STATE OF THE WORLD

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Rethinking Education on a Changing Planet

THE WORLDWATCH INSTITUTE

CHAPTER 24

Teaching Doctors to Care for Patient and Planet

Jessica Pierce

In April 2016, the U.S. government released a three hundred and sixteen-page report titled *The Impacts of Climate Change on Human Health in the United States*. The assessment, mandated by the President's Climate Action Plan, aims to provide a comprehensive and qualitative overview of "observed and projected climate change-related health impacts" and warns of serious and sustained risks from elevated temperatures, extreme weather events, degraded water and air quality, and infectious disease. During the report's official unveiling, U.S. Surgeon General Vivek Murthy warned that climate change poses "a serious, immediate, and global threat to human health." He went on to add, "As far as history is concerned, this is a new kind of threat we are facing."[1]

As Murthy's words vividly suggest, our future will be shaped, whether we like it or not, by the realities of living with a disrupted climate, and in ecosystems already strained to the brink of collapse by growing numbers of humans and unprecedented levels of pollution, resource consumption, and biodiversity loss. Those thinking broadly about the protection and maintenance of human health have identified the critical need to reshape our healthcare systems to respond to these environmental challenges. But this evolution is still in its earliest stages, and, for the most part, doctors and other health professionals work as if climate change and other environmental challenges are unrelated to their professional lives. This disconnect is rooted in a system of medical education that has not yet integrated climate change, sustainability, or ecosystems thinking.

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Why Medicine Needs to Take the Environment Seriously

Scientists and public health experts have long understood the crucial links between the natural environment and human health, but only in the past several decades has the true significance of these interconnections become apparent. The enormous literature on these links continues to grow, and environmental degradation—particularly climate change—has become a top priority for all of the world's major health organizations. The World Health Organization has expressed profound concern about a looming crisis brought on by climate change—a threat that is not merely speculative, but that is affecting health right now. The United Nations, for its part, urges immediate action. "Climate change," the UN argues, "is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities, and countries dearly today and even more tomorrow."[2]

Climate change is perhaps the most catastrophic threat to human health. But other environmental health hazards such as indoor and outdoor air pollution, lack of clean water, the presence of pesticides in soils and foods, and the accumulation of toxic chemicals such as lead and dioxins in people's bodies also pose significant health risks. Poor environmental quality is already estimated to account for at least 25 percent of the global burden of disease, and toxic agents are ranked as the fifth most important underlying cause of death in the United States.[3]

Public health experts also are concerned about the degradation and increasing fragility of "ecosystem services," such as nutrient cycles, crop pollination, regulation of the water cycle, and regulation of climate. These services form the basic and necessary substrate for human well-being, and if this substrate becomes too unstable and too polluted, all the pills and scalpels in the world will not save us.

With climate change and other environmental threats taking center stage in discussions of future health and survival, it is perhaps surprising that these issues remain largely absent from medical curricula. Medicine will need to adapt to an environmentally challenged planet and to learn to protect and sustain health without causing further damage to overstressed ecosystems. The medical educators of today and the doctors of tomorrow need to foster a revolution in how medicine is practiced, how hospitals and clinics are designed, and how patients are treated and counseled. And this revolution needs to begin now.

First Steps: Making Environmental Medicine Mandatory

How might we integrate environmental concerns into the current medical curriculum? Let's begin with what we might call "light green" curricular reform, involving the most immediately achievable and superficial changes to the curriculum.

One baby step is to improve knowledge of "environmental medicine"—the diagnosis, treatment, and prevention of disease and ill health that originate from the environment. There is agreement among leading health institutions that the lack of training in environmental medicine is a key weakness within our current medical corps. A survey of U.S. medical schools conducted in the mid-1990s found that one-quarter of medical schools have no environmental medicine curriculum requirements whatsoever, and the remaining 75 percent require, on average, only seven hours of study in environmental medicine over four years. This survey is outdated, but little has changed in the intervening years, and the data remain relevant. Those working to improve the teaching of environmental medicine focus on competencies such as understanding the influence of environmental agents (such as lead or radon) on different organ systems, recognizing signs and symptoms of potential environmental exposures, and taking patients' environmental histories.[4]

Second Steps: Adding Environmental Awareness and Ecosystems Thinking

Learning how to diagnose, treat, and prevent health problems related to environmental exposures is vital, but it is only a first step. Medical students need to have a deeper understanding of how climate change and the other environmental challenges of the coming decades may influence human health, how the provision of health services can inadvertently cause environmental damage, and how environmental sustainability can be aligned with healthy lifestyles. In contrast to environmental medicine, we might call these broader competencies "sustainable health" and might think of them as "medium green."

Although there has been no formal survey of what is being taught (or not taught) about sustainability in U.S. medical schools, an informal review suggests that the answer is "very little to nothing." That the doctors of tomorrow are not learning about our current environmental situation—even about climate change—is shocking. Small studies from other countries suggest that things may be only slightly better outside the United States. In the United

Kingdom, fewer than half of the schools surveyed provided any teaching on climate change and/or sustainability. A survey of Australian schools found that only 10 percent included climate change in the core curriculum.[5]

It is unclear exactly how sustainability can best be integrated into healthcare practices, thinking, and education, and considerable work remains to be done in defining learning goals and content. In one early effort, the General Medical Council in the United Kingdom asked the Sustainable Healthcare Education Network in 2011 to recommend consensus learning objectives for medical curricula in the area of sustainability. Three priority outcomes were identified:

1) Understanding how the environment and human health interact at different levels;
2) Demonstrating the knowledge and skills needed to improve the environmental sustainability of health systems; and
3) Exploring 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.[6]

Some of the subthemes identified as content additions include defining sustainability, understanding the social and economic dimensions of sustainability, population growth and control, nutrition, sustainable procurement, resource use within health care, resilience of health services to environmental perturbations and challenges, waste management, impacts of long-term healthcare trends on sustainability, and conflicting priorities (for example, is environmental sustainability the responsibility of doctors or of citizens, and can these two roles be separated?). Although there was disagreement about exactly what content should take priority, there was consensus among all participants that doctors have a duty to protect and promote health, and that sustainability is fundamentally linked to this duty.[7]

A related but distinct question is, what do physicians need to know about ecosystems and ecosystem services? Sarah Walpole and her colleagues at two medical schools in the United Kingdom conducted an interesting review of this question. As with environmental sustainability, ecosystems and ecosystem services are not yet taught at medical schools, and questions remain about how, when, and where to best integrate this material into the curriculum. There was broad consensus that doctors and medical students need to understand the links between ecosystems and human health, how environmental change

can impact health, and how human activities can impact the environment, both positively and negatively.[8]

LSIS Helen Frank

A U.S. Navy Hospital Corpsman sprays insecticide around a hut in Vanuatu to control the mosquito population and prevent the spread of malaria.

As Walpole and her colleagues note, where knowledge about ecosystems is lacking, "health professionals are less likely to enact environmentally sustainable practices" such as energy efficiency, waste reduction, and careful segregation of waste, nor will they speak readily with patients, colleagues, or members of their community about environmental threats to health—such as local air pollution—or opportunities to promote health through protecting the environment.[9]

Some of the specific competencies that emerge as important include communicating environmental issues to the public and contributing to the sustainability of health systems by implementing positive changes—which rests on an understanding of health care's ecological footprint and how it can be managed. The researchers admit that open questions remain regarding the ideal breadth and depth of knowledge to convey, and what teaching practices would be most effective in transmitting this theoretical knowledge and practical competencies.[10]

Third Steps: Changing the Lens

Although researchers have identified opportunities to integrate ecoliteracy and discussion of climate change into the existing curriculum, the "eco" would still be peripheral to medical training—an add-on or specialization. And this, according to many who have studied the issue, is simply not enough. Rather than thinking about specific content points to be added to existing curricula, it might be far better to focus on integrating an ecosystems view of health and a commitment to sustainability across the curriculum. There are a variety of ways in which the curriculum could expand the way that students think about health and sustainability.

For example, climate change and other environmental concerns could be integrated seamlessly across the existing curriculum, as could learning about the capacity of ecosystems to support and sustain human health through ecosystem services (such as regulation of the climate and provision of food and clean water). "Dark green" change requires more than fiddling with the details of a catastrophically unsustainable system. Sustainability cannot simply be an add-on, but must become the central ethos of medical education and medical care. And sustainability must be understood in deep ways: protecting and promoting health without undercutting the ability of future generations to be healthy and without threatening the vast web of life with which we share this planet.

Medical students can be encouraged to become advocates for sustainability at the university medical centers where they train, an important step in transitioning medicine from being part of the problem to being part of the solution. Student groups, for example, could partner with "green healthcare" initiatives aimed to make healthcare delivery less damaging to the environment. Specific initiatives adopted by medical centers in the United States include reducing meat purchasing and insisting on antibiotic-free meat, buying locally grown foods and composting food waste, requiring that all newly built structures be green building-certified, replacing toxic cleaners with greener alternatives, eliminating polyvinyl chloride (PVC) plastics and phthalates from hospitals, and buying reprocessed medical equipment instead of new. Medical students can then carry these and other initiatives over to the clinics and hospitals where they eventually work. The ultimate goal, of course, is not merely to make health care less *un*sustainable, but to make it sustainable. But these initiatives are an important stopgap and can help with the transition.[11]

Students also can compare existing U.S. healthcare practices with the ideals of a sustainable health system: to be economically and ecologically sustainable over the long term, to be prepared for both increased and novel health challenges ushered in by climate disruption, to do more with less, and to be more energy-efficient, less toxic, and less expensive. Health systems also must be finely adapted to the specific needs and opportunities of each community, since each place faces unique health challenges and has a unique set of resources at hand. Because different countries have evolved different ways to address health care (see Box 24–1), they can offer diverse examples of doing more with less. In Singapore, India, and Costa Rica, for example, good health is achieved at much lower cost than in the United States.[12]

The links between poverty and ill health are clear and are part of the current

Box 24–1. Maya Social-Natural Medicine

Maya medicine has been practiced continuously for more than two thousand years in Mesoamerica and is still the primary source of health care for most of the indigenous Maya population in Guatemala (about 6 million people).

From 2011 to 2015, sixty-seven traditional healers from five ethnolinguistic Maya groups, called *Ajq'ij* or *Ajq'omanel*, engaged in joint research with scientists and medical doctors representing Western modern biomedicine. The goal was to understand cancer better by looking at knowledge systems based on completely different assumptions about how a person maintains health and overcomes disease—in other words, to engage in mutual learning by exchanging medical knowledge.

Maya medicine is based on the principle of *Ixbisb'al li wan*, understood as the ability of a person to keep his or her physical body, mind (thoughts), feelings, and spiritual expression in balance. Disease is explained as the consequence of losing balance in any of these four bases of human existence, and treatment therefore is oriented toward finding and treating the cause of this imbalance.

Whereas biomedical physicians gear "healing" toward treating the physical condition (the organ or body part affected), an *Ajq'omanel* regards the physical manifestation of sickness as a mere "alarm signal" that points to a need to uncover and treat the real cause behind the illness. This includes looking at the recent behavior of the patient and whether he or she is living the principles of respect (*nimb'el*), coexistence (*sahil wanq*), and harmony (*tzalajb'il*) with other people, animals, nature, and the spiritual world. So while it is important to treat the symptoms, relieve pain, and restore the body, a Maya *Ajq'omanel* also will treat the person holistically, understanding the relational aspects that embed the patient in his or her larger family and societal circle, but also in the natural surroundings.

Involving family and social networks in Maya medicine is considered a key aspect for restoring health in a sick individual, as relationships in the therapeutic encounter transcend the typical doctor-patient dyad in Western biomedicine. The goal of the *Ajq'omanel* is to restore the health of the entire system surrounding the patient; thus, treatment includes assigning roles to family members that include emotional, spiritual, informational, and instrumental support (such as caretaking or economic support). A distinct "therapeutic unit" emerges that includes the patient or wellness-seeker, his or her family with its larger societal circle, and the healer—all of whom have distinct yet interdependent roles. Maya belief includes the concept of living energies (*Rajawal*) in nature, so healers also are mindful of whether a patient is having an adequate relationship with the natural environment.

There are many categories of disease that originate in breaking the balance with *Nantat Ix* (Mother Earth). For example, one man from a Mam Maya family suffered from strong headaches and epileptic attacks, the cause of which medical tests could not identify. After consultation with an *Ajq'omanel*, the patient revealed that he had cut down two hundred

continued on next page

Box 24–1. continued

trees illegally from a mountain. The *Ajq'omanel* confirmed that the man was being affected by the mountain's guardian spirit (*Rajawal*) and gave him herbal teas and medicinal baths, conducted two fire ceremonies to ask for forgiveness and offer compensation, and required him—with the help of his family—to replant seven times the number of trees cut and to nurture them for four years. Shortly after the patient started planting trees, his symptoms stopped completely, and he has been in good health since. This traditional practice clashes with the biomedical tradition in most hospitals and clinics in the region that separates the patient from the context, strips his or her identity, and annuls sociocultural support networks.

The level of engagement that an *Ajq'omanel* typically has with the patient and his or her social network is one of the most striking characteristics to biomedical observers. Rather than having a utilitarian encounter, bonds form that support the well-being of a patient by acknowledging the configuration of the patient's particular belief system. There is no fear to address emotional preferences, mental attitudes, or spiritual concerns. On the contrary, Maya healing asks that health practitioners acknowledge the multidimensional aspects of a patient, understood in a continuum that links the patient to the surrounding social and natural world. Maya healing is, in essence, a call back to a symbiotic medicine that understands how we are linked to each other and to the world around us.

—Monica Berger-González, Center for Health Studies, Universidad del Valle de Guatemala

Source: See endnote 12.

medical paradigm. But important links also exist between poverty and environmental deterioration, and likewise between the pursuit of wealth and unsustainability, and these connections can be discussed within the curriculum. To understand why social justice is part of the solution to our environmental crisis, medical students might study areas of the world that are poor but that nevertheless achieve high levels of health, such as Costa Rica, Sri Lanka, and the Indian state of Kerala. What do these areas share? They share a commitment to women's autonomy, education, universal access to primary healthcare services, and egalitarianism.[13]

Students also might be encouraged to study countries like Cuba, which has achieved a "post-petroleum" health system that is about as close to sustainable health care as we have seen. Is it perfect? No—and the problems are worth exploring. But Cuba offers several important lessons: health care can shed its heavy reliance on petroleum and find alternative sources of energy, such as the solar panels that grace the roofs of Cuban health clinics; health care

should be free and universally available; medical education also should be free; and primary care providers can be, to very good effect, "embedded" into communities, so that nearly everyone has a neighbor who is either a doctor or a nurse.

Cuba also offers a vivid reminder that money spent does not necessarily equal gains in health. Despite spending just $817 per capita on health care in 2014—compared to $9,403 per capita in the United States—Cuba achieves health outcomes every bit as good as the United States. Life expectancy in the two countries is the same, at about seventy-eight years, and Cuba has lower infant mortality rates (four deaths per thousand live births in 2015, compared to six per thousand in the United States). It is essential that medical students study the economics of health care and recognize that profit-driven health systems are unlikely ever to be sustainable.[14]

Much of the emphasis falls within the realm of ethics and values. Part of rebooting medical education for the Anthropocene—or the "age of humans" that we have now entered—will involve new ways of thinking about bioethics. For example, students might explore how the four principles of medical ethics (respect for autonomy, nonmaleficence, beneficence, and justice) might look through a green lens, such as in the expansion of "do no harm" to include avoiding harm to the broader community or ecosystem through toxic or unsustainable practices. Ethics classes might place additional emphasis on justice, going beyond the standard discussions about rationing healthcare resources and encouraging future doctors to think about the role of poverty and wealth acquisition in driving environmental damage, and about the need for greater economic equity. Ecological stability and intergenerational justice might be added as fifth and sixth core principles of medical ethics. Many of these topics could be framed as discussions in bioethics courses. (See Box 24–2.)[15]

The Path Forward: From Light Green to Dark Green

As medical students finish their training and transition into the healthcare workforce, they will be entering into an environment ripe for change. Yet their mindset must be primed for thinking sustainably about health and health care. This is why it is critical that medical education evolve, too.

Two interconnected threads need to be woven through the medical school curriculum. First, the doctors of tomorrow need to have the knowledge and practical skills to diagnose and treat patients under a changing ecological and

Box 24–2. Discussion Questions for Future Bioethics Courses

- Does the Hippocratic Oath, and particularly the core ethical principle of "do no harm," apply only to an individual doctor in relationship with his or her patient within the context of each unique medical encounter? If individuals and entire communities and ecosystems are being harmed by the provision of health services, is this a violation of the Hippocratic Oath?
- How should doctors understand demographic trends, as related to ecological sustainability? Is there a problem with human "overpopulation" and, if so, should it influence how doctors counsel patients about reproductive services?
- Must doctors "believe" in the consensus opinion of climate scientists? Can you be a responsible physician and yet also be a climate denier? How, if at all, should climate change influence counseling of patients about lifestyle choices?
- Since reducing consumption of red meat would lead to decreased greenhouse gas emissions and better public health, do all doctors have a responsibility to counsel patients toward vegetarianism or at least less frequent meat consumption?
- In a world of limits, what happens to patient autonomy? Should patient choice be curtailed (for example, no, you do not get to choose to have that elective and unnecessary cosmetic surgery procedure)?
- Who is the patient? Is it just the person in front of the doctor, or is it the broader community, the Earth?
- With so many healthcare resources being funneled into care for those who are very aged or ill, would it make sense to think about embracing death and refusing aggressive or expensive care at the end of life, as an act of ecological activism? Should there be greater acceptance of assisted suicide, or fewer resources dedicated to the very sick or elderly?

economic regime, adapting as well as possible to a hotter, more unstable, and less resilient world. Second, tomorrow's doctors need to erase the artificial line between working to keep people healthy and working to keep the environment healthy. Being an advocate for human health means, necessarily, also being an advocate for ecological health. The ecological is not personal, it is professional. Medical education should mobilize students and doctors to commit to sustainability and ecological stewardship, so that they can help reshape medicine in ways that are less damaging and more sustainable.

Sustainability is not a goal. It is a core value that shapes choices, behaviors, and even thought patterns across all areas of our lives. It is, as Douglas Klahr writes, "an endless process of constant implementation, assessment, and readjustment." At this point in time, it is not a matter of averting crisis—it is too

late for that—but of slowing its pace and adapting to new ways of life as wisely and compassionately as possible. Every choice about sustainable practices is a compromise, and every good we pursue involves tradeoffs. From where we sit now, it is hard even to envision what a truly sustainable approach to human health might look like because we are working from inside the box. "A true paradigm shift," says Klahr, "means that, within a realm of life, everything is subject to change, and this encompasses change that is often unforeseen and unimaginable at the outset."[16]

The Anthropocene will require, perhaps ironically, that we break free from a human-centered worldview. This is essential to learning to live differently. The challenge for medicine is to become "post-anthropocentric," to evolve past our current small view to a more encompassing and long-range perspective. Although we likely cannot even envision what truly sustainable health will look like, a variety of elements may emerge within the new paradigm of post-anthropocentric medicine. These include:

- *An Earth-centered Worldview* (in contrast to our current human-centered one). Humans are part of a wider community of beings.
- *One Health.* The health of ecosystems and their inhabitants are interconnected. A fundamental tenet of post-anthropocentric medicine is that humans pay attention to the health of ecosystems as a whole, as well as to the viability of the multitude of creatures who depend on these ecosystems for survival.
- *The Planet as Patient.* Caring for human patients dovetails with caring for the planet; healthcare systems do not undercut human health by damaging the environment.
- *Treating the Whole Person*. Each individual patient is treated as a whole person, which includes their embeddedness within their community, society, and natural environment. The social and ecological context of care is relevant to medicine.
- *A Commitment to Life.* All life is valued, not just human life (and especially not just certain human lives). The survival of other living beings is intimately tied to our own survival.
- *Violence as Pathogen*. Violence toward each other and toward other forms of life must be addressed as interlinked problems with interlinked solutions, and both have profound implications for health.
- *Health Decoupled from Profit.* As long as health systems and medical care are profit-driven, sustainability will remain elusive.

- *Think Globally, Treat Locally.* Health is local and community-based, but the global situation informs all aspects of healthcare delivery.
- *Health as Social Justice*. Poverty and inequity drive ill health and also environmental destruction. One cannot be addressed without the other.

Given the immediacy and seriousness of our planetary situation, it is critical that medical education begin preparing doctors for the Anthropocene. If we start work now, the doctors of tomorrow can become the visionaries who help create health systems that are environmentally sustainable and economically viable over the long term and that can sustain human flourishing under increasingly challenging conditions.

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Chapter 25. The Future of Education: A Glimpse from 2030

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EarthEd

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THE WORLDWATCH INSTITUTE, in its flagship publication, analyzes how we can equip students with the skills to navigate the turbulent century ahead. With global environmental changes locked into our future, what we teach must evolve. All education will need to be environmental education, teaching students to be ecoliterate, deep-thinking, and deeply moral leaders, ready to face unprecedented challenges. *EarthEd* explores traditional areas of environmental education such as nature-based learning and systems thinking, as well as new essential topics including social-emotional learning and the importance of play. This latest edition of *State of the World* examines how, by rethinking education, people worldwide can better adapt to a rapidly changing planet.

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