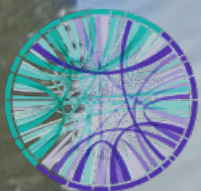


Education for Sustainable Healthcare: Stories, Strategies, and Solutions from the MSC ESH Alliance

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Education for Sustainable Healthcare: Stories, Strategies, and Solutions from the MSC ESH Alliance

Edited by Iain Young



Education for Sustainable Healthcare: Stories, Strategies, and Solutions from the MSC ESH Alliance.

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Sustainable Healthcare Alliance

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from the MSC ESH Alliance is a practical, collaborative e-book designed to help support
educators and medical schools in embedding education for sustainable healthcare
(ESH) into their medical curricula. As a collection of contributions from educators
across UK medical schools, it presents diverse perspectives, case studies and
curriculum integration strategies that reflect the authors real-world experiences. By
sharing lessons learned and evidence-informed approaches, it aims to build a
community of practice and provide accessible guidance to educators committed to
preparing future doctors to lead the transition towards a more sustainable healthcare
system.

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Preface

Our book grew out of conversations around the first meeting of the Education for Sustainable Healthcare (ESH) Alliance in 2025. There was a common sense that, while many were working on sustainability in isolation, there was enormous value in learning from one another and moving forward together. The Alliance has created a space for open discussion, collaboration and mutual support, highlighting both the urgency of addressing planetary health within medical education and the creativity already emerging across institutions. Our book is a natural extension of those conversations. It brings together experiences, reflections and practical approaches from across our community, capturing how ESH is being integrated and embedded in diverse curricula. The chapters of our book reflect a shared journey shaped by cooperation, innovation and a collective commitment to preparing future doctors for sustainable healthcare practice. I would like to thank all the contributors to this electronic book. It has been an honour to be entrusted with this task. I hope that in collecting, collating and editing this book, I have done justice to your inspirational work.

Iain Young

Authors Biographies in Chapters Order

Dr SanYuMay Tun

I have been active nationally and internationally for many years, leading in the field of Education for Sustainable Healthcare (ESH) and Planetary Health in health professions education, and on the boards of the major organisations in this space. My background is transdisciplinary - in medicine as a former general practitioner, in environmental science and policy, and in medical education as a Principal Fellow of the Higher Education Academy (PFHEA), the highest level of recognition for university educators. I established and I chair the MSC – ESHA, the Medical Schools Council's Education for Sustainable Healthcare Alliance, after having led the development of the first ESH curriculum to be endorsed by any national medical educational bodies – Education for Sustainable Healthcare – A curriculum for the UK. This curriculum guidance document is included by the GMC as informing its required *Outcomes for graduates*, to qualify as a doctor in the UK. It has also informed Planetary Health and ESH curricula in other health professions, postgraduate training, and in countries around the world. I have been invited to speak, develop faculty, examine and teach at many medical schools and other institutions across the UK and internationally, including the Centre for Environmental Policy at Imperial College London. At the University of Oxford, I teach on Planetary Health and Education for Sustainable Healthcare and am a Fellow of Green Templeton College.

Dr Ellie Nash

I am a Clinical Lecturer at UCL Medical School and the Planetary Health and Sustainability Lead for the school. My work focuses on embedding planetary health and sustainable healthcare into the undergraduate curriculum, while also training and upskilling faculty to confidently teach sustainable healthcare.

I have experience in both undergraduate and postgraduate medical education, and my other areas of interest include the wellbeing of healthcare professionals and faculty development. I'm also part of the European Network on Climate Health Education, where I co-lead the Resource Creating group. Our aim is to promote collaborative learning on sustainable healthcare across European universities that provide healthcare education.

Dr Zakia Arfeen

I am an Associate Professor at UCL Medical School with experience in curriculum design, assessment, quality assurance, and faculty development. I have designed staff training events for medical school teams around the world, using innovative education technology approaches. I am also a Senior Fellow of the Higher Education Academy and have a background in General Practice.

Professor Trevor Thompson

I'm Professor of Primary Care Education at the University of Bristol, and I've had a long-standing interest in sustainability in education. Since 2010, I've been running short courses on sustainability for medical students, and I still fondly remember helping students set up the university's first farmer's market. That experience, along with the courses, led to co-authoring *Sustainable Healthcare* (2013), which gave me the opportunity to explore the field more deeply.

After a period of focusing on a major curriculum review and navigating the challenges of the pandemic, I'm now returning my attention to sustainability. At Bristol, our undergraduate medical curriculum is structured around helical themes—including Planetary Health and Sustainability—which has been instrumental in driving change. For example, in February 2025, my team and I delivered CLT to all first-year medical students, working closely with two brilliant student sustainability champions. Thanks to initiatives like this, Bristol's Planetary Health Report Card rankings saw a significant boost in the latest round.

When I'm not working, you'll find me enjoying books, bikes, boats, and tending to my sunny allotment to improve its yield.

Ms Lakshmi Aggarwal

My interest in sustainability was sparked when Sir Ed Davey visited my primary school to speak about the 2015 Paris Agreement. Ever since, I've been eager to get involved in sustainability wherever I can.

I successfully applied to be one of two Sustainability Champions for the School of Medicine in 2024, and over the past year, I've played a pivotal role in driving sustainability efforts at Bristol Medical School. I'm proud to have helped the school rise from 13th in the UK to 2nd in the world in the Planetary Health Report Card rankings.

Some of my proudest achievements include creating and curating a weekly article on developments in sustainability in medicine that reaches over 1,500 readers and conceiving and pitching a new role for student sustainability representatives in each affiliated hospital—a proposal that's now been approved by programme directors and hospital deans. I was honoured to be personally recognised by the Vice Chancellor of the University for my work this year.

Ms Lucy Westover

I am a Specialist Sustainability Officer at Bristol Medical School, where I have had a lead role in embedding Carbon Literacy throughout the curriculum. These efforts were recently recognised with the Health and Life Sciences Education Network (HALSEN) Unsung Hero Award, an honour

that reflects the collective progress we've made across the school and wider University.

Last year, Bristol Medical School became the first medical school to be accredited as a Carbon Literate Educator at Bronze level. Supporting this achievement was a highlight of my work: 65 staff and students completed training and committed to meaningful sustainability actions. Just a year later, we have trained over 450 staff and students, putting us firmly on the path to achieving silver accreditation. I've been supporting other Schools across the University of Bristol to roll out CLT for their staff and students, meaning even more people across the institution are becoming certified and empowered to take climate action.

Professor Jon Issberner

Professor Jon Issberner is a senior neuroscientist and medical educator whose work has been central to advancing sustainability in medical education across Scotland. A former Dean of the Faculty of Science at St Andrews, he leads the School of Medicine's sustainability agenda, chairs the Sustainability in Medicine group he founded, and established the national Consortium for Sustainability in Medical Education. He also initiated the Scottish medical student sustainability network and contributes to leading UK and European bodies shaping sustainable healthcare education. Most recently, as first author working with colleagues from all five Scottish medical schools, he led a national White Paper presented at a Scottish Government Reception, outlining A "Once

for Scotland” approach to embed sustainable healthcare education in undergraduate medical training (DOI: 10.5281/zenodo.18455754).

If you're interested in discussing ways in which you could be involved in expanding the student sustainability network into your school, I would be most interested to hear from you. Please feel free to contact me at jpi@st-andrews.ac.uk.

Dr Sarah Aynsley

As a Reader in Education and Scholarship at Keele University, specialising in immunology. I'm passionate about designing and implementing curricula that challenge traditional approaches to learning. I actively champion inclusive and accessible education, working to broaden the curriculum so that students gain the skills and awareness needed to thrive in a global landscape.

As part of my role, I've introduced sustainable education into the Keele MBChB programme and contribute to university-wide sustainability projects. I've also developed several community-facing sustainability initiatives. These include students co-creating and delivering health education sessions to inclusion healthcare groups, collaborating with a local community interest company to run sessions on health, wellbeing, and sustainability, and promoting wellbeing initiatives across the university.

Dr Vivienne Crawford

I am a Reader in Geriatric Medicine and Medical Education at Queen's University Belfast, where I've been teaching medical students for over 30 years. My academic career has had two distinct phases: the first focused on research, and the second on medical education. I'm a Senior Fellow of the Higher Education Academy.

I lead the Student Selected Component Programme and the Global and Population Health Curriculum theme, and I'm also the deputy lead for the undergraduate Medical Portfolio. In addition to designing and delivering my own modules, I contribute across the undergraduate curriculum. From 2016 to 2023, I led Patient and Public Engagement, which includes oversight of the Simulated Patients Programme and lay representation in curriculum governance.

Dr James Bevan

I was previously Senior Teaching Fellow in Planetary Health at the University of Southampton. Before studying medicine, I worked as a corporate sustainability consultant. During my medical elective at Mount Sinai in New York, I was introduced to their "infusion" approach to integrating planetary health into medical education. On returning to the UK, I led a similar initiative at Southampton. I later co-founded the International Medical Education Collaboration on Climate and Sustainability (IMECCS), and I am active in the Global Consortium on Climate and Health Education. I am currently a Public Health Registrar and

Academic Clinical Fellow at the London School of Hygiene and Tropical Medicine, where my research focuses on the intersection of infectious disease and environmental change.

Dr Inna Walker

I am a Principal Teaching Fellow at the University of Southampton and a Consultant in Public Health Medicine at the National Institute for Health and Care Research. I co-lead the Population and Planetary Health theme in the undergraduate medical curriculum. This longitudinal strand includes public health, global health, planetary health and healthcare sustainability. I am a Fellow of the Higher Education Academy and a strong advocate for student co-design and quality improvement in medical education.

Professor Kalyanaraman Kumaran

I am a Professor of Public Health at the University of Southampton, with over 30 years of experience in academic and service public health across the UK and India. I am involved in undergraduate and postgraduate public health teaching and co-lead the Population and Planetary Health theme in the undergraduate medical curriculum. My interests include the application of multifaceted, population-level interventions to improve long-term health using a life course approach, as well as teaching and training initiatives.

Professor Kay Mohanna

As Professor of Values-Based Healthcare Education at the University of Worcester I serve as Head of Department for the Three Counties Medical School and Programme Director of the MBChB.

I led the integration of the United Nations Sustainable Development Goals across all learning weeks of our curriculum, including a summative assessment on sustainable healthcare. I also introduced a student Green Impact Project Assistant role to help implement the Planetary Health Report Card.

As Chair of the Medical Education Subcommittee for the charity Doctors Worldwide, I've worked in the Rohingya refugee camps, where I witnessed firsthand the devastating impact of climate change in the global south.

Dr Ned Powell

I am a Reader in Medical Education and Director of Student Selected Components (SSCs) at Cardiff University School of Medicine. My background is in molecular and cellular biology, with a focus on cancers caused by Human Papillomavirus (HPV). My work on the epidemiology of HPV infection and resulting cancers made a major contribution to the evidence base supporting introduction of HPV vaccination initially in girls and subsequently in boys too. More recently I've developed a strong interest in Sustainable Healthcare, and lead on this aspect of the Undergraduate Medical degree. I'm particularly keen to utilise Sustainable

Quality Improvement methodologies, undertaken during SSCs, to improve the sustainability of local practices.

Dr Anna Stickland

I'm a salaried GP based in Merseyside and Senior Clinical Lecturer at the School of Medicine, Liverpool. I hold the posts of Year 1 Director and Theme Lead for Patient Care Pathways within the MBChB programme. This community-oriented theme focuses on helping students understand the patient journey through health, illness, and healthcare; particularly in relation to facilitating patient-centred care across healthcare interfaces, including the safe and effective use of care pathways.

Dr Nicola Dowling

I have a background as a salaried GP in Liverpool with a special interest in Sexual and Women's Health; I also work as a Community Clinical Tutor and have a keen interest in Sustainability. I'm a member of the Greener Practice group—a grassroots organisation dedicated to helping General Practice transition towards environmentally sustainable healthcare.

Dr Jitiratn (Proud) Rojchuphan

I am a Foundation Year 1 doctor at Salisbury District Hospital with a strong interest in sustainability and public health. During my internship with Thailand's Digital Economy Promotion Agency, I explored how IoT technologies can support smart and sustainable city initiatives. As part of a public health elective at Imperial College London, I developed a learning

module on how AI can advance sustainable healthcare and examined the environmental impact of AI. I am passionate about integrating environmental awareness into healthcare and community development, and I continue to promote sustainable practices through quality improvement projects and interdisciplinary approaches.

Dr Jack Hall

I am a Foundation Year 1 Doctor currently working in General Medicine in Northern Ireland. My clinical interests include general and acute medicine. In Medical Education, I am particularly interested in clinical reasoning, lifestyle medicine, and free open access medical education content. I am very excited to contribute to this book and am especially interested in different approaches to integrating sustainable quality improvement in undergraduate medical curricula.

Dr Anna Ogier

I am a resident doctor and Teaching Fellow in the School of Public Health at Imperial College London. As part of the Undergraduate Public Health Education team, I teach across the MBBS Medicine curriculum, with a key role in developing and delivering the Lifestyle Medicine and Prevention (LMAP) and Population Health modules. I have actively embedded sustainability into the medical curriculum, including teaching on sustainable quality improvement and the intersection between climate change, health inequities, and the wider determinants of health. Alongside

teaching, I maintain my academic interests and have co-led research projects in Global Health, Public Health, and medical education.

Dr Junzheng (Ray) Wang

I am an academic clinician and Teaching Fellow in the School of Public Health at Imperial College London, where I teach on the undergraduate medicine, global health, and medical bioscience programmes. My teaching covers sustainability in healthcare, including sustainable quality improvement, planetary health, and one health. As a graduate of Imperial, I served as Chair of Imperial Students for Global Health (2020–2022) and completed my academic foundation training in Thames Valley. Beyond academia and clinical practice, I hold a strategic leadership role at Ormiston Trust, championing school-based environmental social action projects that now engage hundreds of young people.

Dr Christopher-James Harvey

I am a Senior Strategic Teaching Fellow in Psychology at Imperial College London. I hold multiple roles within the Faculty of Medicine linked to student wellbeing, including co-leading the design and delivery of the Lifestyle Medicine and Prevention (LMAP) modules, serving as Director of EDI for Undergraduate Science, and as Head of Academic Tutoring for the MBBS programme. I hold a PhD in Psychological Medicine and a master's in medical education. My teaching and research explore behaviour change, wellbeing, and the role of sleep in stress and mental health, and I encourage students to reflect on their own health behaviours.

Dr Richard Pinder

I am a clinical associate professor of Public Health at Imperial College London. I am an experienced public health physician with a special interest in health care, health system management, and the medical workforce. I lead the first three years of Imperial College School of Medicine's undergraduate medicine programme, as well as the Undergraduate Public Health Education (UGPH) unit within Imperial's School of Public Health. I have introduced planetary health and sustainability teaching at Imperial, as part of the Lifestyle Medicine and Population Health curricula.

Professor Amir Sam

I am Head of the School of Medicine at Imperial and a consultant physician and endocrinologist at Imperial College Healthcare NHS Trust. I have authored several medical textbooks and numerous original research articles. I have chaired national groups, including the UK Medical Licensing Assessment (MLA) Clinical and Professional Skills Assessment subgroup at the General Medical Council, and the MLA Applied Knowledge Test Exam Construction Group at the Medical Schools Council (MSC). I have collaborated with Imperial faculty and medical student representatives for the Planetary Health Report Card initiative to enhance planetary health coverage across the curriculum.

Dr Noreen Ryan

I am Domain Lead for Quality Healthcare at Imperial College School of Medicine and a practising GP. I am involved in the design, development, and delivery of teaching and assessments on sustainability in quality improvement across the undergraduate curriculum.

Dr Emily Shaw

I am a GPST3 and Academic Clinical Fellow based at Newcastle University. I work with the medical education team teaching final years, including SusQI and planetary health concepts. I am also undertaking a qualitative research project looking at medical educators' personal experiences of developing education for sustainable healthcare as part of my master's in medical education.

Professor Arti Maini

I am a GP, Director for Undergraduate Primary Care Education at Imperial College London and a member of the Medical Schools Council Education for Sustainable Healthcare Alliance. I pioneered health coaching training for all Imperial College medical students to support sustainable healthcare through personalised care, health promotion, and shared decision-making. I'm also the co-author of the highly acclaimed book Coaching for Health – Why it works and how to do it.

Dr Neha Ahuja

My role involves being a GP and Principal Clinical Teaching Fellow in Primary Care Design, Evaluation and Assessment within the Undergraduate Primary Care Education Unit at Imperial College London. I'm passionate about fostering a sustainability-oriented culture in healthcare and medical education to ensure we deliver excellent care now and for future generations. I lead Imperial's strategy for integrating sustainable healthcare education into the undergraduate primary care curriculum. I developed and currently lead an innovative student selected component (SSC) in sustainable healthcare, and I have worked closely with students to embed sustainable healthcare throughout the curriculum.

Ms Steph Powell

I hold the position of the Community Collaboration Lead in the Undergraduate Primary Care Education Unit at Imperial College London. I promote an asset-based approach to community engagement, helping our team build mutually beneficial partnerships that draw on the strengths within communities. I am passionate about ensuring diverse patient perspectives are accurately represented in medical education, including in materials focused on sustainable healthcare.

Dr Nikul Kotecha

Alongside my work as a GP based in Oxfordshire, I am a tutor at both the University of Oxford and Imperial College London and an examiner for

Imperial and St George's University of London. I am deeply committed to sustainable healthcare and medical education. I have led efforts to integrate sustainable healthcare into Imperial's undergraduate primary care curriculum, including delivering a dedicated sustainable healthcare module and supporting student placements focused on sustainability. I also deliver workshops for medical educators on incorporating sustainable healthcare into their teaching.

Dr Nina Dutta

I am a GP in London and Deputy Director for Undergraduate Primary Care Education at Imperial College London. I have a particular interest in diversity and inclusion. I have led multiple curriculum and faculty development initiatives that embed sustainability principles within undergraduate medicine. I'm also the lead editor of the second edition of 'GP at a Glance', which includes a dedicated focus on sustainable healthcare in general practice.

Dr Felicity Connolly

I am a Senior Clinical Lecturer in General Practice, the Co-director of Primary Care Academic Teaching and the Clinical Lead for Education for Sustainable Healthcare at the University of Lancaster Medical School. I co-lead the primary care core theme in the MBChB curriculum at a university strategic level in the Medical School. My role involves leading a large team of academic GPs to deliver the Primary Care, GP and Community Curriculum both on campus and in GP and community placements across

all five undergraduate years. I am a member of the UK medical schools Heads of Undergraduate GP Education group, working strategically to influence UK medical training to increase the numbers of graduates choosing a career in general practice.

My role as Clinical Lead for Education for Sustainable Healthcare (ESH) has developed alongside this. Since 2018 I have led integration of ESH into the MBChB curriculum to prepare our future health professionals for the impacts of climate and environmental change on health. I am a member of the national core group who run the Medical Schools Council ESH Alliance. I am involved in national and global networks to advance the emerging field of ESH. I was a contributing author to the UK Medical Schools Council Curriculum for Sustainable Healthcare which has been presented internationally in multiple forums and across multiple health education programs. I am a member of Lancaster University Faculty of Health and Medicine Sustainability Group, as well as Lancaster University Sustainability Knowledge Exchange group. I represent Lancaster University at the European Network of Climate and Health Education (ENCHE). As an academic GP I am strongly committed to medical education and influencing the way we train our future doctors with a positive experience of primary care and sustainable healthcare. My career in clinical general practice has been diverse and has enabled me to work - and experience life – in different areas of the UK and abroad, from inner city to remote rural practices. Having trained and worked extensively in areas of deprivation, I have an interest in the social determinants of health and addressing health

inequalities - which are especially magnified by the effects of climate and environmental change. I also work clinically as a GP in South Cumbria, UK. I believe deeply that strengthening primary care across global health structures is the key to accelerating universal health coverage, as envisioned by the UN and WHO in the Declaration of Astana 2018 and UN Sustainable Development Goal 3.

Dr Iain Young

I am the Vice Dean for Student Experience at the University of Liverpool, where I work to integrate sustainability into both education and leadership. My research focuses on collaborating with industry to develop sustainable approaches in food security. I've long been committed to teaching sustainability principles such a cross-disciplinary module, *Challenges in Sustainability* (finalist in the EAUC Green Gown Awards) and an online, faculty-wide module on Sustainable Healthcare. Beyond the university I've led outreach activities such as an Office for Students Uni-connect project that, over several years, engaged hundreds of schoolchildren from Merseyside in sustainability boot camps—an initiative aimed at inspiring the next generation to think critically about sustainability.

Dr Anna Jones

Anna qualified in medicine subsequently training in general practice and public health before entering medical education. Working in a small rural hospital in South Africa sparked her interest in the intersection between

health and the environment. Subsequently witnessing the forced migration of a community due to water insecurity whilst working with WHO in Ethiopia and then responding to the impacts of extreme events such as flooding and fires in the UK whilst working with the Chemical Hazards and Poisons Division of the Health Protection Agency all reinforced how crucial it is for healthcare professionals to better understand and be able to respond to these environmental threats. She joined the Division of Medical Education at Brighton and Sussex Medical school in 2011 and since 2019 has led on the Sustainable healthcare education across the core undergraduate curriculum. Collaboration with like-minded colleagues both locally and nationally has been incredibly rewarding for her.

Dr Louise Davis

I am an Associate Clinical Professor at Warwick Medical School where I have 2 roles: Chair of Course Progress Group and Academic Lead for Case Based Learning. Both positions provide many opportunities to work in partnership with students and staff.

Why did I get involved in ESH? To be honest, I can't remember a time when I was not interested in nature and our planet. I love to spend time outdoors observing and photographing wildlife to learn more about the world. As a doctor and medical educator, I believe I have a responsibility to communicate how human health is inextricably linked to the health of our planet. This love of nature tends to spill over into my academic work, and

our students occasionally encounter wildlife photos in lectures or as CBL slides. I am reliably informed that student favourites are puffins and seals.



Puffin photo by Louise Davis

Foreword: 'How we came to be' - A commentary SanYuMay Tun, founding chair of the MSC – ESHA

This commentary is an adaptation of my talk at the opening of our inaugural two-day MSC – ESHA Away Day in March 2025. We were delighted that so many colleagues could participate in this meeting, representing the majority of all the UK medical schools. This critical mass would enable us to maximise networking, sharing and collaboration, and so give impetus for the implementation of Education for Sustainable Healthcare (ESH). The theme of the away day was 'For sustainability, how should future medical practice be different, and how might medical education change to promote this?'

Timeline of the development of the ESHA

I spoke of the timeline of the establishment of our Alliance which, while in medical education terms might seem to have progressed fairly rapidly, needs to continue the work at pace, considering the urgency of our earth systems crisis:

6 October 2021 - The Medical Schools Council hosted a special conference for all UK medical schools, on Education for Sustainable Healthcare and Planetary Health: 'Education for Sustainable Healthcare - Co-creating our Planetary Health'. From those who came forward at this meeting I formed a working group of medical educators from several different UK universities to develop a planetary health and sustainable healthcare curriculum that would be nationally applicable, beyond the more local

document that I had been working on with my co-author. Developing this curriculum was done through a series of consultations, discussions and review processes and, when I had finished writing it up, the Education Leads Advisory Group (ELAG) of the MSC reviewed, and fully endorsed, the curriculum.

6 May 2022 - Publication of the ESH curriculum on the MSC website, as 'Education for Sustainable Healthcare - A curriculum for the UK' (Tun and Martin, 2022). The ESH curriculum document is freely available to download and use with attribution (CC BY-NC-SA 4.0) and designed to be adaptable for differing contexts by not setting levels of competency (i.e. no verbs such as understand, explain, analyse, evaluate). We now know that it has been used in several different parts of the world, and I will expand on this later.

22 June 2022 - The GMC included the ESH curriculum in its 'Further reading' list of documents that informs delivery of its *Outcomes for graduates*, which sets out what students must know and be able to do to qualify as a doctor in the UK. The GMC has stated that the ESH curriculum will inform future iterations of *Outcomes for graduates* and other related guidance.

12 May 2023 - The ESH JISC list (from Joint Information Systems Committee, which provides Eduroam for example) was set up by the MSC, forming the basic network for communication within our Alliance.

30 Jan 2024 - Representatives have been invited to be nominated from each medical school and we continue to include new medical schools as they become established in the UK.

19 March 2024 - We held our inaugural meeting with the growing list of members signed up to the JISC group, and established a pattern of quarterly online meetings, which have been consistently well attended by representatives of the majority of medical schools at each meeting.

6 September 2024 - Formalisation of the ESH Alliance at MSC

24-25 March 2025 - Away day meeting of MSC – ESHA representatives in person

October 2025 - GMC Medical Licensing Assessment content map adopts specific content of the ESH curriculum that is key to the practice of sustainable healthcare; effective September 2026 onwards [this note is a later addition to the timeline, because of the huge significance for medical education].

Sustainable healthcare ‘focuses on the **improvement of health** and **better delivery of healthcare** rather than late intervention in disease, with resulting **benefits** to **patients** and to the **ecosystems** on which human health depends, thus serving to provide **high-quality healthcare** now without compromising the ability to meet the health needs of the future’ (Tun, 2019)

This definition, which I derived through my research, has been adopted by AMEE the international association for health professions education, the MSC, and the GMC.

Of the four principles of sustainable healthcare set out by the Centre for Sustainable Healthcare, the first and most fundamental priority, prevention, is naturally aligned with the concept of planetary health, which relates human health to the health of Nature.

In January 2024, a mandatory new GMC duty of Sustainable Healthcare came into effect (GMC, 2024a). This requires medical professionals for the first time to take account of our responsibilities to the wider population, rather than just to our patient. There is a secondary duty regarding choosing sustainable solutions and considering the environmental impact of healthcare.

In my talk I was at pains to emphasise that sustainable healthcare is not about depriving people of healthcare or imposing unwanted changes, nor mainly about recycling, plastics, or inhalers. Sustainable Healthcare is good medical practice - because healthcare is most sustainable when people are well - and involves finding out and respecting what matters to patients, enabling good health, as well as using our skills in clinical reasoning and practising non-defensively.

Looking forward

It is encouraging that the GMC has been able to put out a position statement that prioritises planetary health and sustainable healthcare in medical education standards and outcomes (GMC, 2024b). Internationally there is interest in incorporating ESH in health professions education, such as at AMEE, and institutions in several other countries have either adapted the ESH curriculum or are developing their own. There is mutual recognition between the ESH curriculum and the international student-led Planetary Health Report Card (PHRC, no date).

The ESH curriculum has also informed the Massive Open Online Course (MOOC) produced by UCL/ FutureLearn for all health professionals globally, the Foundation Year doctors programme module of NHS Scotland, and the Allied Health Professions (Council of Deans of Health) ESH guidance document; and the Nursing and Midwifery Council is looking at it while updating their toolkit. The General Dental Council has called for similar a ESH curriculum for dentistry. The ESH curriculum has given rise to research projects at various institutions.

We can be proud that the Education for Sustainable Healthcare Alliance is alongside only three other formalised groups of the MSC, namely the Assessment, the Selection and the EDI Alliance. Our first away day conference has now added impetus to our enthusiasm to embed ESH in medical education.

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Chapter 1. Creating an environmental lens to undergraduate medical education curricula. Eleanor Nash and Zakia Arfeen. University College London Medical School

An ambitious aim, to “create an environmental lens to undergraduate medical education” with the intention to finely weave Planetary Health and Sustainable Healthcare (PH&SH) into all aspects of the medical curricula and establish it as an important subject within healthcare and medical education. The outcome to this “environmental lens” is for students to consider PH&SH consistently in their undergraduate medical training and future clinical practice.

Small steps to include PH&SH in undergraduate training were already happening at the medical school – *ad hoc* lectures and special study modules for the enthusiastic few. Students had limited exposure and with a lack of integration into the overall curriculum, could find it hard to place the relevance of isolated individual lectures into their overall learning and may not prioritise the significance. PH&SH affects every aspect of healthcare: to reflect this and ensure it is integrated well into the curriculum, the approach of “creating an environmental lens” to the medical undergraduate curriculum was taken.

Such a monumental change to undergraduate medical training needs a multi-pronged approach, which includes senior faculty engagement, faculty development, curriculum changes and student engagement.

Senior Faculty support

PH&SH is an emerging field within medicine and a recent meta-ethnography on experiences of introducing PH&SH into undergraduate medical education highlighted that both a top-down (senior leadership driven) and a bottom-up (student driven) approach was required (Nash et al., 2024). Developing an “environmental lens to medical education” would not be feasible without institutional buy-in and the support from Senior Leadership Teams that this was the direction the medical school is to take with PH&SH.

Faculty Development

There is limited awareness and understanding among clinicians and medical educators on PH&SH. They are therefore unlikely to educate others on the topic despite sometimes having the most access to students (Tun, 2019).

Studies indicate that senior or experienced educators and clinicians feel insufficiently confident teaching PH&SH, because they lack the necessary expertise or specialist knowledge (Walpole, 2017). In contrast, more junior clinicians and educators appear to demonstrate greater knowledge on PH&SH than their senior colleagues (Bates, 2023).

Faculty development on PH&SH therefore needs to be a core institutional activity with a focus on training the educators to overcome these barriers being paramount. At UCL this was achieved through various means:

Faculty Development Day – focusing on an introduction to PH&SH and its place within the undergraduate curriculum.

A PH&SH educators toolkit – online downloadable resources for medical educators to use to assist with incorporating PH&SH into teaching sessions. This includes one or two simple educational slides that can easily be incorporated into sessions; ideas on how to teach and promote PH&SH related discussions and signposting to further resources.

Curriculum changes

Reviewing existing literature on introducing PH&SH into undergraduate medical curricula demonstrated that a longitudinal curriculum throughout every year of medical school is the most successful method to integrate it into medical curricula (Brand et al., 2021; Liu et al., 2022). At UCL, the curriculum is structured to include longitudinal themes which run throughout all years. Planetary Health has its own module within these longitudinal themes. In addition, the ongoing aim is to incorporate PH&SH into every module, in every year. The educators tool kit will support faculty to do this.

The new Planetary Health module and Intended Learning Outcomes (ILOs) for this, in turn, mandates PH&SH to be included in the formative and summative assessment process. Students are unlikely to engage with content unless it is assessed (Preston et al., 2019) and through the inclusion of PH&SH in assessments, students will hopefully be more attuned to the importance and relevance of the topic. These measures

help comprehensively cover and embed PH&SH into the undergraduate curriculum.

An example of educational sessions incorporating PH&SH is the “Stress, Me and Climate Change” tutorial. This session combines clinical and holistic aspects of medicine, with a focus on individual’s looking after their own wellbeing as healthcare professionals, and how stress and burnout can lead to less sustainable and less climate-friendly decision-making.

Student engagement

A student working group was established across all the year groups within the medical school. The feedback and buy-in from the students helped shape the new PH module and the PH&SH content being interlinked with existing modules within the medical school.

Unforeseen barriers

No curriculum changes can occur without some challenges or resistance from individuals and unanticipated hurdles that have been encountered include:

Criticisms from faculty

There has been criticism and negative comments on the relevance of the topic and reluctance to engage in teaching PH&SH by members of the faculty. Thankfully, with senior leadership support paving the way for the curriculum changes and faculty development, we have been able to

progress with PH&SH changes within the curriculum and hopefully the criticisms will lessen with time.

Clinical skills

The aim to make the clinical skills department more sustainable by reusing equipment and decreasing waste was less successful. An example is when teaching students how to draw-up medication or create sterile fields, they were asked not to dispose of syringes and reassemble sterile kits for future use. This unfortunately taught the students incorrect methods for disposing of medical waste, causing confusion when they started clinical placements. The educators realised, until students are confident at performing new clinical skills, they must be taught the full procedures correctly, and discussing re-using equipment for training purposes (to decrease waste) appears to only cause confusion. Ultimately, as clinical skills departments replicate real life scenarios, clinical skills departments will not be able to become more sustainable until hospitals also become more sustainable (Blythe et al., 2023).

Creating an environmental lens to healthcare education is possible and desirable. A dedicated and enthusiastic team is required with support from senior leadership and students, strategic faculty development initiatives and carefully considered curriculum changes.

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Chapter 2. Let's Get Literate! Experiences with integrating Carbon Literacy Training into an undergraduate medical curriculum. Trevor Thompson, Lucy Westover, Lakshmi Aggarwal. Bristol Medical School, University of Bristol

Introduction

In this paper we report our recent (2025) experience providing Carbon Literacy Training (CLT) to all students in Year 1 of the undergraduate medical programme at Bristol Medical School (BMS). CLT is a training package provided by the Carbon Literacy Project. Students who complete the training can apply for Carbon Literacy Certification. To date, of the 285 students in this cohort 230 have already attained accreditation. Here we explain the organisational context, what we mean by Carbon Literacy, the challenges we faced, and how the training was organised and evaluated. We conclude by considering the future of CLT for UK medical schools.

Organisational Context

The University of Bristol was, in April 2019, the first UK University to declare a Climate Emergency (University of Bristol, 2019). BMS funds two student Sustainability Champions who are employed by the Students' Union. We have academic co-leads for sustainability, employed half-a-day a week by the medical school as well as a professional services colleague employed full-time as a sustainability officer. In April 2025, BMS was ranked 2nd nationally and internationally in the Planetary Health Report Card (PHRC n.d.). The Bristol organisational culture is therefore well

orientated toward sustainability. Without this groundwork there would have been little chance of our Carbon Literacy proposal being adopted.

Pedagogical Context

Supported by initiatives such as the Planetary Health Report Card, the level of inclusion of sustainability learning objectives in UK medical curriculum is increasing. However, it is still a marginal topic. For instance, a survey of clinical-year students at one UK medical school, published in 2022, showed that less than 2% understood the concept of sustainable healthcare (Gupta, Shantharam and MacDonald, 2022). Students in medical schools in over 100 countries were asked about the integration of climate change in their curricula and only 15% felt that it featured in their course (El Omrani et al., 2020). Nationally, we have the Education for Sustainable Healthcare Alliance's curriculum document (Tun and Martin, 2022) to steer innovation but relatively few nationally agreed learning resources specifically for medical students. CLT might be one way to fill that gap.

What is Carbon Literacy Training?

CLT was developed by the Carbon Literacy Project (The Carbon Literacy Trust, 2025); the aim of their work is to educate and empower individuals to reduce their carbon footprints and to encourage others around them to do the same. The training takes attendees through the basic science behind climate change, the health impacts, ways of reducing emissions and how to communicate this to encourage behaviour change in others. The training takes place over a full day, some of which can be self-directed.

We have been running CLT for a couple of years - 142 members of staff were certified as of April 2025. As late as October 2024, we wondered if it might be possible to run the training with an *entire* undergraduate year group.

What set-up challenges did you face?

By good fortune our year 1 leads were able to identify a space in the curriculum for CLT – usually the biggest hurdle. At this late stage we couldn't find a suitable venue on campus, thus we applied to our Curriculum Innovation Group for the £1500 needed to book a repurposed branch of *Marks and Spencer* called *Sparks*. *Sparks* is home to a range of businesses favouring reuse, repair and recycling of consumer goods. The ethos and funky vibe of *Sparks* was nicely aligned to CLT. We also needed to hire a laser projector. Luckily, we were able to recruit tutors *pro bono* from the ranks of colleagues who had themselves done the training.

How was the training structured?

Lecture. A “*Let's Get Literate!*” Lecture covered climate science headlines and introduced students to three senior professionals a) Professor Daniela Schmidt, IPCC Senior Author and Climate Scientist b) Professor David Pencheon, founder of the (then) NHS Sustainable Development Unit and c) Dr Mat Molyneux, consultant anaesthetist in Bristol. Matt and team had removed the gas *desflurane* from the supply chain.

Online. Students next completed an online training session created by the CL Project and Greener NHS, hosted on the NHS's eLearning for Healthcare platform, to which students had prior access. This covered Carbon Literacy over five modules [Box 1], with each ending in a quiz. Formally the online session takes three hours. Unfortunately, our plan for getting completion logged by eLearning for Healthcare didn't work out so we had to rely on student self-reporting.

Module Title	Description
Introduction	Defining the principles of climate science, discussing current emissions, consequences and projections from the 2021 IPCC report.
Impacts on our environment & health	Exploring the global, societal and physical health impacts of climate change, and how this affects healthcare staff's work.
Vulnerability to climate change & pandemics	Which communities are most vulnerable, and which are most responsible – the concept of “climate equity”.
Climate policies & legislation	Introducing global policies e.g. the Paris Agreement, UK policies e.g. net zero by 2050, and NHS policies e.g. net zero scope 1 and 2 emissions by 2040.
Communicating & inspiring action	Explaining how to engage others in conversation about climate change and discussing case studies of climate action in healthcare.

Box 1. The Five online modules with the Carbon Literacy Training Package

Face-to-face. Students then attended one in-person training session in groups of 60 during the week of 24th-28th February 2025 at Sparks. Sessions ran 1pm – 4pm. These sessions were based on a slide deck provided by CL Project. There were four modules i. revision of online learning ii. carbon foot printing (personal and NHS) iii. health co-benefits of pro-sustainability actions and iv. action-planning.

How did/does Carbon Literacy Certification fit in?

The training offered students the chance to obtain a nationally recognised Carbon Literacy certification at no personal cost. Students were required to

complete an application form comprising two pledges: one personal and one impacting the carbon footprint of a group (e.g. sports club, flat co-residents or one of their tutorial groups). Pledges are not enforced. A sample of individual and group pledges (Box 2).

Individual Pledge examples	Group Pledge examples
Walking more/taking public transport instead of driving/taking an uber to places as this is not only good for the environment but better for my own health as well.	Commit to making more vegetarian meals as a family, instead of consistently eating meat. Aiming to restrict meat to weekends would be enough to balance the protein requirements and personal cravings, while keeping the other meals both healthy and less damaging to the environment.
I will commit to only buying second hand clothes items.	My group pledge is to organise with my flat (or house next year) to cook our evening meal at the same time. This will help reduce the number of times the oven/hob will be turned on; we can also share the oven to further reduce this impact. In the future this can be taken further with potential house meals and meat free days each week to reduce our environmental impact.
I am going to switch my bank from NatWest, a company that	I am going to encourage my football team to get the bus to football instead of getting Ubers,

invests in fossil fuel and military organisations, to Nationwide.	if someone is late and need to get an uber I will encourage them to use the share feature on uber to half the carbon footprint of a journey
I will be looking at my weekly food shop and attempting to reduce the number of groceries I buy which are from overseas by buying more local produce.	Reducing food waste at my workplace. At my place of work a lot of food is wasted due to overproduction and wasting cancelled orders; I will work with my employer and the managers at work to review the quantity of food we prep and the demand at the time to avoid over cooking food and offering cancelled orders out to customers for free, we can also review or implement composting wasted food if such opportunity would be feasible.
I will try to travel less by plane and when travelling possibly look at alternative methods such as by the train.	In a group setting, I will organise lifts to placement at different hospitals and GPs instead of driving there by myself. This is beneficial as this reduces the number of cars on the roads, which leads to less air pollution due to reduction of greenhouse gases like CO ₂ .

Before throwing away any clothes, I will first try to fix it, redesign it using my sewing machine or see if I can use it in another way than initially intended.	Work with other students to organise a walk to work scheme
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Box 2. Examples of the individual and group pledges used to obtain Carbon Literacy certification

Was there a benefit to Bristol Medical School of our students getting CL certified?

Yes, Bristol Medical School is already a Bronze Carbon Literate Organisation. Getting our Y1 students CL certified is a major step towards the medical school attaining Silver Carbon Literate Organisation status. This status would help us gain traction for our work within Bristol University and lend us some authority as we build partnerships locally and nationally – for instance with other medical schools. We are the first medical school to apply CLT to an entire cohort. Certification cost £10 per student in February 2025. With 400+ pledges made, CLT may also lead directly to emissions reduction at BMS.

Were students involved the planning of this training?

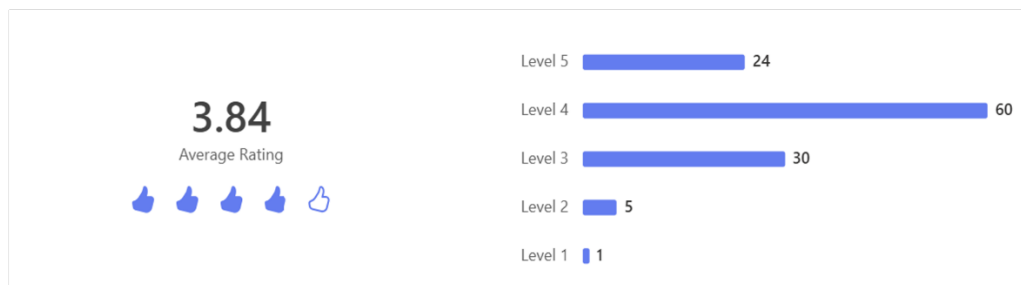
Yes. We had a meeting with two Y1 students with a view to hearing their perspectives before it went live. They emphasised the need to make it relevant as many students would likely feel unengaged. Lakshmi, SU Sustainability Champion and co-author of this paper, trialled and created a

commentary on the online learning materials (see Chapter 4 of this book). Though we couldn't change the materials based on her feedback, we used it in our communications with the students.

How did students rate the CLT experience?

We tied the eLearning declaration to a feedback form which helped to nudge up response rates. Of 285 students in Y1, 245 attended, 126 gave feedback and 221 returned their CL certification forms. Of these 201 are now certified. Note that the CLT was not a progression requirement and so was strictly speaking *voluntary*, though we didn't emphasise this point!

In terms of usefulness and enjoyment, please rate the “Let’s Get Literate!” lecture



In terms of usefulness and enjoyment, please rate the eLearning



In terms of usefulness and enjoyment, please rate the face-to-face training in Sparks



Figure 1. Students’ rating of three elements of the Face to Face CLT training

These findings were congruous with our expectations that the eLearning would be considered less enjoyable and less useful than the lecture or the tutorial sessions.

What are your reflections on the eLearning elements?

We chose a CLT package focusing on *healthcare*, over the more generic education package (the CL Project provide eight different packages for different audiences). The eLearning, which drew diverse feedback (Box 3),

might benefit from being redesigned specifically with a medical student audience in mind. We judged some of the information as too basic and lacking in the critical approach we encourage. The assessment structure was also basic and easily gamed. A tyranny of all such material is the speed at which it goes out of date. We also felt the early modules were too pessimistic in places: “the doom-and-gloom nature of the content only fuelled my already present climate anxiety, and the scale tipped from spurring me into action to paralysing me with fear far too often” (student reviewer).

Positive	Negative/improvements that could be made
Engaging	Too many graphs that showed similar things
Useful and concise	Difficult to access on all platforms e.g. it wouldn't load on Safari
Covered a good breadth of knowledge	Could be presented in an easier-to-understand way, e.g. through more graphs rather than large bits of text.
Very good visual aids that made it easy to understand the information	Didn't cover anything they didn't already know
Enjoyed the NHS specific information, which they had not come across before and would not cover elsewhere	Would be good if it contained more videos and testimonials
Very useful, helped them to realise how little they knew about the climate crisis	Layout could be simpler to make it easier to find the materials and quizzes.

Quiz section at the end was useful to get them thinking and check their knowledge	Not very well suited for Medical Students
Good reminder of what we should all be doing to reduce our own carbon footprints	Would like to have learnt more about some of the youth activism that is happening
Very relevant	Felt basic and quite straightforward
Quite interesting	Repetitive
Some information was very surprising	Give more examples of case studies
Good to be informed on how to implement this into their lives in terms of having conversations with others	More up-to-date information needed as well as more in-depth explanations about the impact on lower income countries
	Could be more interactive

Box 3. Positive and negative assessments of the CLT online modules

How about the slide deck for the face-to-face session?

The CL Project provide a large and fully scripted slide deck for the face-to-face session. To give time for the small group work we had envisaged, we had to edit this down quite substantially whilst preserving the overall structure. They encourage you to add local examples of NHS best practice. The deck is designed with the working NHS professional in mind and, again, we wondered if it would be worth creating a new deck specifically for medical students. We did a few things to help engage our students in the learning (Box 4).

Giving examples of family and friends being affected by climate change
Having an engaged tutor attached to each group
Having poster competitions in parallel with most activities
Analogy of a patient with cancer – nihilism not allowed!
Giving local examples of sustainability in action in the NHS
Allowing time in class for the completion of certification applications
Hiring an interesting space, providing refreshments and interval games
Limiting student numbers to <70 during the f2f sessions (we ran these x5)

Box 4. Actions we took to improve engagement in the f2f session.

What was your overall impression of CLT at Bristol?

The student feedback, relative to other aspects of the course, was pretty good. Challenges included students not perceiving the material as relevant to a medical degree, feeling it wasn't an effective use of their time, perceiving the level as too basic and feeling that the sort of changes we were encouraging were too little too late. On the other hand, certification returns were higher than we predicted and 33/126 answered 'yes' to the question, "I am interested in finding out how to take this further, e.g. to become a CL certified trainer or to help BMS rework the current material into a version pitched directly at medical students". We believe the CLT sends clear signals about our educational values as an institution.

Would we recommend CLT to any UK medical school?

The attraction of CLT is that it is a discrete package of learning covering a wide range of topics in a condensed period of time. It is also action-focused - the individual and group pledges get students thinking of

practical steps. The certification gives the student a valid qualification for their CV and could help your institution get recognition for its efforts in supporting sustainability. The main resources you will need are a) curriculum time b) space on campus c) certification fees (now £15 per participant) d) a cadre of tutors and e) the disk space to organise it all. All doable – we’ve just decided to run CLT again in the 2025-2026 academic year! There are other options such as the serious game *Climate Fresk* that we are exploring. Climate Fresk was created by Cedric Ringenbach in 2015 to raise awareness of climate change.

Should we create a medical student-specific version?

As said, the *healthcare* package is more aimed at NHS employees. We feel there is a very good case for creating a new package aimed squarely at medical students. We have already discussed this with the CL Project, and they have expressed enthusiasm. They would work in partnership with academic developers to ensure the new materials can be accredited. The new package could link directly the revised ESHA curriculum document and contain the latest thinking in assessment and group learning methodologies. Most importantly, it could be pitched to encourage a critical and nuanced approach to the science and the politics.

How might we take forward a medical student version?

We encourage colleagues to contact us directly. We would recommend a panel of around five medical schools to ensure a lithe development process. We have some funding that could pay a project worker to do the

heavy lifting, and it would of course be important to have CL Project and student involvement.

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Chapter 3. The Importance of Stopping and Reflecting. Prof. Jon Issberner. University of St Andrews School of Medicine

At the University of St Andrews, we're a relatively small medical school with limited staff and, like many workplaces across the UK, initial interest in sustainability was driven by just a handful of passionate individuals.

Until recently, sustainability in medicine was rarely, if ever, on the radar.

Even now, two years into this journey, I'm still asked by colleagues - particularly from the research side - "Why should we bother with sustainability?" My go-to answer used to be: "Well, it's about prolonging life on the planet." That's usually met with polite, blank expressions. It's only when I add, "It's also increasingly required by grant-awarding bodies, it's a strategic priority for the University, and we're aiming for recognition for our sustainable labs," that I get a flicker of understanding. Apparently, the bigger existential reasons can be harder to grasp than immediate institutional incentives.

There's a caution here: striking the right balance between raising awareness of climate urgency and motivating change is delicate. Too much doom, and people disengage; too little, and complacency creeps in. We believe the answer lies in science-informed policies—both institutional and governmental—that support the United Nations's 17 Sustainable Development Goals (United Nations, n.d.). This allows institutions to help shoulder the change management required for climate resolution.

Building Something Sustainable (and Realistic)

Creating a sustainable medical school is a bit like gardening. You start with a grand vision—a flourishing, awe-inspiring space full of possibilities. Then reality kicks in. The time, resources, and budget just don't stretch far enough. So, you redesign. You scale back your ambitions. You rework your ideas into something more practical and achievable, and then you dig in—literally and figuratively.

That first year, you roll up your sleeves. You do the groundwork. You make real progress. By the end of the year, it's not a show garden - but it works. It's functional, it's solid, and it's a platform to build on.

Of course, in year two, much of what you built needs tending, reshaping, and expanding. The garden that was “good enough” now feels like it should be better. And the budget? Somehow, it's smaller. But for now, let's just focus on that first year. Remember; stop, review, and reflect positively on what you have done.

Celebrating the Small Wins

One lesson I've learned is the importance of pausing to reflect. When you're pushing hard -especially when trying to implement wide-reaching change - it's easy to race ahead to the next challenge and forget everything you've achieved.

When you hit a roadblock or plans shift, it's tempting to feel like you've made no progress. But that's the moment to stop and take stock. List your

wins. Share them. Give your team perspective and remind yourselves how far you've come.

Two Years In: What We've Achieved

When our School began exploring sustainability in medicine, we had no dedicated budget. I've been fortunate to have time allocated in my workload to lead these efforts, but much of the progress has come from the goodwill and commitment of staff and students. Here's what we've achieved so far:

Forming a Recognised Group

We formalised a grassroots group of sustainability enthusiasts into a recognised committee - Sustainability in Medicine (SIM) - to connect the school with university-wide initiatives and help staff access resources.

Representation at University Level

We secured a presence on two central university committees, giving us a voice in shaping sustainability strategy more broadly.

Empowering Student Involvement

Students formed their own sustainability group, began holding regular meetings, and connected with peers across Scotland. The student lead now sits on the SIM committee.

Curriculum Review

Our student group reviewed all years of our pre-clinical BSc course, suggesting ways to embed sustainability. This, alongside the ESH curriculum, informed a staff-led review, which is currently underway.

Forming a National Consortium

We helped establish a consortium with representatives from all Scottish medical schools to promote sustainability in undergraduate medical education and share resources. Student representatives are invited to attend and contribute and have been awarded funding a two-year Scottish Clinical Leadership Fellow to coordinate activity across all five schools. The Consortium has recently published a White paper entitled A “Once for Scotland” approach to embed sustainable healthcare education in undergraduate medical training, which calls for the formation of a central board to lead this initiative (Issberner et al 2026). This work will be supported by the Leadership Fellow.

Green Gown Awards Finalist

In 2024, the consortium was recognised when we were named finalists in the Green Gown Awards (EAUC, 2025), celebrating sustainability in higher education.

Sustainable Research Practices

We’ve launched two initiatives to reduce our research footprint:

A centralised store for lab consumables to reduce packaging waste and transport emissions.

Adoption of the Laboratory Efficiency Assessment Framework (LEAF) to drive improvements in lab sustainability.

Our Next Goals

Strengthen ties with our local NHS Board.

Grow the national student network by supporting staff in other institutions.

Build connections with additional NHS Boards across Scotland.

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Chapter 4. Championing the Champions – How formal, paid positions helped to transform the sustainability curriculum.

Lakshmi Aggarwal and Matthias Mitra. University of Bristol

Introduction

This paper details our experience of the Sustainability Champion (SC) programme for Bristol Medical School (BMS) from 2022 to 2025. We provide context for the role, overviews of each year of the programme, our successes and challenges, and the overall benefits of implementing this programme.

Sustainability Champions Context

The University of Bristol SC programme was launched in the 2021/22 academic year with 11 champions from 10 academic departments. It had grown to 20 students from 16 departments in 2024/25 academic year. The programme was initially conceived by the Students' Union (SU) elected full-time undergraduate officer, who campaigned for, and secured, the initial funding from central university sources including the Development and Alumni Relations Office (DARO) and the Sustainability Office.

In the 2022-23 academic year, the funding model shifted to Faculty and School-level sponsorship. This ensured buy-in from hosting departments who welcomed students to challenge, change and lead on sustainability strategies and projects. The SU's costs to administer the programme

continued to be supported by institutional funding pots (Sustainability Team, Education for Sustainable Development [ESD] Team, DARO, etc.).

Currently, each hosting department funds the SC role at the equivalent of one day per week (0.2 whole time equivalent), but the SU administers the scheme and employs the SCs as student-staff. This formal status allows access to the university's ESD staff network, Climate Action Plan Coordinators network, the SU's full-time officers and the academic representation team.

Purpose of the SC role

The overarching goal was to work in partnership with school and faculty staff to embed sustainability into the academic experience, including the curriculum, elective projects, research and employability. There were no formal KPIs set, which allowed individual students and departments to identify viable and valuable priorities. To ensure standards were being met, we had meetings with our SU line manager and departmental designated contact at least once a month, and each academic year culminated in a showcase where every SC presented their work to key stakeholders. The SC objectives and outcomes summarised in Table 1.

Main objectives	How we achieved these
Build positive relationships with staff	Prioritised in-person meetings where possible
Shape School plans	Attended and presented at senior-level meetings with programme directors and hospital deans
Understand student demand for sustainability	Gathered student feedback e.g. surveys and used as evidence for initiatives
Contribute to CAP	Attended the climate action plan meetings and collaborated on projects e.g. BMS sustainability website
Co-develop new teaching content	Created an explanatory video on consulting patients to switch inhaler types
Facilitate collaborations with academic societies	Worked with medical society Galenicals to establish sustainability representatives on hospital placements

Table 1. Overview of the Project in its First Year (2022)

The medical school invested in the programme from the start, so having been involved from the inception of the role, there was essentially a free rein to go in any direction. We decided to divide a medical student's everyday life into three categories: central teaching (involving anything on campus); academy teaching (involving anything on placement); student activities (involving anything not directly related to education - such as student societies). From here, we started to triage the most urgent issues to address, identifying some of the biggest sources of carbon emissions, such as excessive car travel.

First Year Successes and Challenges

Having pinpointed the issue of unnecessary car journeys, we considered what we could realistically change. From years three to five, students are on placement full-time, with the majority being located outside of Bristol and with poor public transport links; this means that many travel back by car at the weekend. It would be unreasonable to insist this is not allowed, as it is important for a range of factors including socialising, mental health and wellbeing. However, we thought a sensible solution to this could be to facilitate car-sharing to reduce the environmental impact of these mass exoduses. We contacted car-pooling companies such as 'BlaBlaCar' to ascertain whether a partnership would be possible, however, they could not offer any organisational support. With the SC role still in its early stages and lacking the resources to take this on by ourselves, we decided the project was unfeasible but it provided several key lessons.

One of the main challenges faced was that the programme started quite late in the academic year, making it difficult to roll out initiatives. Typically by February, a general fatigue seems to seep throughout the student body, and they are much less likely to engage with the smaller-scale initiatives that are feasible in a short time frame - such as surveys. However, we did find that staff were very receptive to ideas that we proposed. Our principal success was the positive relationships built with members of staff, which laid the groundwork for more progress to be made the following year.

Overview of Project in its Second Year (2023)

In 2023 the programme began in October, which greatly improved our productivity. We decided to use the Planetary Health Report Card (PHRC) as a framework to home in on specific areas of improvement. The PHRC is a student-led global initiative created by medical students at University of California, San Francisco in 2019. The medical-school-specific report evaluates courses based on five metrics: curriculum, community outreach, support for student-led initiatives, interdisciplinary research and campus sustainability. We focused our efforts on the areas we had scored poorly on previously – such as curriculum. Globally, 126 medical schools completed the report this year and BMS was ranked 13th in the UK.

We found that the PHRC was a useful tool when meeting with senior members of the medical school, as it provided clear criteria with examples of full-scoring evidence. This meant we could present them with specific ideas we wanted to implement and demonstrate exactly how they could impact our ranking.

Second Year Successes and Challenges

As the curriculum had previously received a low grade on the PHRC, we looked at the criteria and identified which points we did not currently fulfil. Having found that the impacts of climate change on cardiorespiratory health was not discussed sufficiently, we chose to advocate for a dedicated lecture on this topic. *'The harms of air pollution – and the solutions'* was

approved and delivered by specialist registrar Dr George Nava for the year two cohort in their respiratory case block.

Whilst on placement full-time, we noticed some significant problems with recycling processes in the accommodation. In Bath, many flats did not contain recycling bins or have incorrect ones – leading to a large proportion of recyclable waste being thrown away into general landfill. In Swindon, there was zero capability at all to recycle plastics and when contacted, the provider seemed very unwilling to pursue this issue. Our challenge lay with the fact that most hospital accommodation is contracted out to private companies, meaning that there is little the medical school can do centrally to enact changes. This meant we needed to communicate with the providers directly, who had no obligation to engage with us as we did not have a direct contractual relationship with them.

Overview of Project in its Third Year (2024)

This was an exciting year where we developed some real momentum. BMS agreed to fund a job-share with 1.5x the standard hours, meaning there were now two Sustainability Champions working nine hours per week between them. This enabled us to tackle a lot more projects simultaneously, as well as being able to examine the course from both a preclinical and clinical perspective.

As in most UK medical schools, the vast majority of lecture-based teaching at BMS features in years one and two, meaning that the numerous

sustainability-related curriculum additions we had implemented were not being enjoyed by the clinical cohort. Therefore, we considered how to integrate this more into years three, four and five - in line with the helical theme on *Planetary Health and Sustainability*. A helical theme is a formal structure within our curriculum, which is embedded throughout the course. It encapsulates an aspect that is not specific to any one specialty, but which is vital to producing well-rounded graduates. It is useful as it highlights themes whose importance is at risk of being minimised and therefore signifies something that the medical school believes has particular value.

Third Year Successes

One of our proudest successes this year was the introduction of Carbon Literacy training for the entire first-year cohort (see Chapter 2). We assisted with reviewing the learning materials, providing a student perspective and interviewing participants at one of the sessions.

This year we finally brought our long-anticipated hopes in the online realm to fruition, with the creation of both an external Bristol Medical School Sustainability website, as well as an internal Sustainability SharePoint page with more specific information designed for students.

We developed an instructional video on how to have consultations with patients about switching from metered dose to dry powder inhalers, made for students by students. This was another area in which it was useful to be

employed by the SU, as they were able to provide *pro bono* support in the form of professional filming equipment and a videographer.

We collaborated with a local organisation called 'Facts4Life' to create a student choice project called 'Healthy Planet, Healthy People'. It provides second- and third-year medical students the opportunity to go into local primary schools and teach children about health, disease and wellness through topics such as '*The Importance of Nature and Environmental Awareness*', '*The Environment as a Living Ecosystem*', and '*Looking to the Future - Integrating Sustainability into Daily Life*'.

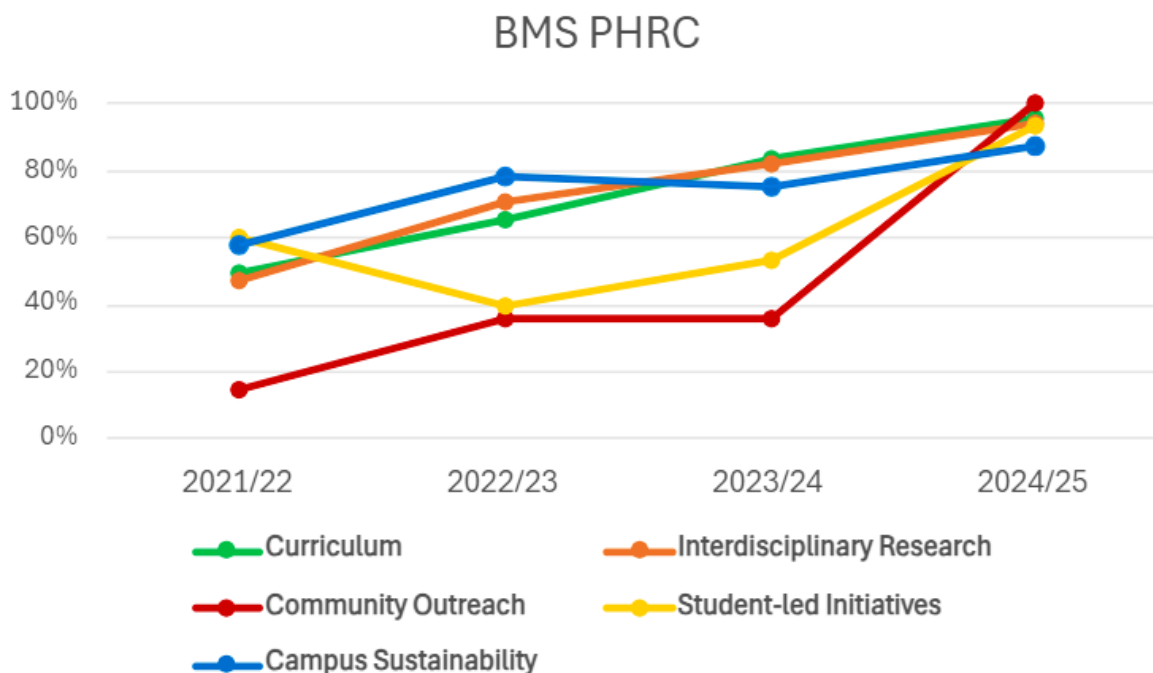
We kept students abreast of developments in sustainability in medicine, both internally and externally, by publishing short articles in the central administrative bulletins and the medical society Galenicals' newsletters, both of which are sent out weekly to all MBChB students.

Having identified an opportunity to embed more sustainability in clinical years, we created a proposal for sustainability representatives in each academy, who could identify opportunities to reduce energy and water consumption in hospital facilities, assist us with the implementation of sustainability projects and work with clinical teaching fellows on the many sustainability and waste reduction quality improvement projects (QIPs) being run. This was partly inspired by a similar initiative developed in Canada in 2021, albeit on a larger scale (Luo et al. 2021). After three months of working in teams on green quality improvement projects, the medical students leading them fed back that they were motivated by their

‘collective passion’ for sustainable healthcare and found it inspiring to interact and collaborate with peers and staff that were equally invested in the topic (Luo et al. 2021). We presented this idea to the programme directors and academy deans, who enthusiastically approved it for the 2025/26 academic year.

The combination of these numerous successes resulted in an impressive achievement: out of the 139 medical schools from 18 countries that completed the PHRC, BMS came second in the world (Aggarwal and Mitra, 2025) (Fig. 1)

Figure 1. Year-on-year changes in BMS domain scores.



Third Year Challenges

One challenge in 2024/2025 was the sheer number of different projects we were working on. We were very ambitious with our goals and had several different ideas in varying stages of development all needing our time and attention, so at times it was difficult to balance the role whilst studying for our medical degrees. On top of sometimes feeling overburdened, the large workload also required a different management and communications approach. This was the first year with two SCs, both pursuing our own ideas, meaning it could occasionally be tough to keep each other in the loop. Additionally, whilst it was helpful to have SCs in both the preclinical and clinical phases, this provided another challenge - as one was campus-based and the other was on placement full-time.

Overall Challenges

Some of the barriers we faced included the resistance from certain accommodation providers to engage with our recycling initiatives, despite following up with them over several years. There were also issues with connecting students to fellows carrying out QIPs, which was disappointing as there were several sustainability related projects that could have utilised keen students and provided them with some research experience and possibly a publication. However, the roll-out of sustainability representatives in academies could resolve both problems, as there will be a student based in each hospital who will be on the ground and can provide feedback, carry out surveys, and advertise QIPs that are looking for student involvement – in addition to getting involved themselves. It could also broaden student engagement, which was another challenge we experienced, as very little of our work incorporated students aside from ourselves.

Overall Benefits of the SC Role

One of the unique selling points of the SC programme is the factor of SU employment. As medical degrees are on par with a full-time job with respect to the hours worked, students simply do not have sufficient time to dedicate to volunteering for sustainability initiatives, including their involvement in completing the PHRC. Unpaid work is a privilege afforded to those who do not have to support themselves with the costs of the degree and living through paid employment. However, when it is reframed

as a part-time job, it becomes more accessible to those needing to work, as well as potentially allowing students to reduce their hours spent on other paid employment.

Other benefits that came from our formal employment status, instead of loosely volunteering - included the training and skills development we received and the managerial and well-being support e.g. welfare check-ins.

Additionally, the official nature of the role encouraged us to produce work of a high standard, as there was a manager to report to and colleagues all accomplishing their own projects. Working for the SU also lent us another degree of credibility when speaking to departmental staff, as well as companies such as the accommodation providers.

The interdisciplinary nature of the programme also enabled us to collaborate with other departments, share successful initiatives and gain an appreciation for the sustainability work being carried out in the wider university. It meant we were part of a larger cohort of students and staff leading on sustainability and provided us with the opportunity to meet other teams such as the Medical Schools Council ESD group.

Conclusion

The SU has taken the decision to withdraw their support for the programme following 2024-25 due to finances and shifting priorities, However, BMS intends to transition to an internal internship modelled on the existing programme to continue this work. The downside of this

includes losing access to SU staff and the enhanced credibility that the formal position provides in discussions with external organisations.

However, it is clear that students championing sustainability has tangible impacts, and this programme, therefore, is a valuable example of an initiative that has the potential to be replicated in other universities.

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Chapter 5. Integrating Education for Sustainable Healthcare into Medical Education. Sarah Aynsley. Keele University

I am not ashamed to admit that the first things that used to come to mind upon hearing the word sustainability were recycling, trees and green spaces. Little did I know that ideas, views and critical concepts that I was passionate about (global health, access to vaccination, women's health) were also ***sustainability***.

Today's learners are much more aware and engaged with sustainability than previous generations, but from my experience they tend to focus on the obvious topics and can often struggle to see the direct relevance of sustainability to their future practice. I firmly believe that higher education has a responsibility to empower and equip our students with the skills and understanding to face the challenges in a changing society. However, too often enthusiasm and passion for teaching sustainability is curtailed by the practicalities of introducing learning opportunities without making it a token addition, particularly in what is already a busy curriculum in medical schools. Empowered by having my own thinking challenged in 2017 by a passionate friend, I embarked on a journey to align areas of sustainability already taught, provide opportunities throughout the curriculum to engage in topics and increase understanding in both students and staff.

One new addition was a session which was designed to encourage students to consider the issues and impact of sustainability from three different perspectives:

1. Their own lives - personal attitudes and approaches to integrating sustainability in the things they do and their personal understanding of the concept.
2. Clinical practice – their own clinical practice and the practice they see around them when engaging on clinical placements.
3. Global context – understanding the different global challenges and their impact on healthcare, including the role they have in collective impact as future healthcare professionals.

The session was delivered in Year 3 and had two intended learning outcomes; to identify and propose solutions to sustainability challenges, and to understand the role individuals and institutions have in contributing to sustainability.

It was important to design the workshop to be as engaging and relevant as possible. To this end an interactive peer approach was used. Groups of eight students were asked to imagine they were a team that had been put together to address a pressing sustainability related issue. The teams were given full scope to identify a topic of their choice, these could be local, national or even global. This approach was chosen to encourage groups to explore the full breadth of topics they could think of and draw on lived experiences. The ownership of the issue selected encouraged engagement and a feeling of accountability. The groups were told they were competing for a 'pot of money' that would be awarded to just one of the

sustainability initiatives, introducing elements of gamification and an opportunity to discuss the realities of limited funding to solve issues.

After identifying a topic, the teams related it to relevant sustainable development goals, identified different individual contributing factors and focused on one of these to devise possible solutions. The breadth of topics we have had over the years have been inspiring, from groups identifying period poverty, air pollution, global vaccine access, food shortages, waste from surgery and anaesthetic gas pollution.

Students were given an introductory talk around the sustainable development goals and issues in healthcare before the workshop, this was delivered with me as lead in combination with sustainability experienced guests, including the university's sustainability project officer, the hospital net zero lead, and clinicians practising sustainability in their own practice. The inclusion of these authentic voices, who are working in and addressing sustainability issues, was a significant benefit, giving authenticity to the information being delivered and the ideas being explored, as well as role modelling the changes that can be made. Longitudinal evaluation of the sessions showed a strong increase in student understanding of sustainable healthcare issues (average 78% agree the session increased knowledge) and 79% agree that taking part in the session will impact their clinical practice. A sense of moral duty and a conscious effort to engage and improve systems was clear in feedback and they enjoyed the group approach to combat challenges. Since engaging in the session students

have been motivated to start their own sustainability related projects including a beauty bank, tackling period poverty & inclusion healthcare sessions.

It was important for this initiative to be embedded for the whole cohort, to allow students to hear from each other as well examining the ideas of their peers. However, engagement of staff to facilitate sessions can be a challenge. Whilst many staff are interested in aspects of sustainability, they can lack the confidence to lead and deliver these sessions (Tun et al 2020). Understanding the scope of staff knowledge and confidence in delivering sustainable healthcare education is a focus moving forward, with the intention providing opportunities for staff development and training.

Sustainability is an integral part of the practice our students are entering as working professionals and the delivery of integrated education is crucial (Brand et, al. 2020). The session described here is just one part of a strand of approaches now woven throughout our curriculum, developing literature review project options, including sustainability topics into problem-based learning cases, equality and diversity discussions, supporting student extracurricular projects and being active in highlighting and discussing sustainability throughout the curriculum. Eight years on from first launching into integrating sustainability to the curriculum there are five learning points I would highlight to anyone embarking on the journey. 1- Engage role models from the professional environment e.g. as case studies or facilitators, 2- involve all relevant stakeholders- university

and healthcare based educators, workplace professionals, sustainability leads etc, 3- consider the format of the teaching session(s) - group work, activate learning, peer learning are all beneficial, 4– use an integrated approach throughout the curriculum to support the understanding that sustainability is intrinsically woven into healthcare, 5- Support your staff group both academic and clinical in understanding sustainability. Together we educate the next generation of change makers.

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Chapter 6. Integrating Sustainability into Medical Education – Lessons from the Coalface. Vivienne Crawford. Queen's University Belfast

Out of the Starting Blocks

In 2015, Queen's University Belfast (QUB) introduced a novel Student Selected Component (SSC) for year two students called 'Healthcare needs smaller feet! – Sustainable Healthcare: Theory into Practice'. This was part of a national pilot study by the Centre for Sustainable Healthcare (CSH), with six medical schools aiming to implement new teaching about healthcare sustainability. I and a colleague designed the SSC to instil an understanding of the topics central to sustainable healthcare. Content covering the global aspects relevant to sustainable healthcare was facilitated, and participants considered local aspects that may be amenable to change with a view to improving sustainability. Alongside traditional teaching methods, students conducted interviews with healthcare leaders and site visits to healthcare Trusts. The module introduced global warming and sustainability to our teaching for the first time, and some content developed was subsequently moved to the core curriculum and delivered to all students. This initial SSC highlighted challenges in relation to hearts and minds regarding Education for Sustainable Healthcare (ESH), the lack of knowledgeable staff to deliver it, and students' perceptions of the need to engage with it.

C25 Curriculum - Helical Themes and the Integration of ESH in the Curriculum

In September 2020, we commenced delivery of a major revision of our traditional curriculum. Named the C25 curriculum (as the first cohort graduated in 2025), this offered the opportunity to expand and integrate ESH content, which was achieved primarily via one of the new helical themes of Global and Population Health. Leading on this theme, I ensured our students would be upskilled in sustainable healthcare by crosscutting skills and learning throughout the five years of undergraduate study (Tun, 2019; Bray et al, 2022). Students now consider sustainable healthcare in case-based learning (CBL), lectures, tutorials, several SSCs, a transition to practice session, reflective practice and a sustainable quality improvement (SusQI) project.

Examples of ESH that I have developed and currently deliver across C25 include:

- 1) In years one and two, sustainability is included where relevant in each case for CBL. Aspects of ESH are listed in the learning outcomes and content is provided for CBL facilitators to guide student discussions.
- 2) A new SSC on Planetary Health, examines global warming and its impact on human health and equity (Shaw et al, 2021; Tennison et al, 2021).
- 3) All year two students participate in a tutorial on SusQI, where they consider the carbon footprint of the healthcare sector, describe what

quality in healthcare is, consider the links between quality improvement and sustainable healthcare and practise the implementation of a simple Plan-Do-Study-Act (PDSA) cycle. Additionally, these students participate in a 'Transition to Practice' session at the close of second year, on the topic of Sustainability in Healthcare. I deliver this session with a colleague from the University Sustainability Team, building upon early lectures to expand their understanding of how the environment affects health and how healthcare impacts the environment (Teherani et al, 2017). Students are introduced to current national project examples in SusQI, and as they prepare to enter the clinical phase of their undergraduate training, they are encouraged to observe clinical practice with the addition of a sustainable healthcare lens.

4) As part of their Reflective Practice Portfolio, third year students complete a reflection on SusQI. They are asked to reflect upon a clinical activity they have become familiar with, where they recognise a negative or positive impact on sustainability. They are guided via a set of questions, such as, 'How might any negative sustainability impacts be mitigated without compromising health outcomes?'. Alternatively, they can talk to trainees on their placements who are undertaking QI work, discuss with them how they are considering sustainability in their project, and use their learning to guide a reflection on how they might do things differently in the future.

5) The implementation of our final year SusQI project has been several years in development, liaising with undergraduate education leads in the

NHS Trusts and investigating the logistical and financial feasibility. The final section of this article discusses the first implementation of this project (Spooner et al, 2022).

The Planetary Health Report Card and Transition to our Student-led SHDG: Motivation and Acceleration

In parallel with our new curriculum, in 2021 QUB medical students completed their first 'Planetary Health Report Card' (PHRC) (McFall et al, 2021). An international venture, aiming to increase planetary health awareness and accountability among medical schools, the PHRC was developed in 2019 by medical students at the University of California Medical School. It is a "...student-driven metric-based tool that aims to evaluate health professional schools on discrete metrics in five main category areas: Curriculum, Interdisciplinary research in health and environment, Community outreach and advocacy, Support for student-led initiatives and Campus sustainability." While QUB have increased their overall score in the last four years and were ranked 9th out of 24 UK schools in 2025, there is still scope for improving our metrics, but more importantly, the 2025 publication shows that international advocacy is working to increase planetary health education in the field of medicine as many schools have improved their scores.

Senior leadership is crucial for the successful implementation of new curriculum initiatives, and one of the key impacts of the PHRC was the impetus it provided to Faculty. Hearts and minds were affected and

influenced by the drive and enthusiasm of our students (Tun et al, 2020). Staff motivation increased and efforts were accelerated and supported by Faculty. Documented success and improvement in QUB's PHRC led to the group's transition to a new Sustainable Healthcare Development Group (SHDG) with further reach in respect of input and integration to our curriculum and with the University Sustainability Strategy. Faculty have now appointed a sustainable development lead for activities across medicine, dentistry and biomedical sciences. My involvement with the PHRC, SHDG and the appointment of a sustainable development lead continues to engage me with ESH. Additionally, I have ensured my own upskilling via completion of the University's first 'Education for Sustainable Development' Programme through SEDA (Staff and Educational Development Association) and an international course on 'European Climate Resilient Health Systems', delivered by the Association of Schools of Public Health in the European Region (ASPHER) and the Global Consortium on Climate and Health Education (GCCHE). I would highly recommend both programmes of study and assessment.

Towards the Finish Line...

Adaptations to Covid-19 forced me to develop an online SSC for all year three students. Normally the majority undertake placement SSCs, however this was clearly not possible given the Covid restrictions. In C25, it had always been the plan to have students undertake their own SusQI project in final year, and I therefore used this opportunity to test resources,

assessments and guided self-directed study on the topic of SusQI. Again, though, students' perceptions of the topic's relevance were somewhat disheartening. However, considering that this cohort had yet to experience the clinical phase of their course due to Covid-19, perhaps it was unsurprising. In 2024-25, we delivered our first pilot of SusQI in which all final year students undertook a longitudinal SusQI project. Resources, templates and detailed guidance was provided and a training morning given on QI methodology (Clery et al, 2021). Logistical challenges in grouping the students and other aspects became apparent and will require modifications to subsequent iterations of the module. Excellent posters were produced and presented by the students and assessed by dedicated staff. Some student feedback however, suggested that doubt about the relevance of SusQI to their role as doctors remained. We hope a virtuous cycle of good practice will become established, in which, as resident doctors, our 2025 and subsequent cohorts see the relevance of their training in SusQI 'on the job' and encourage undergraduates on rotation.

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Chapter 7. Integrating Planetary Health into the Medical Curriculum: A Case Study from the University of Southampton. James Bevan, Inna Walker, Kalyanaraman Kumaran. University of Southampton

Understanding the Educational Gap

In 2020/21, staff and students at the University of Southampton led a national audit of planetary health and sustainability teaching across UK medical schools, using the expanded “Educating for Sustainable Healthcare - Priority Learning Outcomes” as a benchmark (Centre for Sustainable Healthcare 2013; Bevan et al, 2023). The study found considerable variation in the coverage of planetary health and sustainability topics across institutions, but also provided an opportunity for the staff at Southampton to critically examine their own curriculum. This review revealed that planetary health topics were insufficiently covered within the core curriculum, prompting the public health education team to develop a new strategy to address this gap in medical education.

Establishing Strategic Resource and Leadership Support

Recognising the structural and logistical challenges inherent in curriculum reform, the public health education staff secured support from senior leadership at the medical school and successfully advocated for the appointment of a Planetary Health Teaching Fellow (Bevan et al, 2023). This fixed-term part-time role lasted three years and was designed to accelerate the integration of planetary health content and support lasting,

curriculum-wide changes. The fellow set out implementing the audit findings through embedding planetary health and sustainability topics across the core curriculum, while also providing motivated students with opportunities to develop their interests and skills in this rapidly-developing field.

Collaborating to Identify and Address Barriers to Integration

The University of Southampton sought help from other institutions and became one of the founders of the International Medical Education Collaboration on Climate and Sustainability (IMECCS), a global network of staff and students dedicated to embedding planetary health in medical education (IMECCS, 2025). Through this collaboration, several common barriers to implementation were identified:

- Limited time within a dense medical curriculum
- Variable educator awareness and subject knowledge of planetary health
- Lack of capacity among medical faculty for curriculum change

To address these challenges, IMECCS promoted an 'infusion' approach to teaching planetary health and sustainability, which was first implemented at the Icahn School of Medicine at Mount Sinai, demonstrating the feasibility of integrating planetary health content into existing teaching sessions (Kligler et al, 2021). Drawing on this model and using the shared,

openly available resources from IMECCS, Southampton adopted this approach in their own infusion project (Bevan and Roderick, 2021).

Integrating Content into the Curriculum

Guided by the audit findings and the Planetary Health Report Card, the Planetary Health Teaching Fellow conducted a comprehensive review of the undergraduate curriculum to identify existing sessions where planetary health content could be integrated with minimal redesign. Teaching staff responsible for these sessions were offered ready-made, evidence-based materials, including slide decks, reference lists and detailed teaching notes, customised to align with their existing learning objectives. This streamlined approach encouraged widespread adoption and enabled planetary health themes to be incorporated across all five years of the programme.

Alongside the infusion project, the teaching fellow also expanded the scope and visibility of planetary health teaching by introducing core dedicated lectures on topics such as sustainability in primary care and surgery, health system resilience, as well as ensuring inclusion of more extensive references to planetary health in existing public and global health lectures. Focused sessions on the relationship between planetary health and infectious diseases were also added to student selected units.

In the graduate-entry curriculum, which is structured around predefined learning outcomes and employs peer-to-peer teaching, new planetary health and sustainability learning outcomes were incorporated, while

several existing outcomes were modified to reflect environmental issues. Resources were also provided to aid the peer-to-peer teaching.

Developing a Core Module

Building on this foundation, the medical school has committed to introducing a new year-long Population and Planetary Health module in the third year of the programme, which will incorporate teaching on public, global and planetary health. It is hoped that the creation of this module within the core curriculum will signal to students the importance of planetary health in medical practice, while also providing dedicated curriculum space to teach the topics in depth.

Fostering Student Leadership

Students have played a central role in driving curriculum innovation at Southampton. Supported by the teaching fellow, a student group “Students for Population and Planetary Health” was established to boost this collaboration. In the past, students have provided their views on specific curriculum development suggestions and some of them are also involved in co-designing the new third year module.

Student participation in this group has led to significant achievements, including peer-reviewed publications and presentations at international conferences. Some students have leveraged their experience to secure places on competitive intercalated public and global health master’s programmes at internationally renowned institutions. This practice of

encouraging student engagement aligns with the latest pedagogical thinking that emphasises student–staff partnerships in planetary health education, which will contribute to the development of future leaders who are prepared to address the health challenges posed by the climate and ecological crises.

Evaluating Progress

Efforts to evaluate the integration of planetary health and sustainability topics into the curriculum need to be an ongoing endeavour. Students submit an annual review to the Planetary Health Report Card initiative (Planetary Health Report Card, 2025), and a recent student-led audit re-examined the entire medical curriculum against the Educating for Sustainable Healthcare learning outcomes (Tun and Martin, 2022) to identify remaining gaps in teaching provision.

Conclusion

Southampton's experience offers a pragmatic model for integrating planetary health into medical education. By combining student engagement, institutional support and external collaboration, the teaching staff were able to implement meaningful changes. It is understandable that not every institution may be able to afford a planetary health teaching fellow even on a part-time, fixed-term basis, or will choose to prioritise such spending. Nevertheless, this case study illustrates some of the ways of embedding planetary health across undergraduate medical training as

part of preparing future doctors for practising medicine in a changing global context.

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Chapter 8. The Planetary Health Report Card: Integration of sustainable healthcare into a new graduate entry medical programme. Kay Mohanna. University of Worcester Three Counties Medical School

Background

Nationally and internationally, medical students have a strong track record of engagement with sustainability and sustainable healthcare, notably through the development of the student-led international Planetary Health Report Card initiative. The Three Counties Medical School (TCMS) is a new medical school which admitted its inaugural cohort in September 2023, and we are committed to supporting the development of doctors who are socially responsible, global citizens. We used the PHRC to help evaluate our curriculum planning to date and in so doing highlighted areas we might not otherwise have considered. This project was part of the University of Worcester Green Impact Project Assistant scheme (GIPA) which funded a student-assistant to participate with us in evaluating our progress, seek out gaps and use the tool to plan the next steps in curriculum design.

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Introduction

In 2020 a review, by medical students, of 2817 medical school curricula across 100 countries found only 15% of medical schools had included the

health effects of climate change in the curriculum (Omrani et al., 2020). These students, as future doctors, recognised the importance of social accountability as an integral part of their undergraduate education:

With deteriorating ecosystems, the health of mankind is at risk. Future healthcare professionals must be trained to recognize the interdependence of health and ecosystems to address the needs of their patients and communities.

In 2022 United Kingdom medical students sent an open letter to the General Medical Council (GMC) requesting the inclusion of climate change and planetary health outcomes in the undergraduate medical curriculum (Lee et al., 2022).

Currently, around half of the medical schools in England use the PHRC to self-assess in five areas: curriculum, interdisciplinary research, community outreach and advocacy, support for student lead initiatives and campus sustainability (The Planetary Health Report Card, 2021). This report card is now used by a range of healthcare disciplines to evaluate and rank undergraduate curricula in schools that have graduated at least one cohort. We sought permission to use the format of the report card to evaluate our planned curriculum, specifically with a view to using it to contribute to the ongoing curriculum development in our new graduate entry MBChB programme.

As a new medical school, we seek student feedback at all stages to refine and develop our curriculum. For this project we sought to employ students

as academic partners to further develop their leadership and advocacy skills. Faculty acting on feedback enables students to be co-creators of the curriculum, which also aligned with the first of five key components to deliver the vision of the University of Worcester learning and teaching strategy (University of Worcester, 2020).

Aims

We sought to harness the enthusiasm and energy of our medical student body with the support of our GIPA:

To involve and educate fellow students on aspects of sustainable healthcare

To devise a project which:

- raises awareness on campus and beyond of the importance of sustainable healthcare
- increases the social accountability of the Three Counties Medical School
- evaluates and ensures dissemination of the project outcomes

This evaluation involved reviewing curriculum documents, teaching resources and assessments for the medical degree, and also elements of the University strategic approach and campus infrastructure.

A key element of curriculum design was the embedding of the United Nations Sustainable Development Goals (SDGs), with their attendant further reading. For example, in respiratory week with its focus on chronic

obstructive pulmonary disease, we placed SDG [11] *Make cities and human settlements inclusive, safe, resilient and sustainable*, which includes target 11.6:

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality (United Nations Department of Economic and Social Affairs, 2015).

Assessment

Early in semester one, the first MBChB summative assessment is a mandatory student-selected component related to sustainability in healthcare or planetary health. Students are required to work in groups and create a poster and a presentation.

The University of Worcester already sets a tone for cross-campus sustainability and the PHRC recognises this by including an institutional level evaluation. Some examples included working with a European Union funded campus sustainable mobility project with an agreed action plan to help decarbonise travel and the university investment in the largest one-site number of electric car charging points in Europe. The Sustainable Research interdisciplinary research group has strengthened the capacity for effective research collaboration and includes aspects such as a designated Green Impact Laboratory Chief Technician. For over a decade the university has had a sustainable procurement group, including student and academic members, to focus on ethical procurement issues including,

for example, campus catering and workers' rights and environmental impact in the supply chain.

Conclusions

Using the PHRC as a tool to evaluate both our curriculum and the wider university context has identified recommendations that we will aim to implement as the curriculum rolls out over the rest of our four-year degree. It has raised awareness of university-wide initiatives and opportunities for medical students' involvement. One missing area of curriculum design that this project highlighted was development of clinical communication skills to discuss aspects of sustainable healthcare with patients.

Other outcomes have included a development in student advocacy and the project has initiated an authentic set of skills, including project leadership and quality improvement awareness and professional values through sustainability-awareness. (Mohanna et al 2025).

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Chapter 9. A One-Week Introduction to Sustainable Healthcare for Year 2 Medical Students at Cardiff University.

Ned Powell. Cardiff University, School of Medicine

- *Focus: Developing a new SSC focused on sustainable healthcare*
- *Lessons learned: Importance of student engagement and experiential learning*
- *Recommendations: Focus on empowering and motivating students to be active agents for change.*

Since 2021 the School of Medicine at Cardiff University has offered a Year 2 Student Selected Component (SSC) in Sustainable Healthcare. This comprises a full week of teaching and learning activities for 12-24 students (a summary of design and content is provided in table 1). It has evolved significantly over this period as the lead facilitator (NP) has reflected on experience and learned from mistakes. Initial efforts concentrated largely on imparting knowledge of the science of climate and its health impacts. More recent iterations have focused much more on the development of sustainability as an aspect of professional identity, with a greater focus on motivating students to support and enact change. This evolution was prompted by discussions with students on completion of early iterations of the course, that seemed to indicate that students had found the content interesting but did not strongly relate it to their personal behaviour or professional practice.

This perceived deficit has been addressed through several avenues including:

1. Greater exploration of personal ethics supported by group discussions, with the aim that students develop a shared professional identity that includes awareness of sustainable healthcare, coupled with an intention to enact relevant principles in their personal lives and professional practice.
2. Use of relevant role models and case studies to deliver content where possible.
3. Increased peer to peer learning, including:
 - a. Frequent group discussions
 - b. Use of short videos that students watch, usually a specified TED talk that presents different views on sustainability issues, and then describe and explain to their peers on the following morning.
 - c. A final small group presentation. Over the course of the week, groups of 3 students familiarise themselves with an allocated report addressing a topic relevant to sustainable healthcare and deliver a short presentation on it at the end of the week.
4. Greater exploration of sustainable Quality Improvement concepts, methods and case studies.
5. Stressing relevant guidance including from GMC Outcomes for Graduates, the GMC “duty of sustainability”, NHS Wales Strategic

Decarbonisation Plan and Wellbeing of Future Generations Act (Wales).

6. A session on communicating climate change modelled on the approaches proposed by Climate Outreach.
7. A session on Carbon Literacy. This does not meet the requirements for full Carbon Literacy training (as promoted by the Carbon Literacy Project) but does introduce the basic concepts (including Global Warming Potentials and Carbon foot printing)
8. The week comprises 5 half days of direct contact teaching and is loosely based around the priority learning outcomes developed by the Centre for Sustainable Healthcare.

Lessons learned:

1. Students have a strong preference for social learning activities and particularly appreciated prompted discussions e.g. on the topic of ethical principles in relation to sustainable practice, or discussion of the responsibilities of different groups (government, professional, personal).
2. Short videos, predominantly TED talks, can be used to provide a variety of perspectives. Students also enjoy the social aspects of being required to provide a short synopsis of the video they had viewed. This was the first activity on days 2, 3 & 4 and groups were mixed to encourage new social interactions.

3. Feedback on the course has been very positive and demonstrates that a proportion of our medical students are highly receptive to information on sustainable healthcare and are eager to support change.
4. The course works well as a primer to encourage students to undertake Sustainable Quality Improvement projects as part of their Year 3 and Year 4 SSCs (comprising blocks of 6 and 7 weeks each).
5. There is an abundance of good quality resources available to support teaching in this area.

Table 1. Plan for Year 2 Student Selected Component in Sustainable Healthcare.

Day, Priority Learning Outcome and topics covered	Activity	Aim	Resources
Day 1. PLO: Describe how the environment and human health interact at different levels <i>Health impacts of climate change environmental degradation</i>	Icebreaker	Think for a minute, then write down why this topic is important to you. Chat in pairs for 2 min, then introduce your partner.	
	Introduction	Explanation of structure of week including assessment (allocate groups and topics for student presentations on Friday)	
	Watch: David Attenborough – Climate change the facts	Easy and engaging introduction to topic. Create shared experience and baseline knowledge.	https://www.bbc.co.uk/iplayer/episode/m00049b1/climate-change-the-facts
	Short discussion of Attenborough video (in groups of 3)	Consolidate learning and shared experience. How did the film make you feel? What did you learn? What were the most important messages? 5 mins and report back...	
	Presentation on Health impacts of climate change (20 mins) - delivered by course lead.	Summarise main health impacts of climate change, as described in Lancet Countdown report.	https://lancetcountdown.org/
	Short discussion of Health Impacts (in groups of 3)	What aspects of this did you already know? Did anything surprise you? In the UK, what health impacts will we notice most? 5 mins and report back...	

	Homework. View allocated short talks. Topics include air pollution, food systems and climate & climate advocacy.	Aim is to explore different perspectives on sustainable health related topics. Student are divided into 3 groups. Each group is allocated one short talk to view before tomorrow's session.	<u>Air pollution:</u> https://www.ted.com/talks/rosamund adoo kissi debrah the tragedy of air pollution and an urgent demand for clean air <u>Food systems and climate:</u> https://www.ted.com/talks/jonathan foley the problem with food and climate and how to fix it?subtitle=en <u>Climate advocacy:</u> https://www.ted.com/talks/fehinti balo gun how to find your voice for climate action?language=en
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Day 2. PLO: Demonstrate the knowledge and skills needed to improve the environmental sustainability of health systems <i>Ethics and Carbon Literacy</i>	Students form groups of 3 (one student from each homework video group). Then have 3 mins each to explain content of video they viewed.	Consolidate and share learning and perspectives.	
	Presentation on ethics of climate change	Consider responsibility for climate change and climate action.	Amnesty International - Climate Justice and Human Rights Explained: https://www.youtube.com/watch?v=jwJAb9aAltI
	Discussion of climate justice in relation to personal ethics and to 4 pillars of medical ethics	To link ethics to professional identity as medical students.	
	Presentation on Carbon Literacy and NHS Carbon footprint	To introduce concept of Carbon Literacy and highlight carbon footprint of NHS	Based around training provided by Carbon Literacy Project (Healthcare specific resources) https://carbonliteracy.com/ and incorporating: Lancet Planet Health. 2021 Feb 10;5(2):e84–e92. DOI: 10.1016/S2542-5196(20)30271-0 Health care's response to climate change: a carbon footprint assessment of the NHS in England
	Quiz activity: Small groups of students are given list of various items related to daily living and healthcare and asked to arrange them in rank order of carbon footprint.	To encourage consideration of carbon footprint associated with goods and services	Book: How Bad are Bananas? The Carbon Footprint of Everything. Mike Berners-Lee Carbon footprint calculator: https://footprint.wwf.org.uk/

	Students then individually calculate their own carbon footprints.		
	Homework. View allocated short talks. Topics include Climate Justice, Methane and Climate, Health and Poverty	Aim is to explore different perspectives on sustainable health related topics. Student are divided into 3 groups. Each group is allocated one short talk to view before tomorrow's session.	Climate justice: https://www.ted.com/talks/david_lamm_y_climate_justice_can_t_happen_witho_ut_racial_justice?subtitle=en Methane: https://www.youtube.com/watch?v=tIWuP7wESZw Climate, Health and Poverty: https://www.ted.com/talks/cheryl_holder_the_link_between_climate_change_health_and_poverty?language=en

Day 3. PLO: Discuss how the duty of a doctor to protect and promote health is shaped by the dependence of human health on the local and global environment. <i>Policies and Sustainable Quality Improvement</i>	Students form groups of 3 (one student from each homework video group). Then have 3 mins each to explain content of video they viewed.	Consolidate and share learning and perspectives.	
	Presentations on: Wellbeing of Future Generations (Wales) Act 2015 NHS Wales Decarbonisation Strategic Delivery Plan Cardiff University Environmental Sustainability Strategy	Introduce students to legislative framework and NHS and University commitments. Aim to stress location of carbon hotspots within clinical practice (e.g. pharmaceuticals and medical equipment)	https://www.gov.wales/sites/default/files/publications/2021-03/nhs-wales-decarbonisation-strategic-delivery-plan.pdf https://futuregenerations.wales/discover/about-future-generations-commissioner/future-generations-act-2015/ https://intranet.cardiff.ac.uk/_data/assets/pdf_file/0009/2483487/Environmental-Sustainability-Strategy-Recast-Amend-v1.3-February-2021-Final.pdf
	Discussion - How is Cardiff University's policy reflected in the medical degree?	Encourage students to reflect on how the various policies influence, or don't influence, their experience as students.	
	Presentation on Quality Improvement (QI) and Sustainable Quality Improvement (SusQI)	Introduce concepts and methods including QI, process mapping, PDSA cycles, systems thinking, SusQI, principles of sustainable healthcare, triple bottom line. Illustrate SusQI with local case studies (undertaken by Yr4 students as part of SSCs).	https://www.SusQI.org/

	Homework. Research the following websites: UK Health Alliance Against Climate Change, OurHealth OurPlanet, Greener NHS. Advice to students is: Just spend 10 mins exploring your allocated site. Find one thing that interests you. Tomorrow will need to explain it to the rest of the group...	Aim is to explore some resources available to healthcare professionals interested in sustainable healthcare. Student are divided into 3 groups. Each group is allocated one short talk to view before tomorrow's session.	https://ukhealthalliance.org/ https://ourhealthourplanet.co.uk/ https://www.england.nhs.uk/greenernhs/
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Day 4. <i>Co-benefits and communicating about climate change</i>	Students form groups of 3 (one student from each website group). Then have 3 mins each to describe the content of the website they explored.	Consolidate and share learning and perspectives.	
	Group task - Explore Co-benefits of reducing greenhouse gas emissions.	In groups of 3-4 students, spend 10 mins discussing all the ways reducing greenhouse gas emissions might be good for public and individual health. Take notes and report back. Aim to highlight that climate action has considerable benefits for individual health.	
	Discussion - why is climate change a difficult topic for conversation?	In groups of 3-4 students, spend 10 mins discussing why climate change can be a difficult topic for conversation. Take notes and report back	
	Presentation on communication	To give helpful tips on how to communicate around climate change - based on materials from Climate Outreach	https://climateoutreach.org/britain-talks-climate/
	Q&A on Friday presentations	Recap brief for tomorrow's presentations. Remind students that these will be peer assessed, so should be targeted at appropriate level for peers.	
	No homework tonight - focus on preparing presentations for tomorrow.		

Day 5. <i>Peer to peer teaching.</i>	Student presentations - students are divided into groups at the start of week and assign topics - over the week they prepare 15-minute presentations based on the assigned document. The brief is to outline the central ideas and explain their relevance to sustainable healthcare. The presentation is the assessed output from the week (the SSC is a summative task). Students are informed that the aim of the presentations is peer to peer learning and content should be pitched accordingly. To emphasise this, students are required to assess each other's presentations using a simplified rubric with three questions on a Likert scale (1. The presentation was interesting and engaging 2. I understood the subject matter of the presentation 3. I understood how this topic relates to sustainable healthcare) plus free text boxes for "Best feature..." and "Could be improved by..."	National Food Strategy	https://www.nationalfoodstrategy.org/ Optional podcasts: https://www.bbc.co.uk/programmes/m000xz3x https://www.bbc.co.uk/programmes/m0018njr
	Overprescribing	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019475/good-for-you-good-for-us-good-for-everybody.pdf	
	Air Quality (just executive summary)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1121599/executive-summary-and-recommendations-air-pollution.pdf	
	Moving forwards: Healthy travel	https://www.healthytravel.wales/uploads/1/2/9/5/129546984/moving_forwards_-_dph_annual_report_cardiff_and_vale_2017_en_cy_web_.pdf	
	Plant-powered Planet	Report: https://s41874.pcdn.co/wp-content/uploads/Plant-powered-Planet-Report-final.pdf Use infographics at: https://ukhealthalliance.org/influencing-policy/plant-powered-planet-building-a-healthy-sustainable-food-system/	

	Prizes & wrap up While academic calculates scores for prizes, students complete evaluation of the week. Following the session students write a short reflection highlighting the most significant learning points from the week and highlighting any actions they intend to take.	These activities are intended to encourage reflection and consolidation of learning but also support action.	
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Chapter 10. Introducing a Year 2 MBChB Sustainable Patient Pathways workshop: A Case Study. Anna

Stickland and Nicola Dowling. University of Liverpool

We developed a Sustainable Patient Pathways workshop for our Year 2 MBChB students. This is delivered in the latter half of their academic year and is introduced as a clinical placement consolidatory learning activity. The intention is that it introduces ideas and practice relating to sustainable healthcare that the students can then look out for when they are on their hospital placements. The workshop is heavily based on principles developed and shared by the Centre for Sustainable Healthcare (CSH) after we both attended a SusQI course in early 2020. Our hope is that this session supports our learners' development as student doctors so that they are better equipped to, not only achieve the GMC Outcomes for Graduates relating to sustainable healthcare but are also better equipped to work effectively in the NHS, now and in the future.

The workshop runs as a 1-hour session, with approximately 30 students spread across 4-6 tables in a university-campus-based teaching room. We have now run this for three consecutive academic years making small improvements each year and, more

recently have introduced this session to our Year 1 Graduate Entry Programme students.

The Learning Outcomes for our session are:

- Understand how pathways can be used to facilitate the delivery of effective patient care
- Recognise common areas of wastage in the NHS
- Consider the patient journey through an episode of care and how this can be improved
- Identify opportunities for lean pathways and improving sustainability when delivering patient care

We contextualise the relevance of these Learning Outcomes by linking them to the students' previous learning related to the pillars of sustainability, their experiences of pathways, the Royal College of Physicians' domains of quality in patient care, which includes sustainability as a key marker of quality care (Atkinson 2010), together with an introduction to the NHS Net zero plan. We ask students to consider what they know about the NHS carbon footprint already and where they think carbon hotspots might occur in practice. This usually generates a good discussion with some pre-conceptions challenged within the student small discussion groups.

This then gives us an opportunity to introduce the Centre for Sustainable Healthcare's (CSH) "Principles of Sustainable Clinical Practice". We discuss ways to improve patient outcomes and quality of healthcare delivered whilst simultaneously reducing unnecessary clinical activity and resource use.

Our students then break up into smaller groups to be guided through different patient clinical presentations and their associated journeys through healthcare.

One of these patients is Stephen, a 40-year-old with poorly controlled Type II Diabetes Mellitus, who presents to his GP with recurrent abscesses which have previously required admission to the Surgical Assessment Unit for incision and drainage with follow up dressings from the local Treatment Room.

The students work in their small groups to discuss the patient case and consider Stephens' journey across different healthcare settings and interfaces. The students are asked to identify environmental impacts and resource usage at each step of the patient journey following the CSH Principles of Sustainable Healthcare. Students collaborate to make suggestions related to opportunities for reduced activity via disease prevention, patient empowerment or use of lean pathways together with opportunities to reduce carbon usage via identification of low

carbon alternatives or review of operational resource use (Mortimer 2010).

The students are supported to review Stephen's usual medication, his chronic disease management and social environment to identify how his care and disease management could be improved. For some students it is an eye opener that sustainability can centre on disease prevention and patient empowerment to improve self-care. Too often students look to identify low carbon alternatives, rather than looking for more upstream and holistic changes. Whilst the students are engaging in these discussions and creating visual aids to present back to the group, we run a set of sustainability related music tracks in the background for some added inspiration. Big Yellow Taxi is the opener with a bit of Radiohead 'Fake Plastic Trees' for good measure!

Each student workshop has engaged positively with these activities and whether it is the effect of the background music, the clinical cases themselves, the subject matter or the enthusiasm of our tutors, it is great to see this and hear our students' ideas about what could make a difference.

Student evaluation of the workshop is not mandatory, but the Likert scores and comments completed by students suggest that they enjoy and value the session. They felt that the calm

environment, the interactivity and music supported their learning in the session.

Interestingly, separate to the workshop specific evaluation, we came across a minority of student comments that suggested that, although some students felt the sessions were interesting, they didn't understand the need for teaching related to sustainability. They couldn't see the relevance of the sustainability to their clinical placements and felt that perhaps this was outside of their jurisdiction. These were only a very small handful of comments within a large year cohort of over 300 students and so do not seem to reflect wider student opinion about the teaching but perhaps identify a harder-to-reach group of students who need more than a workshop to see the relevance of sustainability to their future career. These students undoubtedly need to see more role models embracing sustainability in their clinical practice and experience sustainability in action across a range of different clinical placements. How can we as educators better capture the attention and enthusiasm of this small cohort of students?

Acknowledgements: As educators we have felt fortunate to have had access to resources developed by the Centre for Sustainable Healthcare (CSH) with both of us having attended a CSH SusQI course in 2020. This helped us both to not only better inform our

own practice but also consider how we can apply these concepts within education of peers and students.

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Chapter 11. Case study: Integrating sustainability into Lifestyle Medicine and Prevention modules for early-years undergraduate medical students. Jitiratn (Proud) Rojchuphan, Jack Hall, Anna Ogier, Junzheng (Ray) Wang, Christopher-James Harvey, Richard Pinder, Amir H. Sam, and Noreen Ryan. Imperial College School of Medicine, Imperial College London

Jitiratn (Proud) Rojchuphan and Jack Hall both led equally on writing this chapter.

Background:

Imperial College School of Medicine (ICSM) has integrated sustainability and preventive healthcare into its undergraduate medical curriculum. Over the first two years of the programme sustainability has been incorporated into Imperial's innovative Lifestyle Medicine and Prevention (LMAP, pronounced El-Map) modules (Fig. 1). These modules seek to foster core competencies in Lifestyle Medicine, promote physician health, and enable a population health mindset.

LMAP's focus on prevention, person-centred care, and the wider determinants of health makes it a natural host for sustainability, recognising the topic as an institutional, national and international priority for medical practice and health systems. Collaboration

with other teaching teams, including those in healthcare quality and leadership further strengthens this integration.

In this chapter, we will explore an example of how LMAP has systematically incorporated sustainability into medical education and illustrates how teaching teams have worked together in the design and delivery of learning materials. Teaching

Sustainability within the LMAP curriculum

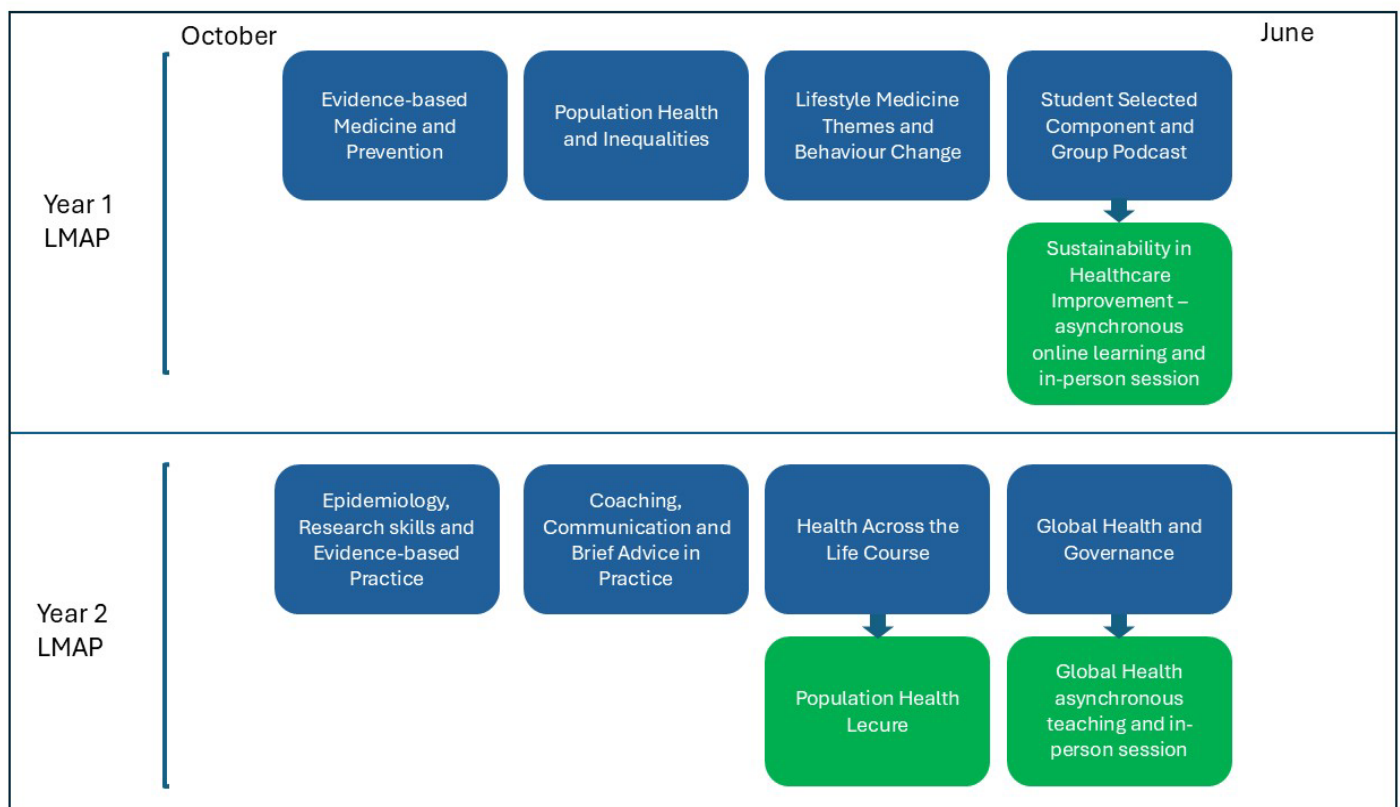


Figure 1. Course Structure of LMAP

The teaching of sustainability in LMAP follows a spiral curriculum model, where key concepts are introduced early and revisited with increasing complexity.

The programme's structure demonstrates careful pedagogical planning:

The foundation is laid in Year 1 through dedicated sessions on the importance of considering sustainability in healthcare improvement.

Year 2 expands to examine planetary health, climate change impacts on health systems, and introduces the Sustainable Development Goals.

Case Study: Sustainability in Healthcare Improvement – Year 1

This series of sessions have been co-designed by the teaching teams for population health and those teaching professionalism and health care quality (known locally as the Professional Values and Behaviours team). Across these sessions students learn about their role as future doctors in managing resources effectively and sustainably (General Medical Council, 2024).

Within the sessions, students discuss the SusQI framework, where the health outcomes of a service are measured against its environmental, social, and economic costs and impacts to determine its sustainable value (The Centre for Sustainable Healthcare, n.d.-a). SusQI embeds the Centre of Sustainable Healthcare's principles of sustainable clinical practice: prevention,

patient empowerment and self-care, lean clinical pathways and low-carbon alternatives (The Centre of Sustainable Healthcare, n.d.-b).

Sessions are based on a flipped-classroom pedagogical approach, comprising a mandatory two-hour asynchronous online learning event followed by a 90-minute in-person tutorial.

Part 1: Asynchronous Online Learning

This session introduces climate change as a public health emergency, prompting students to consider its impacts across the domains of Public Health: health improvement, health protection, and health services.

Students are introduced to the four principles of SusQI and the NHS's commitment to achieving Net Zero by 2040 (Stancliffe et al., 2022). The learning employs diverse educational formats, including textual information, embedded videos, diagrams, infographics, and real-life case studies.

The teaching team has found that the BMJ's Towards Net Zero Healthcare clinical case study (Sherman et al., 2021) has been particularly useful in integrating SusQI principles with key population health concepts. These include the wider determinants of health, active travel, prevention, and patient empowerment. This case study helps assess student understanding and

underscores how Lifestyle Medicine interventions benefit individual patient health, population health, and planetary health.

Sustainability is positioned as an integral domain of quality healthcare alongside other domains such as patient safety and efficiency (Mortimer et al., 2018). This connection reinforces students' existing knowledge of quality improvement in healthcare. Throughout the session, opportunities for reflection and collaborative engagement are provided through virtual whiteboards.

Authentic quality improvement initiatives illustrate the implementation of SusQI in clinical practice. The asynchronous component concludes with students reflecting on personal behavioural changes they could adopt to enhance sustainability in their daily lives, incorporating the COM-B model of behaviour change (Michie et al., 2011), exploring the interactions between an individual's behaviour and their capability, opportunity and motivation.

Part 2: In-Person Tutorial

Students work in small groups facilitated by faculty from both the LMAP and Professional Values and Behaviour teams. The session is focused on a review of a patient journey of a child with asthma - adapted from CSH resources.

Teaching integrates SusQI with core population health concepts that include health literacy, shared decision making, housing, green and blue spaces, food security, and active travel. This in-turn highlights the intersection between the wider determinants of health and sustainable healthcare practices.

In small groups, students rapidly develop and propose a SusQI project using the Plan-Do-Study-Act (PDSA) cycle (NHS England & NHS Improvement, 2021). Each group then presents a 90-second pitch to their peers, emphasising the anticipated impacts of their proposed intervention. This exercise fosters deeper learning through collaborative discussion and prepares students for their future quality improvement projects which they complete later in the course.

The tutorial concludes with highlights from CSH's Green Team Competition (Centre of Sustainable Healthcare), demonstrating the clinical, environmental, financial, and social benefits of SusQI initiatives within the NHS, and signposting further opportunities for sustainability engagement, such as student societies.

Barriers and enablers

Integrating sustainability into ICSM's undergraduate curriculum has not always been straightforward. The GMC's mandate (General Medical Council, 2018) for recent graduates 'to apply the principles of ...sustainable healthcare to medical practice,'

complemented by the MSC's ESH curriculum (Tun et al., 2022) provides helpful guidance yet requires some-level of interpretation.

Imperial has embraced the sustainability agenda, with the medical school matching the wider university's commitment (Imperial College London, 2021) as well as the NHS net-zero commitments (NHS England, 2022).

Reflecting on our journey, we have identified three strategic enablers that have facilitated adoption:

Curriculum agility and integration: an already-packed curriculum has required careful collaboration and engagement with teaching leads to integrate the learning and ensure that the sustainability agenda is meaningful - not simply perceived as an 'add on.'

Early clinical contextualisation: demonstrating the clinical relevance of sustainability to early-year medical students with limited clinical exposure is a challenge. We worked in partnership with students to co-produce learning material: ensuring content resonates with the next generation of students and clinicians.

Consistency, expertise, and clinical authenticity: we have needed to ensure that faculty are appropriately trained in the concept of sustainability in healthcare as there is a variability in clinical tutors' expertise in this area. The meaning of sustainability can differ, with

preconceptions that sustainability focuses solely on low carbon alternatives or that sustainability of a project relates to its ability to continue in the long-term. Comprehensive pre-session briefings (combining written and video resources) have been put in place to standardise delivery.

Through this integrated approach, sustainability is evolving from an adjunct topic addition to core clinical knowledge, equipping graduates to optimise health outcomes across individual, population, and planetary levels.

Useful Resources

MSC ESHA Curriculum:

https://www.medschools.ac.uk/media/2949/education-for-sustainable-healthcare_a-curriculum-for-the-uk_20220506.pdf

Centre for Sustainable Healthcare's SusQI framework, and educator's toolkit: <https://www.SusQI.org>

Toward's Net Zero clinical case study -

<https://www.bmj.com/content/379/bmj-2021-066699>

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Chapter 12. Integrating sustainable quality improvement into the Newcastle MBBS programme.
Emily Shaw. University of Newcastle

Why?

The General Medical Council (GMC) has mandated in 'Outcomes for Graduates' (2018) that all doctors must be able to apply the principles of sustainable healthcare to their practice, and the National Health Service (NHS) has made a commitment to achieve Net Zero by 2040 (NHS, 2022). Barriers to integrating education for sustainable healthcare (ESH) have been recognised (Tun, 2019). These include difficulty in assessing learning in the subject, lack of knowledgeable teachers, uncertainty of location in an already crowded curriculum and a need for learning resources.

Prescott et al. (2018) advocate for the early integration of practical experiences in medical training, enabling students to embed sustainability as a core element of their professional identity. Further, Shaw et al. (2021) emphasise that effective education for sustainable healthcare (ESH) should actively engage students in experiential learning that fosters critical thinking, leadership, and change management skills. However, Bray et al. (2023) identify that the perceived difficulty of applying sustainability principles directly and practically to patient care is a key barrier to sustainable healthcare education.

Sustainable quality improvement (SusQI) aims to improve healthcare through assessing healthcare outcomes using the lens of the 'triple bottom line' (Mortimer et al., 2018). The triple bottom line measures the environmental, social and economic costs against the health outcomes of a service. This allows an assessment of 'sustainable value'. The Royal College of Physicians has identified sustainability as a key marker of quality within healthcare (RCP, 2011). This called for the definition of quality to be expanded to include social and environmental impacts. Thus, sustainable quality improvement is not seen as a replacement of traditional quality improvement (QI) work, but rather sustainability principles should be embedded into existing QI theory and practice (Mortimer et al., 2018).

Our ambition for integrating SusQI into our curriculum was to allow students to actively experience direct relevance of sustainability to patient care through involvement in a patient focussed, active process. This would also provide an opportunity for assessment of ESH skills and help to make sustainability a mainstream part of QI work. At Newcastle, a review of our curriculum with a view to developing a spiral ESH curriculum coincided with the development of a new final year curriculum. This gave us an opportunity to integrate sustainable quality improvement into the final year programme.

How?

At Newcastle, the new final year curriculum included an assistantship in general practice consisting of a three-week rotation in semester 1 (AS1), and a four-week rotation in semester 2 (AS2), usually undertaken in the same GP practice. The assistantships included supervised clinics, weekly tutorials and undertaking a SusQI project.

SusQI concepts were introduced in AS1, and SusQI projects were undertaken during AS2. The students had to present their SusQI in poster form to fellow students and GP tutors in their final week of the assistantship.

Faculty involved in the SusQI programme can be seen in Figure 1. Tutorials introducing the topic of SusQI were delivered to small groups of students by GP tutors (attached to the University including academic GP trainees, GP trainees undertaking integrated training posts in education, and clinical teaching fellows). In house GP supervisors supported students within their placement practice to select a suitable project and carry out the QI work.

Sub-dean for primary care	Teaching fellow with interest in ESH	5th year teaching fellows	GP tutors	In house GP supervisors
• Link with senior management • Lead for integrating ESH into curriculum	• Undertaken training from Centre for Sustainable Healthcare on susQI • Leading development of susQI programme, including supporting GP tutors and GP supervisors with ESH and susQI work	• Responsible for development of 5th year curriculum, including implementing ESH work • Involved in teaching tutorials • Link for in house GP supervisors	• Include clinical teaching fellows, academic trainees and GPs • Facilitate tutorial based sustainability teaching and student susQI presentations	• Responsible for supervising students in practice • Support students with susQI projects within practice placement

Figure 1. Faculty involved in SusQI programme

The students were asked to undertake a quality improvement project in their GP practice and apply the triple bottom line (Figure 2) in order to assess sustainable value. Tutorials briefed them on the process and allowed them time to plan the projects with GP tutors and their peers.

$$\text{Sustainable value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$

Figure 2. The triple bottom line

The timeline of the SusQI project is shown in Figure 3.

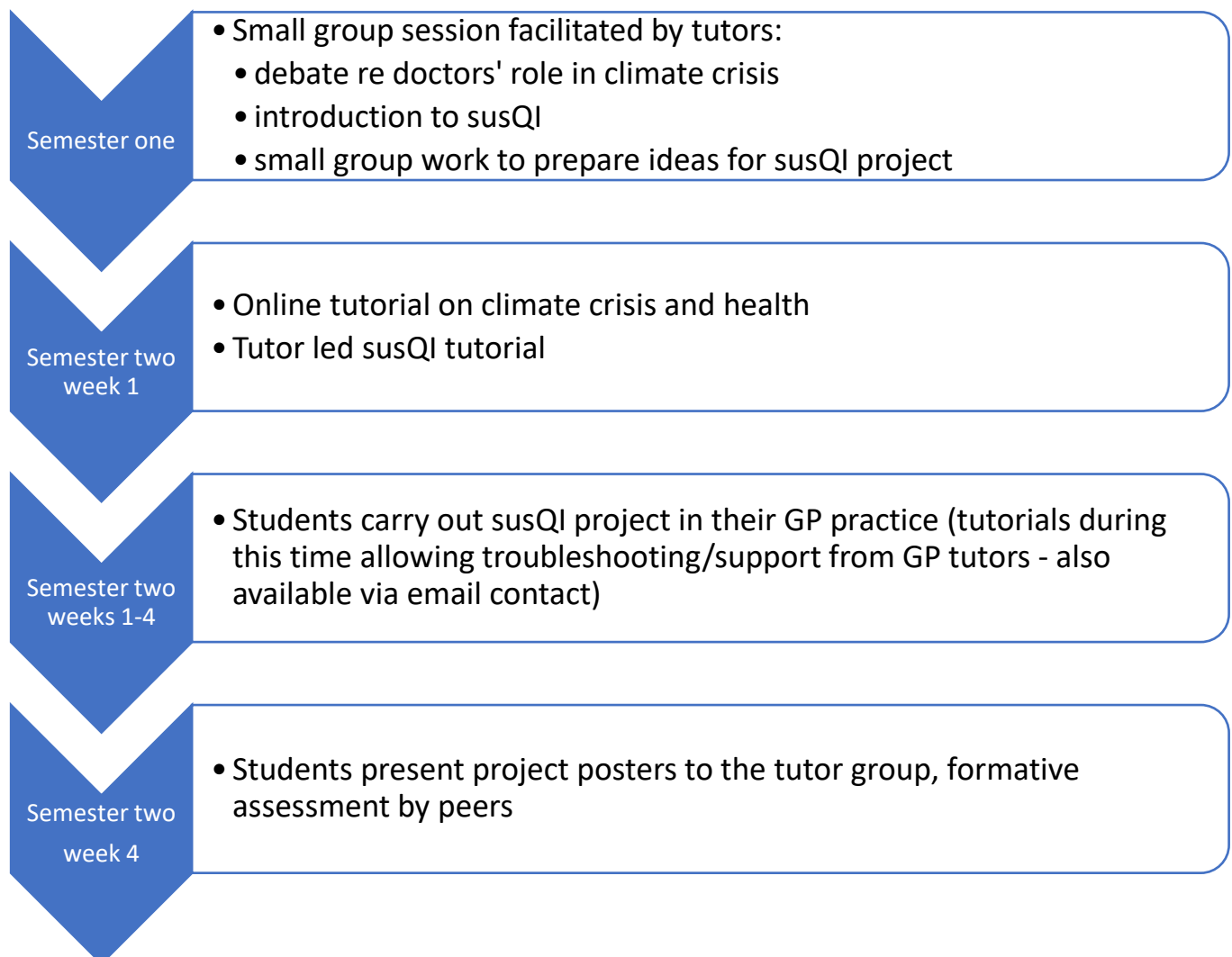


Figure 3. The timeline of the SusQI project

Example project

Any quality improvement project could be undertaken so long as the triple bottom line (TBL) was included. Figure 4 shows an example project and how the TBL could be applied.

Project title: Review of antibiotic prescribing for past 3 months in cases of sore throat - was CENTOR/FeverPAIN criteria used to guide management?

Environmental

- Calculate carbon footprint of inappropriate antibiotic prescriptions

Financial

- Calculate cost to NHS of unnecessary antibiotic

Social

- Impact on health beliefs regarding antibiotic use of local populations

Figure 4. An example project with TBL

Other project examples included opioid deprescribing, staff and patient active travel, stopping second anti-platelet post MI, switching from MDI to dry powder inhalers.

We were aware that students had a relatively short time frame to undertake their projects. Students were advised that for smaller projects, such as a staff/patient travel survey or a focused medication project, completion was expected. For larger projects, such as considering energy inputs into the practice building and exploring ways to reduce energy use, we advised students completion may not be possible in the short time frame. In this

case they were asked to present a full design plan and evidence that they had started data collection.

To assess the environmental element of the TBL, an estimation of carbon footprint is often required. Students were signposted to resources to assist them with this (see Appendix).

Assessment

In advance of the final tutorial of AS2 students were asked to prepare a conference style academic poster, which must include the TBL. The students were not required to print the poster; it could be presented via Powerpoint. They were signposted to university guidance on creating an academic poster.

Students had five minutes to present their poster individually to the group. There was then five minutes allocated for questions. Lastly, the other students were asked to give feedback to the presenter via Padlet by scanning a QR code with their devices. Ahead of the session each student was asked to prepare a QR code that linked to a Padlet page for their individual feedback. The Padlet page had three prompts:

- What I liked most about your presentation was:
- What would be helpful next time:
- What I have learned from your presentation:

This allowed each student to leave the session with formative feedback on their project and presentation, whilst also requiring minimal faculty resource. This year a certificate has been introduced – tutors will issue students with a certificate if the student has completed the SusQI project to a satisfactory level.

Evaluation

The introduction of SusQI to the final year has been evaluated and the results published in (Chambers et al. 2024). In brief, they concluded that the integration of a large scale SusQI programme is feasible, it was low cost and it was a useful way for students to connect and apply theory to clinical practice. It did not require faculty heavily experienced in ESH; GP tutors and in house GP supervisors reported they enjoyed learning alongside their students. It also provided an opportunity for formative assessment of sustainable healthcare learning outcomes.

In response to this evaluation, students are now able to undertake the project over the entirety of their final year, and it can be primary or secondary care based.

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Appendix: Useful resources to calculate carbon footprint

The Sustainable Healthcare Coalition (n.d.) *Carbon Footprint Calculator*. Available at: <https://shcpathways.org/full-calculator/> (Accessed: 11 September 2025).

The Centre for Sustainable Healthcare (n.d.) *Carbon Footprinting of Clinical Activities*. Available at: https://www.SusQI.org/_files/ugd/f57abc_5da876a6470d491a923a1af69f2c64a9.pdf (Accessed: 11 September 2025).

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Chapter 13. Embedding Sustainable Healthcare in the Imperial College London Undergraduate Primary Care Curriculum. Arti Maini, Neha Ahuja, Stephanie Powell, Nikul Kotecha and Nina Dutta. Imperial College London

The challenge

Climate change has been widely recognised as a health emergency. With the NHS target to reach net zero by 2040 (NHS England, 2022) and the GMC emphasising the importance of sustainable healthcare education (GMC, 2018), we want to prepare our medical students to practice sustainable healthcare.

Our approach

We mapped the existing coverage of sustainable healthcare in our undergraduate primary care curriculum in collaboration with student partners, identifying areas of good practice and areas for development. Our mapping exercise was informed by the Education for Sustainable Healthcare Curriculum (Tun and Martin, 2022) that has been endorsed by the Medical Schools Council (MSC).

Together with student and community partners, we are building on this foundation to further strengthen sustainable healthcare education in the curriculum from years 1 to 6. We have adopted a spiral approach to curriculum development, introducing key

principles of sustainable healthcare early in the curriculum and building on these in later years with increasing complexity. This includes opportunities for students to apply their knowledge and skills in sustainable healthcare through real-world, experiential projects.

In the first two years of the curriculum, we strengthened our emphasis on principles of sustainable healthcare practice by emphasising the importance of disease prevention and health promotion. Medical students now learn health coaching skills to strengthen patient agency and person-centred care and facilitate conversations about health behaviour change. Health coaching training comprises digital learning, skills practice during campus-based communication skills sessions, and health coaching conversations with patients in a GP setting.

Students explore wider determinants of health and health inequalities through a blended learning approach, including real-world community-engaged projects and case-based learning. Associations such as those between asthma, health inequalities and air pollution are highlighted, illustrating the relevance to clinical medicine.

Year 3 students complete digital learning on sustainable healthcare in clinical practice. This interactive resource incorporates videos, quizzes and a case-based scenario, focusing

on the health impacts of climate change and air pollution. The case-based scenario encourages students to apply key principles of sustainable healthcare in clinical practice. All year 3 students also undertake assessed, community-engaged projects to address a local health priority during their 8-week GP placement. All year 6 students undertake assessed quality improvement projects during their 4-week GP placement. As part of these assessments, students are asked to demonstrate how they have applied principles of sustainable healthcare.

Campus-based teaching sessions for medical students in years 3, 5 and 6 adopt interactive case-based learning approaches and simulation, highlighting the relevance of sustainable healthcare principles in clinical practice. Examples of topics covered include considering greener inhaler prescribing in asthma, addressing modifiable risk factors, improving shared decision-making, raising awareness of social prescribing and rationalising medications where appropriate.

Year 3 students can also choose to complete Student Selected Components (SSCs) on Sustainable Healthcare, Promoting Health Equity and Social Prescribing, enabling them to think critically about these areas and learn from experts in the field. Year 5 students can choose to complete a 3-week specialty choice placement (SCP) on sustainable healthcare in a GP setting.

To support faculty development, we worked with student partners and GP faculty to co-create a short 4-minute video for GP tutors and a one-hour workshop to introduce the topic of sustainable healthcare education and tips for supporting students to learn more. We also incorporated key information on sustainable healthcare within GP tutor guides for the clinical placements, and within PowerPoint presentations designed for GP tutors to use within tutorials with students.

Insights and impacts

Our collaborative approach to sustainable healthcare is designed to equip students with the knowledge and skills to embed sustainable healthcare principles in their clinical practice.

Student feedback highlighted their learning about the intersections between health and climate change. Students valued opportunities to think critically about sustainability and apply sustainable healthcare principles in their project work and patient interactions. They also reported that this learning prompted them to reflect on their roles in advocating for sustainable healthcare approaches.

Faculty members noted that involvement in sustainable healthcare teaching inspired them to develop this in their own clinical practice. Community partners have valued opportunities to shape

curricular materials through highlighting what matters most to communities.

Lessons learned

Working in partnership with students, faculty and community partners has been key in developing our approaches to embedding sustainable healthcare in the curriculum and creating engaging curricular materials. We have learned that developing strong, respectful relationships, having clear, mutually beneficial goals, building in flexible ways of working and ensuring regular check-ins are fundamental to this process. We have also recognised the importance of valuing the time commitment from students and community partners, and ensuring that this is reciprocated, including through reimbursement where possible and appropriate.

Next steps

We will continue to review our materials and approaches to increase their accessibility and relevance for our students. We plan to continue working with student and community partners to develop our curriculum and strengthen our guidance for tutors and students on embedding principles of sustainable healthcare in community-engaged quality improvement projects and in clinical practice.

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Chapter 14. Experience of Faculty Development for Education for Sustainable Healthcare (ESH). Felicity Connolly. Lancaster University Medical School

Following the inclusion of sustainable healthcare in GMC Outcomes for Graduates (*GMC Outcomes for Graduates* 2018) I have led the integration of ESH in our MBChB Medicine core curriculum at Lancaster University Medical School from 2019.

- We threaded many of the ESH themes through existing teaching.
- We developed two new modules in Year 3 and 5.
- We used a spiral curriculum approach.

This continues to be a work in progress as we roll out more ESH learning via our ongoing curriculum review process.

It was fundamental that we developed meaningful core curriculum learning that was neither a tick box exercise nor dependent on a few willing individuals with an interest but was rolled out across all areas, and therefore sustainable in the long term. As such we have had the experience of the faculty development challenges and rewards of including this new and emerging area of medical education.

What have we done?

Below is a summary of the ESH integration at Lancaster Medical School. Initially we used the ESH Priority Learning Outcomes developed with the GMC (Centre for Sustainable Healthcare, 2013), as well as the Royal College of General Practitioners Undergraduate Teaching General Practice Sustainability intended learning outcomes (Harding A, 2021).

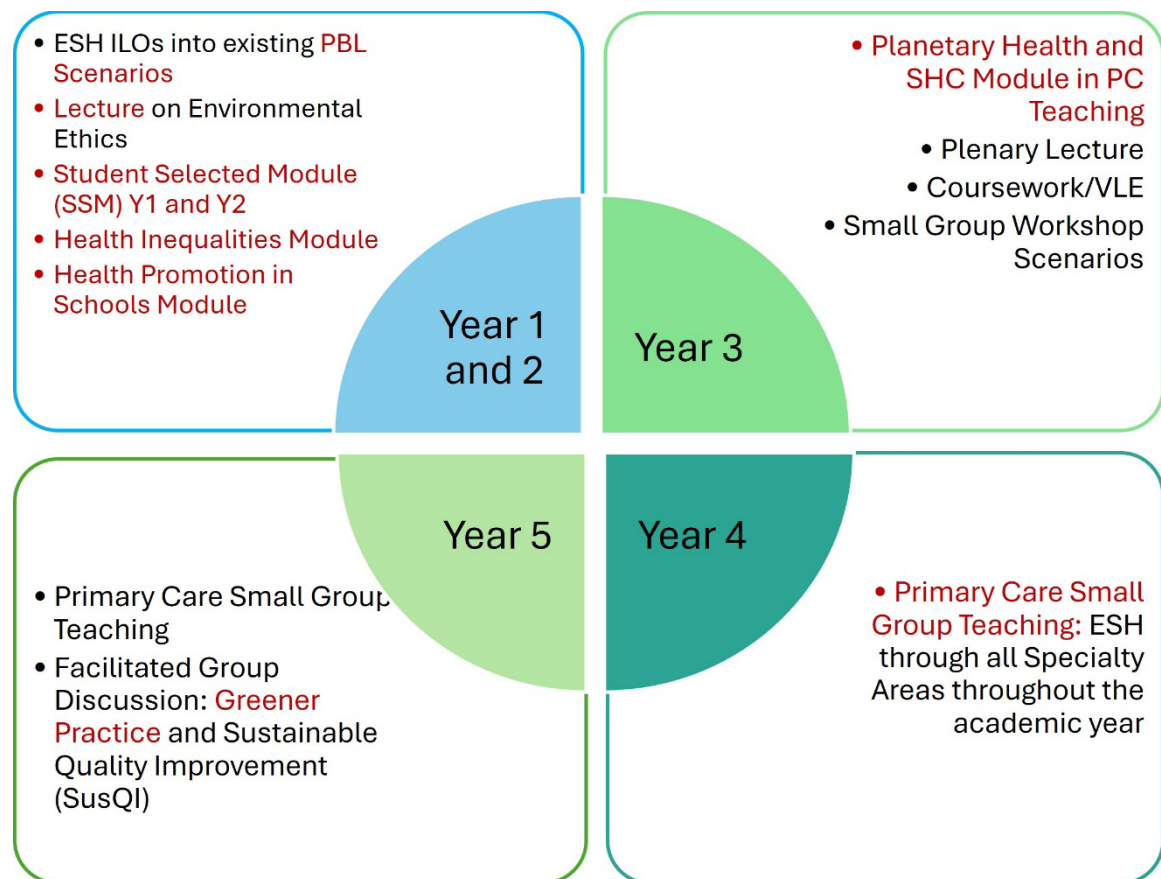


Figure 1. Summary of the ESH integration at Lancaster Medical School

Year 1

- Integrated new ESH ILOs into existing Problem Based Learning (PBL) Scenarios to introduce the concepts
- Lecture on Environmental Ethics
- Year 1 student selected module (SSM) on environmental ethics of sustainable healthcare

Year 2

- Integrated new ESH ILOs into existing PBL Scenarios
- Added a climate change angle to:
 - Health Inequalities module - student presentations on impact of climate change
 - Health Promotion in Schools module: students deliver a lesson to Year 6 primary school pupils about healthy and low carbon lifestyles affecting cardiovascular health.
- Year 2 student selected module (SSM) on Sustainable Healthcare, Environmental Ethics, Planetary Health

Year 3 Module: Planetary Health and Sustainable Healthcare

- Plenary Lecture: Introduction to Planetary Health and Sustainable Healthcare

- Flipped classroom approach: coursework/Moodle pre-reading to explore scenarios and resources.
- Small Group Workshops facilitated by GP Educators in Primary Care Clinical Teaching:

Scenarios:

1. Health Benefits of Low Carbon Lifestyle
2. Principles of Sustainable Clinical Practice
3. Waste: pharmaceuticals, clinical waste, food
4. Climate Change Advocacy: what is the doctor's role?

Year 4 Primary Care Small group teaching

- ESH threaded through all specialty areas for 30 days teaching through the academic year
- Used:
 - UK ESH Curriculum to apply to speciality areas (Tun and Martin, 2022)
 - RCGP Undergraduate Curriculum document to apply the primary care lens to sustainable clinical practice (Harding A, 2021)

Year 5 GP and Primary Care Rotation

- Small group teaching, GP Educator facilitated group discussion: focusing on Greener Practice (*Greener Practice*)
- Sustainable Quality Improvement (Sus QI): student Dragons' Den presentations from GP placements (Centre for Sustainable Healthcare).

Faculty Development: The journey...

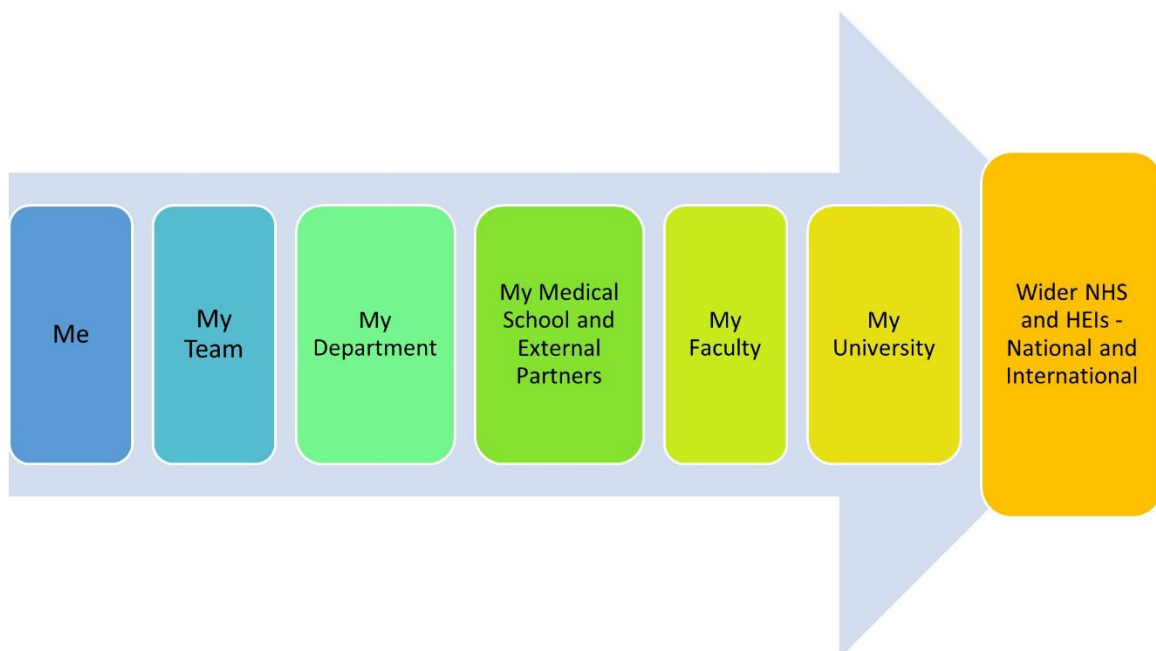


Figure 2. Faculty Development

ESH is a new emerging medical education field unfamiliar to most healthcare professionals. With ESH having not historically been included in healthcare education, faculty development has been integral to process. ESH faculty development began in 2018 with my own upskilling, as the Clinical Lead for Sustainable Healthcare,

and has subsequently spanned my direct primary care team, department, university and, through networking opportunities, more broadly to educators in the wider Higher Education Institution and Medical Education landscape nationally and internationally (Fig. 2).

There have been many challenges, but to name but a few:

- Capacity and time: full curriculum with competing areas of importance.
- ESH has cross cutting themes across all clinical and academic areas, so there is no obvious place to integrate in isolation.
- Many colleagues expressed ESH is “not my area.”
- At times in the early stages a felt lack of expertise and spread thinly.
- Resistance from tutors delivering unfamiliar content.
- Coproduction of learning: tutor learning was often just ahead of, or jointly with, students – caused unease among some tutors. This required support and reliance on quality resources to allow for tutors to be facilitators not “teachers.”
- Students’ experience on clinical placements has not reflected their university learning: students were frustrated about this – there is a need to explain and contextualize.

- Medical students learn across multiple institutions, hospitals, healthcare organisations with inconsistent approaches to sustainable healthcare, poor role modelling among a wide number of clinical educators.
- Division of labour was challenging for assessment writing and wider developmental and evaluation work.
- There is a challenge of assessing ESH which does not easily fit into current assessment methods used in medical schools.

What has helped in the process more generally?

- Senior faculty lead and buy-in from the start: supportive head of school is essential!
- ESH-lead familiarity with overall curriculum and faculty processes to be able to gauge and influence where learning would fit best.
- ESH UK networks sharing practice.
- Wider context of GMC inclusion of ESH in OFG 2018, Medical Schools Council (MSC) endorsement of UK ESH Curriculum and ESH Alliance, University Sustainability Strategy (*Lancaster University Sustainability Strategy*) and NHS NetZero (NHS England, 2020) launch added weight to the case when discussing with faculty.

- Published works: *Fulfilling a New Obligation* (Tun, 2019)
- Resourcing: no new staff were required for workshops – time was carved out in small group teaching in primary care course and integrated into current curriculum more widely.
- GP tutors are adaptable generalists, with many crossover themes between primary care and ESH.
- Student engagement: Planetary Health Report Card (PRHC) helped to steer the direction and provided leverage to senior faculty. (*Planetary Health Report Card*)

Faculty Development strategies and enablers.

I've highlighted some specific resources and approaches which been particularly helpful.

For me as ESH lead.

- Staff resourcing: negotiating and creating time in my job plan, undeniably the most important step. ESH integration needs investment in staff resource and inclusion in school strategy.
- Centre for Sustainable Healthcare resources. (*Centre for Sustainable Healthcare*)

- EUAC – resources and EUAC Leadership Lab course 2024 – to develop the specific strategic leadership skills and approach needed for change at scale (*EUAC*).
- Cross institutional collaboration – Support network of colleagues in national working group (now MSC-ESH Alliance)
- I was a contributing author to ESH UK Curriculum, now hosted on MSC website (Tun and Martin, 2022)
- Planetary Health Alliance – annual conference, educational framework, networks (*Planetary Health Alliance*).
- Global Consortium Climate and Health Education (GCCHE) curriculum and networks (*Global Consortium on Climate and Health Education*).
- Greener Practice Education Networks (*Greener Practice*)
- Planetary Health Report Card (PHRC) - supporting student groups and using their influence as advocates (*Planetary Health Report Card*)
- Pedagogy – two particularly useful guidance frameworks:
 - CoDesigns ESD Toolkit (*CoDesignS ESD Framework*)
 - PHA Alliance Educational Framework (Faerron Guzman, C., Potter, T., & Planetary Health Alliance, 2021)

My direct team: Primary Care GP SCLs and CTFs, and sessional tutors

- Initial structure of teaching with presentations to both students and tutors allowed co-production of knowledge which overcame the initial resistance from tutors.
- Developing quality resources and cases to prompt group discussion, meaning tutors acted as facilitators, and could co-produce knowledge with students as well as encourage peer to peer learning and role modelling.
- Academic GP team: Deputies and GP leads – delegated roles to my GP team to allow opportunities for them to develop educational leadership skills within their year groups.
- ESH Professional Development sessions for tutor development with ongoing CPD, which allowed delegation of ESH teaching and resource development to those delivering it.

My department: Lancaster Medical School

- Tapping into wider expertise – overcoming academic colleagues saying “ESH is not my area.” For all those who said no, there were others who were keen to be involved.
- Finding allies was crucial.

- Academics from many areas offered to develop ESH:
 - Environmental/Medical ethics
 - Sustainable Anaesthesia
 - Social science
 - Global Health
- Curriculum Review process is now allowing more formal approach to integration of ESH as a curricular theme.

My medical school and external placement partners

Engaging clinical partners and educational supervisors from student placements has been a challenge. I have tried various approaches:

- I run annual workshops and plenaries at Medical School External Education Days attended by clinical supervisors from hospital trusts and GP and Community placements.
- In primary care we developed a termly newsletter which is shared with all GP and Community placements – a forum to share our ESH work.
- We secured National Institute for Health and Care Research (NIHR) funding for a Sustainability Medical Education Academic Clinical Fellow to undertake research in

assessment of ESH, and grant funding a PhD in medical ethics of sustainable healthcare.

My Faculty of Health and Medicine

- With an expanding role in ESH I was a founding member of Faculty of Health and Medicine Sustainability Group, advocating for ESH to be one of the five priority sustainability strategic areas for the faculty.
- I have presented our ESH work in faculty forums which has helped to address the need to coordinate education, research and engagement.

My university: Lancaster University

- As ESH Lead I attend University-wide “Sustainability Knowledge Exchange” termly meetings organised by the university sustainability team.
 - We share good sustainability practice across all academic faculties for education, research, engagement and net zero targets.
 - I have presented our ESH work to the wider university which has aided support for embedding graduate attributes in sustainability across all courses.

- I engage with the established University Sustainability team and have forged collaborative working relationships.
- The experience of ESH work has helped to facilitate interdisciplinary and -faculty collaboration, which mirrors the Planetary Health Approach.

Wider NHS and HEI's – national and international

The global nature of the ESH work has provided many opportunities for national and international collaboration:

- I was invited to deliver a SusQI presentation at the National Foundation Doctors Quality Improvement conference, influencing the choice of QI projects that foundation doctors undertake, cascading improvement of sustainable healthcare practices across different UK health care settings.
- As a member of the original ESH national working group, the Medical Schools Council formally approved the MSC-ESH Alliance. We facilitate sharing of ESH best practice across all UK medical schools - both via regular online meetings and in-person conference.
- As part of an international group of medical educators I contributed to an ESH symposium and workshop at AMEE24

international medical education conference, sharing our experience in an international forum of health educators.

- As a member of European Network of Climate and Health Education (ENCHE) we share ESH experiences across Europe (*European Network on Climate and Health Education*).

Reflecting on my ESH work of the past seven years I have realised the importance of stepping out of my own professional comfort zone to aid progression of this new field. Essential in facilitating that is a supportive workplace culture. Encountering and (mostly) overcoming, or working around, barriers has been a recurrent experience. Finding ESH allies to provide support and forge alternative approaches and pathways has been crucial - both in my own institution and more widely.

In conclusion, the process of change and social tipping interventions by the health community described by Howard et al in the Lancet Planetary Health is an experience I identify with from my own ESH journey (Howard *et al.*, 2023). To those who are trying to do similar ESH work I wholly recommend this academic paper and helpful infographics. My experience tells me it is imperative to prioritise finding allies to create the workplace culture needed to facilitate the scale of transformation needed for our healthcare curricula to adequately address the urgency of the planetary health crisis.

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Chapter 15. Planting the seeds of change: promotion of sustainable travel to clinical placements. Iain Young. University of Liverpool

In 2021 the University of Liverpool committed to reducing its carbon footprint and promoting sustainable travel among its students by making pump-priming funding available from a University Sustainability Fund for projects that would help meet these goals. The team saw this as an opportunity to raise awareness of the carbon emissions resulting from certain transport choices; to reduce the environmental impact of student doctors commuting to clinical placements and foster a culture of sustainability empowering student doctors to lead by example in the transition to a net zero NHS.

Project Objectives

The Sustainable Commuting Scheme focused on raising awareness of sustainability and reducing the carbon emissions associated with commuting to clinical placements. The team set out to:

Understand student travel behaviours and any barriers to adopting sustainable travel options.

Raise awareness about the environmental impact of commuting and promote active travel.

Collaborate with NHS partners support sustainable travel by raising awareness, removing barriers and actively encouraging sustainable, active travel choices.

Background

In common with most healthcare programmes, clinical placements are a mandatory component of the MBChB program at the University of Liverpool. For around 30 weeks of each academic year, third, fourth and fifth-year students travel to NHS hospitals, Hospices, GP practices and community settings across the North-West. Most students' daily commute involves a return trip of around 10 miles from their accommodation but many travel substantially further. Lot of students use private cars and travel alone, contributing significantly to the university's scope 3 emissions (Choube, Oh & Zünd 2024).

The NHS has committed to achieving net zero carbon emissions by 2045, with an interim target of an 80% reduction by 2036-2039 (NHS England, 2020). The NHS Net Zero Travel and Transport Strategy (NHS England, 2023) emphasizes the importance of sustainable travel options, including cycling, walking, and the use of zero-emission vehicles. By 2026, sustainable travel strategies will be integrated into NHS trust and integrated care board (ICB) green plans. These policies provide a framework for the School of Medicine to align its travel initiatives with national goals.

Approach

The Cycle to Placement Scheme involved data collection, stakeholder engagement and implementation of targeted interventions.

Data Collection: Surveys and focus groups were conducted to gather information on student travel behaviours, attitudes, and barriers to sustainable travel. This data informed the design of the scheme and helped identify key areas for intervention.

Stakeholder Engagement: Collaboration with NHS partners, including hospital trusts and GP practices, was crucial in developing the scheme. Meetings and workshops were held to discuss the feasibility of providing cycling infrastructure and support services.

Interventions: Based on the findings, several interventions were implemented:

Provision of Bicycles: A fleet of bicycles was made available for students to use for commuting to placements. This initiative was supported by the university and NHS partners.

Cycling Infrastructure: Secure bike storage and changing/showering facilities were identified or made available at placement sites and on campus. High-quality D locks were provided with the bikes along with cycle lights and helmets.

Awareness Campaigns: Information sessions and promotional materials were developed to raise awareness about the benefits of cycling, local bus services (and instructions how to purchase passes and tickets) and other low carbon travel options.

Shuttle Services: Discussions were started with NHS partners to determine whether shuttle bus services could be made available to placement sites, further reducing the need for private car use.

Outcomes

The Cycle to Placement Scheme has had a positive impact on both the environment and student wellbeing. Key outcomes include:

Reduction in Carbon Emissions: The scheme has the potential to reduce placement-related carbon emissions by up to 75%, significantly contributing to the university's sustainability goals.

Improved Student Health: Active travel choices have numerous benefits beyond environmental sustainability and promotion of active living. There are many more benefits to health with benefits to the reduction of risk of chronic diseases, there are potential economic benefits and social benefits (Ding et al. 2024).

Increased Awareness: The awareness campaigns have successfully highlighted the environmental impact of commuting and encouraged more students to consider sustainable travel options. The number of citations of papers related to “sustainable travel”

has increased by over 14-fold from 2014 to 2024 in Web of Science™, Citation Reports (© Clarivate 2025) indicating a growing interest this area.

Challenges and Future Directions

The scheme was initially successful but continuation beyond the first year presented us with several challenges, including ensuring the availability and maintenance of bicycles, managing the scheme on a day-to-day basis and securing funding for expansion and infrastructure. The solution to these challenges was in partnering with a local cycling coop “Peloton” which has the aim of promoting safe, accessible bike use in Liverpool. With Peloton the team have been able to expand the cycling infrastructure, put in place a bike-loan management system, distributing locks and helmets and servicing the fleet of bikes. Peloton also offer servicing of the students’ own bikes, charging only for parts and instruction in safe cycling and basic bike maintenance. Peloton also offer guided group cycling events on evenings to help newcomers to inner city cycling build their confidence.

Conclusion

By aligning with NHS policies and leveraging the support of university and NHS partners the School of Medicine Cycle to Placement Scheme represents a small but important step towards reducing the environmental impact of student commuting to

placement and, perhaps more significantly, promoting sustainable travel. The team have been, throughout, very aware that the long-term success of the scheme is only possible with the involvement of the local bike coop who now provide the logistics of the bike library, and this may not be easy to replicate.

Overall, the team have been impressed how eager the student doctors were to try cycling to placement –the team were overwhelmed with applications to join the scheme, and, despite expansion, the bike library continues to have a waiting list for bikes. Given this level of engagement and enthusiasm, surely the scheme has the potential to make a lasting positive impact on both the environment and student well-being.

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Chapter 16. Embedding Sustainable healthcare teaching at Brighton and Sussex Medical School. Anna Jones. Brighton and Sussex Medical School

Background

We had begun introducing global health teaching at Brighton and Sussex Medical School (BSMS) and, subsequently, in part in response to the Lancet Climate and Health reports, we introduced our first lecture on climate and health in 2013. On a personal level, participating in the “Medact - Healthy Planet, Better World” conference in 2016 fundamentally transformed my own conceptualisation of planetary health.

We then took part in the pilot on ESH led by the Centre for Sustainable Healthcare (CSH) and became one of a small number of beacon medical schools, which supported the development of our teaching together through participation in CSH workshops on ESH. It took more time to incorporate core teaching across years 1 – 4 which followed on from the establishment of my role as lead for ESH which began in 2019. Another significant driver for the development of ESH teaching was the lead taken by BSMS students on the Planetary Health Report Card (PHRC) in 2021. As with many other schools, the PHRC has been fundamental in identifying gaps in curriculum content and in understanding the student experience in this area. These students were also highly

influential in BSMS's decision to declare a climate emergency in 2021.

Approach to teaching on Sustainable health in the UG curriculum:

The overall aims of our core teaching on sustainable healthcare at BSMS are for students to be able to appreciate the health impacts of climate change and how these will affect their clinical practice, the paradox of the negative environmental impacts of healthcare on population health and how to practice medicine more sustainably with a focus on patient safety, avoiding waste and maximising patient outcomes. We have found the principles of sustainable healthcare (Mortimer 2010) to be invaluable in structuring sessions, and they have the additional strength of helping students to consider the various functions of public health and healthcare systems as well as being highly relatable to clinicians involved in this teaching.

Outline of teaching and learning on ESH:

Core curriculum:

Year 1: 'Environment and Health' session: This half-day session sits within the Inclusion and Inequalities in Health strand of teaching. This session covers the basic concepts of planetary health and then focuses on anthropogenic air pollution. Using the case of Ella

Adoo-Kissi-Debrah, students and facilitators explore together the ethical dimensions of this case linking this to inequities in health as well as the concept of the health co-benefits of climate mitigation with active travel as an example. They consider how doctors can advocate for their patients and promote population health using this case study as an example.

In addition, at the beginning of their Clinical skills training, the team introduce the need for rational and appropriate use of PPE - particularly glove use – and link this with their learning on infection control and hand hygiene.

Year 2: A session on ‘Sustainable healthcare’ with the Clinical and Community practice module focusses on the environmental impacts of healthcare with a lecture which includes content on the social, clinical and environmental impacts of healthcare, PPE (particularly around supply chains), the carbon emissions of the NHS and the moral responsibilities of clinicians to practice sustainably. The small group sessions that follow this are led by GP facilitators using a clinical case study that explores the environmental and clinical benefits of disease prevention, medication adherence, and tackling overprescribing. This session uses the principles of sustainable healthcare to structure the discussion which has the wider benefits of helping students to think about the functions of healthcare systems and the role of

doctors. One interesting outcome of this has been that the initially the GP facilitators were quite reticent about facilitating this topic as they felt that they were not experts in SHC. However, this viewpoint changed during the facilitator briefing sessions that we ran with one facilitator remarking “This is really just good primary care, isn’t it?”. The other positive outcome from these sessions is that they have sparked wider discussions around SHC amongst the facilitators.

Year 3: ‘Sustainable prescribing’ sits within the therapeutics module and is a lecture examining the environmental impacts of medicines including carbon emissions and pollution, the issues around medicines waste, polypharmacy and non-adherence, and the role of doctors in prescribing sustainably.

Year 4: This includes a half-day session on SHC which consists of lectures and small group sessions facilitated by clinicians with a particular interest and expertise in this area. We have included not just senior clinicians as speakers at this event but also junior doctors who can talk in a more relatable way to students and explain their own motivations – both personal and professional – for getting involved in SHC as well as how this has supported their own professional development.

During their year 4 rotations students are set the task of working in small teams to identify areas of waste that they have observed

during their clinical placements. This could be around material waste (e.g. inappropriate glove use) or unnecessary clinical activity (e.g. blood tests), and they develop a QI proposal to tackle this which they present at a facilitated session. Despite this not being formally assessed, we have been particularly pleased with their enthusiasm and the scope of these proposals.

Non-core teaching and learning:

- Student selected components:

We run student selected components (SSCs) on Climate Change and Sustainable Healthcare for year 1 and 2 students. These one-hour sessions run for eight weeks covering the health impacts of climate change and sustainable healthcare with contributions from local clinicians with expertise in this area.

- BSMS Student prize in Sustainable Healthcare:

We introduced a BSMS student prize on SHC which is open to all year 3, 4 and 5 students which has helped to raise the profile of this topic. Students are required to submit a QI proposal to tackle any area of the healthcare system and to explain how this would make this part of the system more sustainable. This is very similar to the task that they work on in teams as detailed above in year 4. The students submitting the highest scoring abstracts then present to a panel of experts. This has worked well and has given them

opportunity to expand on their learning from the core curriculum developing their own specific areas of interest.

- Widening participation and outreach:

The BSMS widening participation programme, BrightMed, was established to support local young people from diverse backgrounds who are interested in studying medicine and runs sessions exposing them to a wide range of topics around medicine and healthcare in general. We developed a session on 'Climate change and sustainable healthcare' in conjunction with the BSMS student mentors who contribute to this programme which has had the dual benefit of giving school pupils the opportunity to be exposed to concepts such as, for example, disease prevention as well as the environmental impacts of the use of cannulas and inhalers as well as enhancing the BSMS students mentors knowledge around SHC and their capacity to teach this.

- SHARE conference:

We co-host the SHARE conference with the University of Brighton and CSH which is a free, online annual conference on sustainable healthcare with clinicians and academics presenting and networking on a range of areas. Students are encouraged to attend and present and there is a dedicated session for the PHRC.

Future directions:

Fully integrating and embedding ESH content into the undergraduate curriculum has not yet been achieved at BSMS and although we have made progress in terms of the amount of ESH content there remain some barriers – particularly around its inclusion in clinical teaching. The reasons behind these barriers have been explored in depth by others and include the highly contested curriculum which is obviously an issue for all schools. The belief amongst colleagues that ESH relates to carbon foot printing and behaviour change around issues such as single use plastics is still prevalent, and we need to better articulate that this represents a much more fundamental shift in approach which aims to ensure that our graduates are, for example, better equipped to respond to the health impacts of the climate crisis and the need for disease prevention as well as being able to practice sustainably. As is widely recognised, developing assessment tools in ESH is challenging though does need to be included. We are now looking at ways to enhance our OSCEs to include more content on SHC and planetary health as well as producing new SBAs to assess this content. In addition to this, we are looking at new content on the health impacts of extreme heat and ways to include SHC into year 5 electives.

Our inclusion of ESH within existing modules and making the linkages between SHC and, for example, themes such as deprescribing, disease prevention and QI have supported the development and growth of this content within the curriculum. External drivers include the establishment of the ESH-MSc alliance and the release of the ESH national curriculum which have been very useful levers to push forward this agenda demonstrating that this is now mainstream rather than a niche area of medical education. One example has been the establishment of a new BSMS sustainability committee which has the approval of senior leadership and aims to co-ordinate and develop our capacity across teaching, research and operational sustainability and which we hope will provide support to interested colleagues across the school.

Acknowledgements:

I would like to acknowledge the contributions to this work from BSMS students past and present as well as my colleagues at BSMS and clinicians at local NHS Trusts who have been supportive of the development and implementation of this teaching.

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Chapter 17. Threading Education for Sustainable Healthcare through the MBChB using Case Based Learning. Louise Davis. Warwick Medical School

The need for ESH in our curriculum

Some years ago, a group of our medical students approached senior MBChB staff to advocate for Warwick Medical School to engage with the Planetary Health Report Card (PHRC). We all agreed the need to include Education for Sustainable Healthcare (ESH) within the MBChB curriculum at Warwick Medical School. Following student presentations on ESH and the PHRC at staff meetings, a student-staff partnership was created to plan and enable the integration of ESH across the programme.

Initial Barriers: (more work, no time)

Busy staff and students were initially reluctant to engage. There were concerns raised about the amount of time required to fully integrate ESH in our curriculum and how this could be achieved. Although a few ESH sessions were already well established as lectures and student selective component options, this was insufficient. The doctors of the future need a broad range of ESH topics included throughout the 4-year graduate entry curriculum. However, none of the staff had capacity to take on the extra workload required to lead on designing and embedding an ESH

curriculum. Students and staff were also mindful to avoid increasing curricular burden on students.

Solutions: (minimal work, little time)

The student-staff group and senior faculty agreed that as Case Based Learning (CBL) is the key pedagogy used throughout our MBChB, it would be the ideal location to integrate ESH within our curriculum. CBL connects multiple topics and themes using clinical cases and has the advantage that learning takes place in small groups; ensuring all students have the opportunity to engage with and discuss ESH topics in depth. Additionally, there would be minimal work required to include relevant ESH topics in CBL cases. Furthermore, as keen advocates for ESH, the CBL teaching fellow and I were motivated to undertake the small amount of extra work required to add ESH topics to suitable CBL cases.

Warwick Medical School and Case based Learning

CBL and the closely related problem-based learning (PBL) are used in the majority of UK medical schools. Warwick Medical School has a well-established and large Graduate Entry Medicine Programme, where CBL forms the core of the curriculum across all four years. Student-led small groups explore fictional patient 'cases' with a facilitator supporting but not teaching the group. There are 45 CBL cases throughout the MBChB course where students follow patient cases from presentation to diagnosis, management and

follow-up. The cases are designed to inspire the CBL group to discuss a large array of curricular topics in depth, connecting educational sessions such as lectures, lab work, groupwork and own learning with patient encounters, using clinical application of knowledge within the group. CBL develops student understanding of complex topics, application of knowledge, clinical reasoning, holistic care and team working.

The process of including ESH in CBL cases

A set of accessible PowerPoint slide templates for CBL were designed. Including a specific ESH slide with a contrasting green background and environment icon to be used for prompts on Sustainable Healthcare topics.



Fig 1. Sustainable healthcare CBL template slide

The sustainable healthcare slide template acts as a prompt to case writers and reviewers to include relevant ESH topics. All our CBL cases are reviewed at least once per year, thus there is minimal additional work required to include ESH prompts and some interesting resources at an appropriate point in the case story. Each CBL case covers a wide range of health topics providing options for a good range of ESH topics. The CBL learning outcomes are linked to ESH topics and mapped to the curriculum.

Initial reluctance from students to discuss ESH topics

Some groups of students were initially hesitant to discuss ESH topics, preferring to focus on clinical content. Facilitators and students reported that many students were unsure why the 'green' slides were included, or how sustainability related to medicine. Some students were concerned the sustainability topics might distract them from essential learning.

Acceptance and enjoyment

A note was added to each green slide stating that sustainable healthcare is part of the GMC curriculum. We also reviewed where the ESH slides were placed within each case. Over time, students began to expect the green slides, and facilitators reported that students enjoyed discussing ESH topics in depth. Students informed us of an increased awareness in their groups of the relevance and importance of sustainable healthcare, and how

much they enjoy discussing these topics. One student commented:

‘Sustainability is covered in most of our CBL cases; therefore, we know it is important’.

A few examples of the green Sustainable healthcare slides in CBL cases

Most of our CBL cases include ESH topics; here are a few examples:

1. The case with a patient who develops diarrhoea after eating a sandwich left in the warm for several hours.

Food security (risk to your patients)

How is climate change linked to risk of food borne pathogens?

- How is climate change linked to food production?
- How is food security related to health?

[Journal article: Climate Change and foodborne pathogens](#)

2. The case with a student who returns with a fever after volunteering in Uganda

Vector Borne Disease

Watch this [brief video on Malaria](#)

and if you have time this session have a look on the [ALMA](#) website

Why is malaria a global health issue?

- What is the inverse care law – how might it apply here?
- How is climate change increasing the risk of vector-borne diseases?
- What can be done to reduce the risk?
- What is the inverse care law and how does it apply

3. The case where a patient has severe psychosis

Psychosis Clinics

- How might changes in organisation of clinics impact on the environment?
- How do sustainable clinics improve patient care?
- Why is sustainable healthcare important in psychiatry?

[Sustainable psychosis clinics](#)

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Chapter 18 Conclusion: Education for Sustainable Healthcare (ESH). Iain Young, University of Liverpool.

This conclusion synthesises insights drawn across the chapters of the book, integrating evidence on the barriers, enablers, added value, and benefits of embedding Education for Sustainable Healthcare (ESH) within medical curricula. Where differences in attribution or structure occur, chapter numbering and authorship follow the curated dataset provided in the supporting draft material.

Barriers to Integration

Across institutions, authors consistently describe barriers operating at faculty, curricular, student, and systems levels. These challenges are recurrent and interlinked, shaping, and sometimes constraining, both the pace and depth of ESH integration.

Faculty readiness and confidence are clearly a significant constraint. Many educators reported limited subject expertise (or a perception of limited expertise) and discomfort teaching unfamiliar content and uncertainty about where ESH fits in a curriculum (UCL, BSMS, Imperial, Lancaster, Newcastle).

Curriculum crowding and time constraints were almost universal with already dense programmes limiting the space for new material and constraining staff capacity (Bristol, Southampton, Imperial, Lancaster, Newcastle, St Andrews). Another barrier was a

perceived lack of clinical relevance of ESH topics among some students and staff, this led to reduced engagement, particularly when ESH was introduced late in the programme or if it was insufficiently contextualised (Liverpool, Cardiff, Warwick, Bristol). Implementation pitfalls also emerged, including poorly pitched eLearning, difficulties tracking participation and well-intentioned but sometimes confusing attempts to 'green' clinical skills teaching in ways misaligned with real-world practice (UCL, Bristol). This was even more significant when there was a lack of – or inconsistent role-modelling on placements or resistance from external partners. Finally, infrastructure and system-level barriers were highlighted – notably impact was limited and the ongoing workload to integrate ESH initiatives was difficult to sustain without strong governance and resourcing (Lancaster, Bristol, Liverpool).

Enablers and Strategies

Despite these barriers, authors describe a wide range of effective enablers that supported them in meaningful and sustained curriculum change. Successful approaches typically benefited from a combination of leadership support, faculty development, student partnership and pragmatic curriculum design.

Senior leadership buy-in and formal governance structures were repeatedly identified as critical, lending legitimacy and enabling

resource allocation (UCL, Southampton, St Andrews). Notably, establishment of dedicated ESH roles—such as Planetary Health Teaching Fellows or paid student Sustainability Champions—created protected time, accountability, and momentum for change (Southampton, Bristol). Faculty development days, educator toolkits, and co-production with students helped address knowledge gaps, build confidence and encourage buy-in, particularly where tutors learned alongside students (UCL, Lancaster, Imperial). Curriculum strategies that emphasised infusion, spiral or helical integration and close alignment with existing clinically pertinent learning outcomes helped to reduce pressure on overcrowded timetables while reinforcing relevance (Imperial, QUB, Bristol). Assessment alignment, including the use of OSCEs, SBAs, and assessed quality improvement projects, was highlighted as a key lever for embedding ESH as core rather than optional content (Lancaster, Imperial, BSMS).

Added Value and Benefits

Several authors emphasised the added educational and institutional value generated through the integration of ESH into curricula. These benefits extended to students, faculty, institutions, and to wider communities.

Students demonstrated increased engagement and increased motivation. They described a stronger sense of professional

identity, often defining ESH as aligning with their moral responsibilities as future doctors (Keele, Cardiff, Bristol). Experiential learning approaches, particularly Sustainable Quality Improvement (SusQI) projects were credited with enhancing systems thinking, clinical reasoning and change-management skills (Newcastle, QUB, Liverpool). Institutions benefits included external recognition through improved Planetary Health Report Card rankings, Carbon Literacy accreditation, and sustainability awards, strengthening reputational impact (Bristol, St Andrews, BSMS). Faculty benefited from opportunities for professional development, cross-sector collaboration, and engagement with national and international sustainability networks (Lancaster, Imperial). Health, wellbeing, and community engagement benefits were also evident, for example through active travel schemes and community-engaged projects that linked environmental sustainability with personal and societal health outcomes (Liverpool, Imperial).

Conclusion

Taken together, the chapters in this book demonstrate that integrating Education for Sustainable Healthcare into medical curricula is both achievable and valuable. While barriers persist—particularly around faculty awareness and capacity, curriculum space and perceived relevance, the authors provide practical,

scalable strategies to overcome them. Embedding ESH longitudinally, supporting colleagues to develop confidence and expertise, partnering with students, and aligning with institutional and regulatory frameworks ensures sustainability is not a peripheral topic but a core element of medical education. Collectively, these experiences offer a robust scaffold to help senior leaders, educators and curriculum designers to prepare our future doctors to lead the transition towards a more sustainable healthcare system.

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