

# Preparing U.S. Medical Students to Respond to Climate Change

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## Abstract

The devastating hurricane season this year has brought the economic and health impacts of a changing global climate into stark relief. The varied health impacts of climate change can no longer be ignored by anyone who practices medicine – whether primary care or specialist. Physicians are already at the forefront of the response to climate change, advocating on behalf of their patients. Through professional organizations, membership groups, and individual actions, doctors are working to mitigate the impact of climate change as well as advocating for reductions in carbon emissions. In the future, physicians will be managing the health impacts of climate change, from worsening air quality to frequent heat waves. Medical schools provide a structured space for future physicians to learn about the interaction between human health and climate change. While international efforts to prepare the future health workforce have proceeded at a rapid clip, US medical schools have lagged behind. Medical schools must incorporate environmental health concepts into general curriculum efforts to prepare their graduates to meet the challenges of a changing climate.

## Introduction

The environmental and health disaster following Hurricanes Harvey and Maria is still

unfolding, and the recovery will likely take years. Climate change has made extreme weather events like Harvey more frequent and more intense. Moving forward, the threat to human health from extreme weather events and other impacts of a changing global climate cannot exclusively be the purview of planners, politicians, and emergency management programs. Lessons learned from disasters like Katrina, Sandy, Harvey, and Maria must be incorporated into practice in a wide array of professions and fields. In the future, the full spectrum of health professionals will be responding to the health impacts of climate change with frequency and urgency. From emergency physicians to environmental health nurses to specialists like cardiologist and nephrologists, healthcare providers will be managing the health consequences of climate change. Physicians must play an active role in leading the response to climate change. Medical schools are an important venue for educating future health professionals about the health impacts of climate change and how they can protect their patients' health. There is currently minimal curriculum about environmental and occupational health in American medical schools. Medical students must be taught about the myriad consequences of a changing climate in order to provide relevant, timely care to a 21st century population. The Lancet Commission on Health and Climate Change's seminal 2015 report describes climate change as potentially 'the greatest global health opportunity of the 21st century.' It also warns that the effects of climate change could cause an unacceptably high and potentially catastrophic risk to human health.<sup>1</sup> From changing insect habitats altering the reach of vector-borne diseases, to increasing ground-level ozone exacerbating asthma, to environmental instability instigating global conflict, future health practitioners will be managing the health impacts of a changing

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climate.<sup>2</sup> Globally, healthcare providers are mobilizing to meet the health challenges of climate change through research, calls to action, and direct mitigation efforts. In many countries medical students are at the forefront of these efforts – demanding more education about climate change science and its integration into traditional medical school curriculum. Recognizing that carbon emissions from the healthcare system will contribute to harming the very patients they serve, medical students in the UK have pushed the British Medical Association to divest its investment portfolio of fossil fuels.<sup>3</sup> While there have been some advancements at medical schools in the United States, curriculum reform has not been comprehensive or widespread.

### **Towards a Climate Change Curriculum**

Researchers have contemplated how to adequately prepare the next generation of health practitioners for the impacts of climate change on human health. Discussing the necessity of a climate change curriculum for medical schools, Bell describes how, in the future, emergency care and general practice will be defined by responses to climate change. He highlights cultural literacy and the way climate change may change the scope of the professional, legal, and ethical competencies currently addressed in the medical curriculum.<sup>4</sup> Maxwell and Blashki expand this discussion to address the breadth and depth to which medical schools should address climate change. They call for climate experts to develop consensus learning objectives and competencies.<sup>5</sup> In 2012, Regan et al explored U.K. medical students' understanding of climate change qualitatively through focus groups. They found general consensus about the link between environmental changes and human health, but uncertainty about what students or doctors could do to reduce the harmful impacts of climate change. Students were not sure that it was the role of physicians to address climate change with patients or work towards emission reductions.<sup>6</sup>

### **International Efforts**

Medical schools in Europe, Australia, and New Zealand have made significant progress in preparing future medical practitioners to address the challenges of climate change. In the UK, public health specialists have led curricular development around climate change, but there are

roles for clinicians, ethicists, and climatologists.<sup>7</sup> The Sustainable Healthcare Education Network surveyed UK medical schools for climate change curriculum. Through case studies of existing courses, the program developed three learning objectives: to understand the impacts of environmental change on health and of health care on the environment, and to consider ethical questions of intergeneration health justice. Piloted at Norwich Medical School at the University of East Anglia, the program has elevated the discourse and urgency surrounding climate change and health at the school and spurred further initiatives.<sup>8</sup> Calls from Australian physicians and medical students for curricular reform have increased in number and urgency in recent years.<sup>9,10,11</sup> The Canadian Federation of Medical Students explored the amount of time dedicated to climate change teaching at Canadian medical schools. In 2016, they found just one school preparing to offer a course in 2015 and another offering a non-mandatory session.<sup>12</sup>

### **U.S. Efforts**

Friedrich discussed efforts of the U.S. medical profession to meet the challenges of climate change in her March 2017 review for the Journal of the American Medical Association. Through statements from professional organizations, advocacy groups, and direct action, U.S. medical professionals are demonstrating strong leadership. Friedrich offers some anecdotal evidence that medical students are eager for more training in climate change and health.<sup>13</sup> However there is a dearth of information about current U.S. medical school efforts around climate change training. In April 2015, the Obama Administration announced the "Health Educators Climate Commitment," and in December announced a total of 118 signatory schools in 15 countries. Through the commitment, medical, nursing, and public health schools confirmed their intention to educate the next generation of medical professionals about climate change. In collaboration with the Obama White House, Columbia University Mailman School of Public Health's Global Consortium on Climate and Health Education's continued to advance curricular reform in health professional schools.<sup>14</sup> In September 2015 Kathleen Potempa, dean of the University of Michigan School of Nursing issued a call-to-action for allied health

professionals and their schools to prepare for climate change.<sup>15</sup> Some schools have responded through elective courses and adjunct environmental health activities. The McGovern Medical School of the University of Texas Health Science Center at Houston offered “Climate Change and Human Health” as an elective in the spring 2016 semester.<sup>16</sup> Through the University of California at San Francisco Medical School Bridges Curriculum, students had the opportunity to take an elective in climate change and human health. The course explored the relationship between human activity and environmental change and vice versa, as well as topics of environmental justice and sustainability in health systems.<sup>17</sup> In Minnesota, Health Students and Health Professionals for a Healthy Climate have worked to incorporate curriculum that addresses climate change and health into the students’ Foundations of Interprofessional Communication and Collaboration course, reaching over 1100 students from 17 health professional schools on five campuses.<sup>18</sup>

### **Future Directions**

There are many opportunities to include environmental health and climate change in the medical school curriculum. Medical schools have a number of options when considering how this integration could occur. Whether through a dedicated required or elective course, integration into basic science curriculum, or through case-based learning during clinical rotations, core competencies can be seamlessly woven into existing curriculum. Courses in biochemistry and genetics afford opportunities to discuss the interaction between environment and the molecular building blocks of life. Oftentimes this discussion is limited to the classic example of the correlation between increasing latitude and prevalence of multiple sclerosis, despite innumerable examples of the environment’s impact on human health.<sup>19</sup> Rising temperatures are changing the habitats of insects and other organisms, leading to changes in the distribution of vector-borne diseases, a problem that is well within the purview of infectious diseases and microbiology courses. Rising temperatures and worsening air quality threaten family practitioners’ and occupational health specialists’ work ensuring safe homes and safe work environments.

Responses to temperature-related illness like heat exhaustion and heat stroke are often discussed in the context of internal medicine and emergency medicine clerkships. Incorporating climate change education into clerkship-based learning adds necessary context to environmental health concepts. From inpatient services witnessing increased heat-related illness to ambulatory medicine addressing changing vector-borne illness, students may experience the full breadth of climate change’s impact on human health. As more schools implement curriculum changes, effective teaching strategies and key learning objectives may become apparent. The express goal of the Global Consortium on Climate and Health Education is to foster such innovation and provide a forum for the dissemination of curriculum and teaching tools.<sup>20</sup> A wide array of options are available for medical schools to consider implementing climate change curriculum from a course, to integration in basic science classes, to vignette-based case studies.

### **Conclusion**

Physicians are leading voices in the response to the threats of climate change. Through political advocacy and work within their own organizations, doctors are working to reduce carbon emissions and prepare for the health impacts of a changing climate. U.S. medical students may currently perceive climate change as the purview of public health and emergency preparedness professionals. However in the future medical professionals will see the impacts of climate change on their patients’ health on a daily basis. Further, as sudden extreme weather events become more frequent and more intense, practitioners will be called upon to address the impacts of climate change on an emergent basis. It will be crucial for medical students and other allied health professionals to be comfortable making the connection between a changing environment and individual human health. Medical schools and medical student alliances in the U.K., Australia, and New Zealand are already analyzing current efforts and planning improvements to medical education. Initiatives in the U.S. have lagged behind, but some medical schools are taken steps to prepare their students with environmental health knowledge and skills. However, efforts to prepare the next generation

must be rapidly expanded, as Americans already experience the health impacts of climate change. Medical students and their schools are ideally situated to spearhead this effort.

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