Research article

# Student perspectives of sustainable healthcare education: a focus group study of Cardiff medical students

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## Abstract

### Introduction

The climate crisis is a health crisis. The General Medical Council has responded to the threat by requiring that all medical graduates need to be able to apply principles of sustainable healthcare to their practice. Cardiff University's own environmental policy affirms its intention to teach sustainability effectively. However, these aims are not yet met within the curriculum. Cardiff Medical School intends to revise its curriculum, including an incorporation of sustainable healthcare teaching.

### Methods

To determine the best way to go about including sustainable healthcare in the Cardiff medical curriculum, this project aimed to assess student knowledge on the topic and collate student voices regarding how to teach and exam it. The study involved hearing from 28 students in six focus groups and comparing the data with requirements for graduates and with literature about best teaching practice.

### Results and Conclusion

Core teaching on sustainable healthcare is inadequate, and students feel disempowered to address the health needs of the world they will graduate into. Addressing these deficiencies would involve implementing teaching early in the curriculum, and encouraging students in later years to apply the principles of sustainable healthcare to quality improvement and their daily practice.

### Abbreviations

*GMC – General Medical Council*
*ISCE – Integrated structured clinical examination*
*NHS – National Health Service*
*SBA – Single best answer*
*SSC – Student-selected component*

## Introduction

The climate crisis is a health crisis. From threatening food security to causing mass casualties through severe weather events, it is already having a broad range of health effects across the globe. These are projected to only increase in scope and severity.

According to the Lancet's most recent Countdown report, *"on the current trajectory, climate change will become the defining narrative of human health"*.[1] The dangers posed by climate change demand responses from the healthcare sector, and the General Medical Council's (GMC) Outcomes for Graduates, published in 2018, now includes requirements for new doctors to be *"able to apply the principles, methods and knowledge of … sustainable healthcare to medical practice"*.[2]

Unfortunately, significant discrepancies between the need for sustainable healthcare teaching and what is delivered still exist UK medical schools.[3] This is especially so at Cardiff University, where a recent international assessment rated it the lowest of 31 medical schools for the promotion of planetary health.[4] A review of the curriculum and teaching methods are needed to prepare students effectively for the world they will graduate into.

## Aims

In light of these needs, this study aimed to inform planning for curricular revision, by:

1. Assessing the current knowledge of Cardiff medical students, and gaining insight on their thoughts regarding sustainable healthcare teaching, and

2. Comparing these results with relevant literature, in order to produce tailored and contextualised recommendations to the medical school.

## Methods

### *Design*

The primary aims of the study were achieved through a series of focus groups. Focus groups were chosen as a study design due to the richness of data obtainable, and the semi-informal setting which would encourage free speech, thereby allowing participants to prompt each other and stimulate inter-participant contributions. Ethical approval was granted by the School of Medicine Research Ethics Committee in February 2022.

### *Data collection*

Participants in the study were current undergraduate Cardiff University Medicine students. The study was advertised via online noticeboards (such as Learning Central and the Cardiff Medics Facebook group) and through personal contacts. All participants completed a consent form to confirm that they understood the aims of the research and how their data would be used. Participant consent was also checked verbally at the start of each group discussion.

A total of 28 participants were interviewed in six groups, which were stratified by year of study. Three groups ran in person, and three online, according to participant availability and preference. Each group discussion lasted between 45 and 60 minutes. The content of the discussion followed a semi-structured format, in which participants were encouraged to speak freely about the topic with the facilitator offering prompting questions at intervals. The prompts used were derived from the aims of the study and informed by the background reading:

a. *Opening Question: What are the current and projected future health impacts of climate change?*
   *i. Who is/will be most affected?*
b. *Transition Question: How does healthcare contribute to climate change?*
c. *Transition Question: What role and responsibilities, if any, do healthcare professionals have in addressing climate change?*
   *i. Do you feel adequately prepared to meet this role in future as graduates?*
   *ii. What can/should medical student do to help address climate change?*
d. *Key Question: What teaching have you had that is relevant to climate change and sustainable healthcare?*
   *i. What do we know about the physical basis for climate change?*
e. *Key Question: Should sustainable healthcare have greater representation in medical curricula?*
   *i. What should be taught?*
   *ii. How should this topic be addressed, and at what stage of the Cardiff medical curriculum (for example) might it be most appropriate to address it?*
   *iii. What are the barriers to engaging students in sustainable healthcare education?*

### *Data analysis*

Focus group discussions were audio and video recorded to enable coding and analysis. The researcher took notes on each recording, including some verbatim transcriptions of quotes from participants. Transcripts were anonymised in this process. Participants' contributions were coded by theme, with the themes being generated in part from the questions used, and in part from the data itself (i.e. grounded theory). The coded data was analysed with reference to the relevant literature, to contextualise an understanding of it within the body of work on sustainable healthcare teaching as a whole.

## Results

### *Participants*

The characteristics of the six groups and the coding assigned to the 28 participants are described in **Table 1**. The coding structure assigned to the data is described in **Table 2**.

| Group Number | Year of Study | Number of Participants | Anonymised Code Assigned |
|---|---|---|---|
| Group 1 | 2 | 6 | P1-6 |
| Group 2 | 2 | 6 | P1-6 |
| Group 3 | 1 | 4 | P1-4 |
| Group 4 | 3 | 4 | P1-4 |
| Group 5 | 2 | 5 | P1-5 |
| Group 6 | 4 & 5 | 3 | P1-3 |

**Table 1. Composition of focus groups by year of study**

| Theme | Subtheme |
|---|---|
| Student Knowledge | The Health Impacts of Climate Change |
| | The Contribution of the Healthcare Sector to Climate Change |
| | Waste Production and Disposal |
| | Misconceptions |
| Perceptions about the Roles and Responsibilities of Healthcare Professionals | Raising Awareness |
| | Personal Integrity |
| | Feeling Disempowered |
| | Feeling Underprepared |
| Teaching Sustainable Healthcare | Limited Teaching Received |
| | A Crowded Curriculum |
| | A Need For Examination |
| | The Format and Content of Teaching |

**Table 2. Themes and subthemes identified during analysis of focus group data**

### *Student knowledge*

Students were asked what they knew about the impacts of climate change on healthcare and health needs, and conversely, the contribution of the healthcare sector to climate change.

### *The health impacts of climate change*

All groups were able to suggest a few effects of climate change that directly related to health, such as threats to life from flooding or forest fires, or a greater burden of disease due to a wider spread of infectious diseases. Most participants could describe some of the more general manifestations of climate change, such as rising sea levels, but struggled to link these directly to health effects. Students in almost every group associated climate change with increased air pollution; other forms of pollution were also considered, such as a build-up of microplastics in the environment and bioaccumulation of drugs and drug products, especially in potential food sources.

Students were asked about who would be most affected by these threats. Overall, vulnerability to the health effects of climate change was understood to be in line with current vulnerabilities to other health risks. For example, many groups believed that those with existing multiple comorbidities were at greater risk. Students gave examples of regions that were more vulnerable to weather events,

like tropical storms in Haiti, wildfires in Australia, or flooding in Venice. The majority of groups described how people in resource-poor countries would be more at risk, with people with a lower income within each country likely to be affected most. Students described how climate change may be especially detrimental to populations where employment depends on agriculture, and may pose a risk of malnutrition for populations in hotter climates. Moreover, there was a recognition that food insecurity could cause conflict. These themes are exemplified in the following quotes:

FG2-P2: *"Lower income countries will see more of the effects of climate change, because they don't have the means to defend against it."*

FG3-P1: *"The poorest people are always going to feel the effects of climate change the worst. People in poorer countries are already feeling the effects of climate change. A lot of people, agriculture-wise, rely on seasonal rainfall, or can't afford fertilisers or genetically modified or drug-resistant crops."*

FG3-P1: *"Climate change could cause war over water and resources. It's difficult to get a healthcare system running in conflict."*

***The contribution of the healthcare sector to climate change***

Students recognised that like all large organisations, the healthcare sector's operations are highly energy intensive, which to some degree depends on the burning of fossil fuels. Some examples given were the amount of power that scanners used, the NHS's use of vehicles, including the travel of patients to healthcare centres (increasing with the specialisation of tertiary care centres) and commuting of staff, the production of food and drugs given to patients, and the transportation necessary in the supply chain. Some contributions independent of energy usage were also identified, such as the use and leakage of anaesthetic gases.

One student recognised that the heart of the problem was a concern for patient care without consideration of the environmental impact.

FG5-P3: *"We're trying to do more and more and more, without the idea of the environment in our minds. We're constantly adding new things to the NHS that we can do, without thinking about the impact that it's going to have on the future. I think that that's where a big problem has been. It's one thing to try and get better, but no-one's thinking about what problem we're going to create in the future afterwards."*

***Waste production and disposal***

Perhaps surprisingly, all groups linked climate change with the healthcare sector's production of waste. In fact, in five of the six groups, it was the very first factor offered in answer to the question, 'How does healthcare contribute to climate change?'. While single-use items were important to maintain sterility and patient safety, students believed that this was overdone, and was both inefficient and wasteful due to the *"… extreme usage of material per procedure"* (FG5-P1). The link between waste production and climate change was characterised through an explanation that disposal of waste, especially the biohazardous materials produced by modern healthcare, often involved incineration and carbon emissions.

***Misconceptions***

Some participants clearly did not appreciate that the intention of sustainable healthcare is to attend to the needs of present-day patients whilst safeguarding the needs of future patients. Several students associated themes of sustainability more strongly with protection of the natural world, rather than with care of patients' best interests.

FG5-P1: *"Is sustainability and reducing our environmental impact no matter the cost the most important thing? When you start talking about it in that regard, you start taking money away from looking after people to say, 'actually let's make sure we don't damage the environment.' What's more important? ….it depends on what you value more… sustainability and being environmentally sound, at the expense of potentially saving more money put into research areas that could actually make a real difference to people's lives."*

***Perceptions about the roles and responsibilities of healthcare professionals***

Students were prompted to discuss the responsibilities of individual practitioners, and the healthcare sector as a whole, in addressing these issues.

***Raising awareness***

Some participants described the helplessness that they felt about responding to climate change while still students. In response, others reasoned that their main responsibility whilst students was to become educated about the environmental impact of care. This could be done actively, in holding the medical school accountable for teaching sustainable healthcare in a relevant and engaging manner.

Some groups argued that doctors also have a role in educating patients about the health impacts of climate change, just as they do about the impact of their lifestyle choices. They believed that this responsibility is linked to the privileges that doctors have in being trusted and in interacting with large parts of the population.

FG3-P3: *"I think people need to understand that climate change is a health problem too. People think that climate change is only environmental."*

***Personal integrity***

Students were keen to discuss how doctors should be exemplary in their personal lives, so as to not undermine the efforts towards sustainable healthcare made in their professional roles. In fact, in their opinion, part of the medical school's teaching should encourage this attitudinal development.

FG3-P1: *"[We'd value teaching on] reducing your carbon emissions. Everyone should have an awareness of their own carbon footprint and carbon emissions."*

***Feeling disempowered***

A consistent theme between groups was how students felt that an individual's changes to their everyday practice would not make an adequate difference. Indeed, some students argued that lobbying legislation-makers was a more effective method for doctors to enact change, in comparison to making small-scale changes to their own daily practice. To them, the focus of patient-facing professionals should be on the care of the patient in front of them, whereas scrutinising the system for its sustainability was the responsibility of policy-makers.

FG5-P2: *"Big change has got to come from somewhere that isn't med students or individual healthcare providers."*

FG3-P1: *"There is definitely some stuff that the individual can do around climate change. But the massive stuff that needs to be done, needs to be done by the government: it's changing massive polluters in the industry. The individual does have some role, but you can't forget that it's still these big companies that are responsible for the vast majority of emissions."*

Others expressed how the hierarchical nature of healthcare systems meant that, as a student or a junior doctor, they would not expect to be listened to should they suggest improvements. Additionally, they would not know who to escalate areas of potential improvement to, or how to do it. Their impression was that students and juniors are expected to comply with relevant protocols unquestioningly.

FG6-P1: *"From a hands-on, bottom-of-the-ranks kind of position it feels quite difficult, because you have to stick to the rules that are made by the people above you."*

FG6-P3: *"You get rinsed enough if you even mention something from a medical point of view, let alone something that people are not going to care about. We have a really bad culture within the NHS and healthcare of a hierarchical nature."*

***Feeling underprepared***

Students consistently described that they felt unprepared to practice sustainably as future graduates. They listed a general lack of teaching (bar a clinical skills session on using bins), and not knowing who to go to for help as the main reasons why they felt underprepared. One student, who believed in making day-to-day changes to practice, still confided that, *"I don't know what those small changes are. That makes it a challenge to say what our responsibility is"* (FG5-P5).

***Teaching sustainable healthcare***

Students were asked about what teaching they had received and what they wanted to be taught on the topic.

***Limited teaching received***

Students had received little teaching directly aimed at sustainable healthcare within the medical curriculum. Most participants cited other sources, like the media or secondary school teaching, for their knowledge on sustainability, and they used their own reasoning to provide the links with healthcare.

Facilitator: *"Do you feel that you've received adequate teaching on sustainable healthcare?"*

FG2-P3: *"Obviously, no! We get more resources through what we see on the media, and what's on the TV currently, than what's been given through the medical school… not yet."*

***A crowded curriculum***

A repeated theme was students' fear that they would not be able to take on any additional work, given the content-heavy state of the curriculum already. For some students, when combined with the misconception that sustainable healthcare is not directly relevant to patient care, this represented strong reasoning against incorporation within teaching. However, the majority of participants recognised that given the urgency of the issue, awareness about sustainable healthcare is desperately lacking.

FG1-P4: *"So much other stuff that you have to learn!"*

FG3-P4: *"We're taught about diseases that are deadly; climate change is also deadly."*

FG4-P4: *"If you think about how Covid-19 was implemented into every single aspect of our curriculum, you couldn't get a single lecture without mention of it. It was a very good thing; it was very poignant for the time. Why can't we do that with sustainable healthcare?"*

***A need for examination***

A significant amount of time was spent debating the relative merits of examining sustainable healthcare concepts. The consensus was that examination would be needed to reinforce the importance of the topic and to give students an incentive to engage with the teaching in the face of the burden of other examinable content.

FG1-P6: *"I wouldn't do it if it was optional, because of the other stuff that would come up in the exam. We'd fall behind."*

FG2-P6: *"A lot of medic students say, 'am I going to be tested on this? If the answer is no, then I don't care.'"*

***The format and content of teaching***

The majority of participants favoured learning that was discussion-based or practical over workbooks or lectures, as this would give them opportunity to apply their knowledge. One key suggestion involved formative quality improvement projects that would introduce themes of sustainable practice whilst training graduates in critical thinking skills. Students volunteered a broad range of themes that they wanted further teaching on: for some, they still need grounding in the fundamentals like the health effects of climate change, whereas others recognised that wider teaching on concepts of public health could help them make a difference. Moreover, participants wished to directly associate the concepts taught with the context of patient care.

FG5-P1: *"Also, I feel like sustainability is a practical element, not a theoretical element. It's something that you apply. These are things that you learn through training, through experience, through following policy, not something that necessarily you're going to listen to in a classroom."*

FG1-P6: *"Having not been in a hospital, and not seen many patients, it's hard to know what's realistic, and what could be done."*

Many groups desired the introduction of sustainable healthcare from the early stages of the Cardiff medical curriculum. This approach would have the advantage of setting a context for integrating sustainable healthcare into any subsequent and further teaching. Moreover, it would help ensure that all students gain an equivalent understanding.

FG1-P6: *"If we started it in first year, it would be better because then you have it in the back of your mind when you do everything else. If you do it at the end of second year just before you go into hospital, then you're thinking about it, through everything you learnt."*

## Discussion

The results indicate that, overall, students have a vague and elementary knowledge of the topic, insufficient to prepare them for their future practice. This is consistent with Cardiff's poor performance in the Planetary Health Report Card metric.[4] However, students desire serious and realistic teaching that reflects the urgency of responding to climate change, and outlines opportunities for doing so.

***Students' understanding***

Discussions regarding the links between climate change and health were largely built upon on-the-spot reasoning than prior knowledge or received teaching. For example, analysis of the phrasing of students' contributions reveals that many responses were prefaced with qualifiers such as "I'm not sure" and "I guess". The structure of many students' answers to prompts followed a cause-and-effect chain that suggested that they were formulating their reasoning as they spoke. Furthermore, though groups could collectively succeed in constructing a fairly broad (albeit vague) list of links between health and climate change, it was clear that most individual students struggled to contribute more than a few simple facts on the topic. Students' understanding – conferred on them by media and external sources – was basic at best.

***Applying understanding to future roles***

This basic understanding is far removed from the GMC's requirements for graduates to be "able to apply the principles, methods and knowledge of … sustainable healthcare to medical practice".[2] Clinical teaching experts have emphasised that future graduates must not

only be taught knowledge but must also develop the skills and attitudes necessary for good practice in sustainable healthcare.[5,6] The lack of confidence and fluency among Cardiff medical students around foundational knowledge indicates that students are still not fully equipped in beginning to develop those skills and attitudes,[7] and much less so to then "apply" that knowledge and those skills to medical practice as desired by the GMC. Indeed, some students were able to sketch out the various spheres in which they might have responsibility in addressing climate change, but none could explain with confidence how they would approach doing anything about it. The majority of interviewees in this project confessed that they did not feel adequately prepared to practise sustainably in their roles as future doctors.

***Teaching and examining sustainable healthcare***

Learning outcomes for teaching sustainable healthcare already exist and have been trialled at other medical schools.[6,7,8] The key set described by Thompson et al,[9] are:

- *Describe how the environment and human health interact at different levels*
- *Demonstrate the knowledge and skills needed to improve the environmental sustainability of health systems*
- *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*

It is easy to imagine how the first outcome can be pursued in the case-based learning model, by integrating a discussion about environmental risk factors into the determinants of health. The second outcome is strongly associated with the Centre for Sustainable Healthcare's *"sustainable value"* in quality improvement, which aims to achieve the best outcomes for patients and populations whilst taking into account a *"triple bottom line"* including not only financial costs but social and environmental costs as well.[10] Student voices from other universities concur with this study in recommending the use of quality improvement projects in the clinical teaching years as a means of encouraging students to analyse healthcare systems in view of this principle.[11]

Other medical students around the UK have expressed views similar to those of participants in this study, that any teaching on sustainable healthcare must be reinforced with examination. *"Pressure on students from the quantity of examinable material means important, but non-examinable, material is easily ignored"*.[12] Indeed, clinical teaching experts also recommend a mix of formative and summative assessments that will motivate student engagement and help them to consolidate their learning.[13] In line with the GMC's requirements that students are able to *"apply"* their knowledge, it is critical that assessment *"not only tests acquisition of knowledge but also its application"*.[13] Suggestions for this extend beyond this study's participants' conceptions of single best answer (SBA) questions, into, for example, models of assessment like an integrated structured clinical examination (ISCE) station where students are asked to identify preventable or environmental causes of disease.[6]

***Limitations***

Though this study has been very helpful in uncovering gaps in understanding, it cannot be considered to be fully representative of the Cardiff medical student body. This is due to the small sample size, and the method of participant recruiting through purposive sampling rather than random selection. Moreover, though the recommendations for curricular remodelling set forward in this report are founded on qualitative evidence and review of scientific literature, they do not have the authority that direct trials of teaching methods and outcomes would have.

## Conclusion

It is the responsibility of medical schools to respond to the impending health crisis that is climate change by adequately preparing their graduates to mitigate further damage and adapt to new global health needs. The future's doctors *"need to be prepared to be champions for sustainable change in our workplace and advocates for our patients who will inevitably be impacted by climate breakdown"*.[14] The author's recommendations for implementing sustainable healthcare education within the Cardiff medical curriculum are:

- Introduce the concept early on, preferably within the Platform for Clinical Sciences block within the Autumn term of first year. This will broach awareness of the topic at the beginning of the spiral curriculum and enable students to see how planetary health is relevant to all future topics covered.
- Include environmental risk factors and potential co-benefits of mitigation measures relating to diet, air quality, transport, etc. within the model of health and disease discussed in case-based learning. This is an excellent opportunity to make use of group discussion to engage students, and to discuss the benefits of early-stage prevention of disease over late-stage interventions.
- Include discussion of the environmental cost of treatment options in case-based learning.
- Revise the third year student-selected components (SSCs) to include the "triple bottom line" and sustainability elements within quality improvement projects.
- Continually review the delivery of the course with regards to sustainability, to set a good example for students, and mitigate further environmental damage.

In short, students' current understanding is vague and basic. However, this in fact presents an excellent opportunity: changes to medical education now will have major positive effects in producing the sustainable practitioners of the future.

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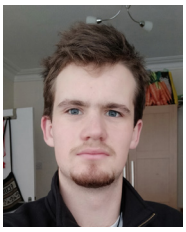

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