthesia. Currently, most of this change has been driven by full-time anaesthesiologists in AKHS hospitals. In the future, extending this practice to all practitioners is planned. The Royal College of Anaesthetist recommends that more than 95% of elective and more than 85% of emergency caesarean sections should be under regional technique.
If achieved, this would lead to tremendous declines in the carbon footprint.

The experience of AKHS hospitals in East Africa is being shared with other operations through peer and professional networks in the region and through AKHS operations in other regions. The process has been initiated with centres in Pakistan which are in a phase of expansion. The aim is to support the use of oxygen and medical air as a carrier gas in surgery, rather than nitrous oxide.

Was your project innovative and original?

Our project was innovative in its multi-faceted approach to amalgamate simple changes to the practice of anaesthesia in a remote and resource poor setting. We also developed an in-house tool to track and monitor carbon emissions from anaesthesia delivery. This helped conduct simple multidisciplinary initiatives involving medical staff, maintenance department and community to reduce carbon emissions. Overall small gains led to significant cumulative benefit over the course of the year.

Our effort in obstetric care has also led to greater adoption of best practice of conducting caesarean sections under spinal anaesthesia.

At the same time raising awareness and sharing of our experience with colleagues in other LMICs working under AKHS will lead to expansion of these practices and significantly reduce the damaging impacts of anaesthetic gases.

Conflicts of interest

None

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The Planetary Health Report Card

Lauren Franklin

What problem were you addressing and why was it important?

The effects of climate change are rapidly evolving and threaten the health and wellbeing of current and future generations. The most recent Intergovernmental Panel on Climate Change (IPCC) report reiterates that the climate crisis is the greatest threat to human health this century and organisations such as WHO have recognised the impact climate change and extreme weather events will have on both physical and mental health.

Future clinicians need to be equipped with sufficient knowledge and confidence to engage in discussions about planetary health with patients as well as to provide environmentally-conscious healthcare and work in the NHS striving towards carbon net-zero.

Planetary health is a rapidly evolving discipline and we are in the early stages of its inclusion within the medical school curriculum.

Currently, at both undergraduate and postgraduate levels, inclusion of Education for Sustainable Health is insufficient. For example, in 2020, only 15% of medical schools across 112 countries delivered teaching on climate change and it was unknown as to the depth and methods in which these were being taught.

To fill this gap, the Planetary Health Report Card was developed to evaluate medical school engagement in planetary health and sustainability.

What did you do to understand the scale of the problem?

Despite a relatively good understanding of the health effects of climate change, this has yet to transition in undergraduate health education. At the time of initiation of the project, there was no formal assessment of the content of different curriculums or a published standard list of core competencies in planetary health medical education worldwide. The project was piloted at the University of California San Francisco and Stanford School of Medicine in the US, where faculty and topic experts provided feedback on the metrics assessment. Since then, formal assessment of the inclusion of climate change and health in medical education has been sporadic, but all studies point towards a substantial lack of core curriculum material on the topic.

No carbon impact assessment or baseline carbon footprint was measured.

What did you do?

The report card assesses medical schools in five key areas: curriculum, research, community outreach and advocacy, support for student-led initiatives and campus sustainability. Each area is measured using standardised metrics, scored on a multilevel point system, ranging from a maximum or 2 to 3 point, producing a score for each of the 5 areas. Annually, student teams from each participating institution collect data to complete the metrics from December to February of the academic year, for final publication and dissemination in April.

This initiative has run for 4 years since 2019, with UK schools part-taking in 3 of them. In 2020-2021, 31 schools completed a report card, followed by 26 in 2021-2022 and 25 in 2022-2023. The analysis is completed by students studying at each of the institutions

with the support of staff and faculty and is then further analysed by a member of the international committee. Each report card provides a valuable needs tool in which students and faculty can collaborate internationally on the development of planetary health education. With ever completed cycle, schools can monitor progress and strive to improve their score and ranking with each coming year. Examples of best practice and novel ideas for implementation of planetary health education are collated in an international summary report that allows collaboration and learning from health professional schools all over the world. The analysis for 2022-2023 has occurred and the summary report will be published on the 22nd April 2023.

What impact did your project have?

Each medical school is given a score and grade for each area assessed as well as an overall score and ranking within the UK.

The Planetary Health Report card has contributed to the development of planetary health education globally. In the UK, improvements have been made by institutions to prioritise sustainable and including planetary health within the curriculum. Of the 20 schools that have completed reports in both 21/22 and 22/23, all 20 schools improved their overall score across all 5 areas, with an average improvement of 6.75%. 18 schools have completed three consecutive reports and have made an average improvement of 13.84% across all areas.

Participants have reported the report card in driving the development of new sustainable healthcare elective modules and core curriculum content, student sustainability positions on curriculum development committees, new dedicated sustainability web pages or regular communications on sustainable healthcare, new community partnerships promoting climate change and health education and many more.

What lessons have you learnt?

Since the use of the PHRC in the UK, there has been improvement in school scores across the board, with the majority of schools making a marked improvement since their first report card. The improvement to the curriculum section is particularly of note and reflects positive curricular change to empower students with the knowledge they need.

Some schools initially faced some challenges in gaining support from faculty however other schools have reported that their school is supportive and has been engaged in making improvements. Turnover in student-led teams has been a challenge, however 25/31 of the schools in the UK who initially participated are still contributing. With some schools now having participated for three years, our aim for the coming academic year is to support students in taking the report cards and acting on the identified deficits. We hope to achieve this through curriculum development workshops and partnership with Climate Resources for Health Education, an open access peer reviewed repository of climate and health materials for implementation.

In terms of long-term sustainability, this initiative has been running for 3 years in the UK however has been running for 4 years total. More schools internationally have joined every year, increasing from 13 schools initially to 96 schools this year. New countries such as New Zealand and South Africa have also joined the initiative.

Given the success of the medicine report card, report cards for other healthcare professional programmes such as physiotherapy are being developed and trialled.

Did your project have a social or financial impact?

This project has not had a known cost impact. This project has a potential social impact of driving student-led change at their institution and creating a working relationship between staff and students, however this has not been measured.

Was your project innovative and original?

This initiative was inspired by the 2018 Racial Justice Report Card, created by White Coats 4 Black Lives, however is unique within its topic area. There is no other project which offers such in-depth insight into the current content of curriculums for planetary health and sustainability. This project has grown in scale and internationally since its inception and has created a community of passionate students. This project has improved the inclusion of planetary health in the curriculum and has often developed a working relationship between students and staff to develop school-specific aims and improvements.

Conflicts of interest

None. PHRC is an organisation I represent however none of the work I do for them is paid.

BMJ Innovations

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