

Tessnim Ahmad:

Welcome to the Spark: Medical Education for Curious Minds. We present the people and stories behind medical advances at UCSF, from medical students to physicians and faculty in the school of medicine. Through the Spark, we share the innovations that are helping bring more equitable and better care to our communities. I'm Tessnim Ahmad, a student in the school of medicine. The Earth's climate has changed throughout its history, since the mid 1900 however, the earth has warmed at an unprecedented rate, and there's little doubt this is due to human activities. Carbon dioxide and other human made emissions act like a blanket in the Earth's atmosphere, creating a greenhouse effect.

The oceans have absorbed much of these gases and heat, Ice sheets are melting, glaciers are retreating, and the global sea level is rising, threatening our coasts. Changing weather patterns also affect air quality, the water we drink and the diseases that ill us. The World Health Organization has called climate change the greatest threat to global health of the 21st century. Dr. Katherine Gundling is a Clinical Professor Emerita in the Department of Medicine, and former practice chief for Allergy and Immunology. After observing the effects of climate change on her patients' health, she decided to take Emerita status and volunteer her time to mobilize the UCSF community to build a comprehensive and future minded response to the health emergency of climate change.

Dr. Katherine Gundling:

To take optimal care of my patients, I have to be very aware of what's around us, the environment both indoors and outdoors. One of the things I've noticed in recent years is some very specific changes that made me realize it's time to think about and address what's happening in the environment because it's affecting our patients. So as an example, with the wildfires, we had so much smoke that was creating asthma attacks for asthma patients. Another example might be hearing from colleagues in Houston where they've had a lot of floods and one of the consequences of floods is mold infestation. If you have asthma or you're actually allergic to mold, it can cause really severe health problems.

Another one that is significant even for patients who have garden variety allergies, so to speak, would be the changing of the pollen seasons. With the warming of the planet, we're experiencing earlier spring times in some places and later falls, and so the tree pollens of the spring are causing symptoms earlier, whether it's hay fever sinus type problems or asthma attacks or whether it might be people in the Midwest or East who have problems with ragweed, that season is occurring later. Increasing CO2 in the atmosphere is actually making it seem more virulent pollen as well. So, for a lot of reasons we're experiencing environmental impact on our patients and that's one of the main motivators for taking a step back and realizing that we have to look at this larger picture and act for the future.

Tessnim Ahmad:

As existing diseases are modified by a changing climate and as new diseases appear, climate change will invariably affect every medical specialty, not just allergy.

Dr. Katherine Gundling:

Additional examples include the mental illness consequences of some of these climate disasters. When your entire town burns down and perhaps you have a spouse or a child who is burned in a wildfire, and you lose your school, your community, your doctor's office. This understandably creates significant problems with mental distress, and colleagues in psychiatry are telling us that anxiety and many other mental illnesses are becoming much more prevalent as a consequence of the changing climate. Another example is vector-borne illnesses, with warming in certain areas, we're starting to see the presence of mosquitoes that we've never seen before. So for example, we're starting to see Dengue fever in the

United States. There are many other examples of challenges that we're starting to see directly related to the changing climate. So we need to act now because this is truly a health emergency.

Tessnim Ahmad:

In addition to these effects on individual patients, climate change also poses broader public health threats, large scale disasters and vector-borne disease epidemics and pandemics will force mass migration and competition for food and other resources. Well, everyone is affected by climate change, certain groups are hit much harder, including the very young, the very old and those already affected by health disparities.

Dr. Katherine Gundling:

Both locally and internationally, we have challenges with health disparities. Some people have good access to health care, other people have none, some people have insurance, some don't. Some are affected by where they live, if you live near a port where there's a lot of diesel fumes everywhere, those people are already affected much more profoundly with their lung and heart health than people who live in cleaner areas. These differences will only be magnified by a changing climate, and so the health effects will be much more severe for poor people, for elderly people who may not be able to drive or evacuate when they need to, for other types of patients who have disabilities or special challenges that make it difficult for them to respond quickly or to even move or to be transported.

So we know that health disparities are magnified by the changing climate and by associated climate disasters. The good news is that, by addressing the challenges that we have to global warming, we can also address health disparities. So many of us are very optimistic, it's actually a golden opportunity to do something about it.

Tessnim Ahmad:

When we think about greenhouse gas emissions, big industries like manufacturing and transportation may come to mind. However, the carbon footprint of healthcare institutions is enormous. Valued at more than \$3 trillion, American healthcare contributes 10% of our carbon footprint. So not only does climate affect health, health and more specifically health care affects the climate. Dr. Seema Gandhi is an associate professor in anesthesia who spearheaded efforts to reduce waste in the operating room. There's a lot of it, an estimated one third of hospital admissions can be traced to the OR. Dr. Gandhi's interest in sustainability didn't begin by hearing reports that the earth is warming, as is true for many of us. She grew up in a developing country, where limited resources forced upon her and her family, a consciousness about waste.

Dr. Seema Gandhi:

I grew up in India in a modest family, one of four siblings. I think that every day our parents and the culture around reinforces, use only as much as you need or don't waste. "Don't waste water, turn off your lights." So I think that we just grew up in a culture around not wasting and being very mindful of the opportunities that we had, whether it was food, clothing, paper, just everything around. Then I moved to London and I was very fortunate to see a socialized way of medicine, but also a way of medicine in which choices were made very thoughtfully. So, when I came to U S, I had this abundant experience of living and working in other countries, that really sparked my interest in sustainability.

Tessnim Ahmad:

Dr. Gandhi recalls the deliberateness with which decisions were made when she practiced in London, and how that changed when she moved to the U S. Here it seemed, environmental and economical considerations reviewed as somehow shortchanging patient care.

Dr. Seema Gandhi:

Even the smallest test that we ordered or the equipment that we use, there was this always reminder and questions from our consultants or attendings as they call it here, about why are you ordering this test? Why do you think you need this test? Or why are you opening two IVs or why are you opening three central line kits? So I think there was always a focus and discussion around waste. That is one of the biggest things that I found very different. The other thing was somehow the culture, the culture is very different, we don't often talk about the cost of healthcare and it's almost assumed that if you think about the cost of healthcare in some way that you're not providing the same quality of healthcare or that in some way we're compromising the patient's safety.

But I don't think that quality, safety and thinking about the cost of the choices we make are all mutually exclusive. Lastly, I think I've often seen a lack of ownership. People think that their choices and their decisions would not have a bigger impact, but I just think if everyone rethink their choices, then together the actions could be cumulative and consequential.

Tessnim Ahmad:

Dr. Gandhi's first sustainability project grew from an observation while supervising a resident in the OR. She recalls him turning up the flow rate of an anesthetic gas with a poor environmental profile. When asked, the resident couldn't explain his choice of gas or its flow rate, she realized the medical culture in the U S fundamentally lacked an appreciation for the connection between health care and the environment.

Dr. Seema Gandhi:

The three most commonly used anesthetic gases in the U S are isoflurane, sevoflurane, desflurane. All these three gases have a very different profile in how they affect the environment. Desflurane has a very high global warming potential compared to sevoflurane and isoflurane. But also the way we use the gas, and to give you an example, you could use the gas at 0.5 liters a minute or you could use a gas at two liters a minute.

If you use desflurane at 0.5 liters per minute, it's like driving a car for about 98 miles, so like going from San Francisco to Sacramento, but if you use desflurane at two liters a minute, then it's like driving a car from San Francisco to LA. So, when I started practicing here, I noticed that people were using a lot of desflurane, but also using desflurane at very high fresh gas flows, and I started education grand rounds. We even had time where we did Hall of Fame and Hall of Shame.

Tessnim Ahmad:

Dr. Gandhi helped create a realtime feedback mechanism in the electronic medical record. The tool collects fresh gas flow usage and warns providers about inappropriate use. Another one of Dr. Gandhi's projects was prompted on a long call night, while shivering in the OR.

Dr. Seema Gandhi:

So, one night I was sitting on cold in the operating room, wrapped up in my two or three blankets because it gets so cold, and there was one lap appendectomy going on in one operating room. I

remember my mom's voice in my hears, "Turn off the lights, turn off your lights." So as I'm sitting there cold, I wondered why there's only one operating room that's currently being used. The lights and the HVAC is on the entire operating room suite. We looked at what is called occupancy-based ventilation. So we looked at how to optimize the occupancy and the HVAC with it.

Tessnim Ahmad:

In addition to greenhouse gas emissions, healthcare also creates large amounts of solid waste. A few decades ago, concerns regarding risks of infection and device failure resulted in a nationwide increase in the use of disposable single use devices. As a result, most devices used in [inaudible 00:11:26] today, are used once and then thrown out. This waste ends up in municipal landfills, which are disproportionately located in poor and minority neighborhoods. This goes back to Dr. Katherine Gundling message, that environmental issues disproportionately affect low income communities and communities of color. The use of two devices in particular disturbed Dr. Gandhi. Bair Huggers are disposable air warming gowns to keep patients warm during surgery. HoverMatt are air assisted transfer devices used to move patients between the hospital bed and operating table.

Dr. Gandhi notices these devices were removed from their packaging for nearly every surgical case, and many times were not used. She worked with the UCSF office of sustainability to perform an observational waste audit. They found that, in more than 30% of cases, Bair Huggers were thrown out unused, only 7% of distributed HoverMatt were used to transfer patients. Dr. Gandhi advocated for more responsible use of these devices through grand rounds presentations and one-on-one teaching with residents. She also advocated for reprocessing of HoverMatt to further reduce waste. She's happy to report that all ORs now have reprocessing bins for HoverMatt. The next device for Dr. Gandhi to tackle is the anesthesia circuit or the plastic tubing that allows delivery of anesthetic gases from machine to patient.

Dr. Seema Gandhi:

Anesthesia circuits are used one circuit per week in UK and Australia, but right now here at UCSF, we use one circuit per case. So if we ended up doing three or four cases in the room, we use three or four different circuits. Why this? If this was in the UK or Germany or many other developed countries, that same circuit would last them for the entire week.

Tessnim Ahmad:

Dr. Gandhi won the 2017 faculty award for sustainability projects, and is now the director of sustainability for the department of anesthesia. Her work has been featured at national conferences and grand round sessions across the country. Last year, Dr. Gandhi had to take a break from her clinical and sustainability work to receive treatment for breast and thyroid cancers. With the clean bill of health and system wide urgency in support for sustainability work, Dr. Gandhi is excited for the next decade. She's most proud that sustainability is now part of the vernacular.

Dr. Seema Gandhi:

I am proud, and now we can talk about sustainability in the perioperative setting and in the medical setting and it's a vernacular. I think that there is the energy and the momentum of people wanting to work towards decreasing their impact and making the right choices.

Tessnim Ahmad:

You see such students recognize that in the very near future, they will be the providers responsible for managing the most deleterious health effects of climate change. They've demanded greater education on climate medicine. Dr. Sherry Weiser, Arian Tehrani and Tom Newman have worked to develop a climate health curriculum for health science learners. They've worked with professors to integrate climate health into existing material. They also emphasize the need to teach critical thinking and problem solving, rather than just fact, in order to be able to solve new problems caused by climate change. Colin Baylen and Nuzhat Islam, are third year medical students who last year helped found a group called Human Health and Climate Change. The student advocacy group is committed to raising awareness about the relevance of climate change, and using their roles as healthcare providers to affect meaningful change.

Colin Baylen:

We've been involved in critical advocacy, we've gone and spoken to our elected officials about how urgent it is to take action on climate change because of its impacts on health. We have put on educational events at our university here at UCSF to educate students and faculty on these connections and help to build a landscape of these connections and discuss how we can move forward as health professionals into a world that's going to be increasingly impacted by climate change. We've also done a number of educational efforts and collaborated with faculty to try and get climate change and these connections to human health integrated into our curriculum.

Tessnim Ahmad:

One of their projects tackles academic air travel, along flight emits more carbon dioxide into the atmosphere than the average person in many countries produces in a year. Academic conferences attract hundreds to thousands of people from all over the world, creating a huge carbon footprint. UCSF faculty and students are no exception.

Speaker 5:

As UCSFs impact and reach as grown over the years, the amount of travel that's taken place to our university for academic and business purposes has also increased. Since we started tracking the admissions for our university from business and academic airline travel over the years, it's increased virtually every year since those emissions have been trapped. In 2017 about 12% of the emissions of our university were just due to business in academic airline travel.

Tessnim Ahmad:

While eliminating academic air travel is not on the agenda yet at least. Carbon offsetting offers a mitigation strategy. A carbon offset is a cost of a project to reduce a specific amount of greenhouse gas emissions. For example, the cost of a project to offset the emissions from a round trip flight from San Francisco to Chicago would cost about \$20.

Speaker 5:

One initiatives we've taken with students in order to try and reduce UCSFs air travel related emissions is through a university wide travel carbon offset program where we go to the different medical departments around UCSF, and we ask them to commit to purchasing a carbon offset per each episode of travel by a member of that department.

Tessnim Ahmad:

Another project is a Report Card to compare medical schools on metrics of climate health.

Nuzhat Islam:

When we first came to medical school, we thought there would be a little bit more involvement of the curriculum and education with respect to climate change and planetary health. However, this is not the case. One of the projects that grew out of the human health and climate change student organization was this notion of a planetary health justice report card, which focuses on a discrete set of metrics by which we can compare medical schools across the nation and internationally as well. The main areas in which we are hoping to grade our institutions, our planetary health curriculum, interdisciplinary research in health and environment, university support for student planetary health initiatives and community outreach centered on environmental health impacts.

The purpose of this Report Card is not just to place a grade on the institution, but the main reason that we felt this was important is that we would like to use this Report Card as a tool to enact change within medical school curriculum and institutional priorities as well. This project was inspired by the Racial Justice Report Card which was created by the organization White Coats for Black Lives and that Report Card had led to substantial impact across medical school curriculums around the country and we were hoping to emulate that.

Tessnim Ahmad:

UCSF Medical Center has been named one of the greenest hospitals in the country. In 2013, UC president Janet Napolitano announced the Carbon Neutrality Initiative, which commits UC to emit net zero greenhouse gases from its buildings and vehicle fleet by 2025, something no other major university system has done. UCSF is making substantial progress toward its 100% green power goal by 2025. Dr. Gandhi says climate change requires us to rethink 2020, the decade. Her advice to herself, students, residents, fellows, and faculty is to question the status quo. That means rethinking all decisions and practices that have been handed down to us. Every decision, process or device from the gloves we put on, to the labs we order, to the drugs we deliver should be examined as to their purpose and environmental impact.

Dr. Seema Gandhi:

The definition of waste is to use or expand carelessly or to no purpose. So, if we need two pieces of gauze and we go and grab four and then throw two, that is waste. If the patient doesn't need CBC on a particular day and we tick it off on a form, then that is waste. So to rethink every single decision that we make ... and I think that it's a lot easier, it takes a little effort initially, but then once it becomes second nature and once it becomes a local and regional culture, and the entire system conforms to it, it snowballs and it becomes easier to follow it.

I do appreciate that there's a lot of effort right now on recycling and I'm involved in some of those efforts, and they're very necessary for downstream improvement and waste diversion. I also think that we have to focus on reducing, so anything that we don't need or we're using in surplus, we have to think about reducing it, reusing, repurposing, and finally, recycling. I would still like us to rethink the choices that we are making, and as a healthcare industry and as a leader in providing healthcare, refuse some of the choices that are given to us and actually set higher expectations of the manufacturers and higher expectations of supply chain and demand for more sustainable products.

I think when we stop questioning our automated behavior is when we get into a pattern of wastefulness, question yourself on the amount of supplies you take. I often see that when well meaning residents come to start an IV, they have twice the amount of supplies that they do need. Then often the

supplies are contaminated and have to be thrown out. Often, there is miscommunication with the team and labs are ordered multiple times. So the biggest message I want to convey is to rethink about every decision that you're going to make.

Tessnim Ahmad:

Thanks so much for listening. We'll conclude with the audio of a video call to action by the student group, Human Health and Climate Change.

Speaker 7:

As Future Healthcare Professionals, our patients will be directly impacted by climate change. Is our job to prepare for the climate crises that will affect everyone, in the form of extreme weather events, exposure to toxins, infectious diseases, food insecurity, worsened mental health outcomes, and destabilization of the healthcare system itself. It is important to remember that climate change is an issue of justice. The populations most effected are those most vulnerable. So, what can we do as Future Healthcare Professionals? As students, we can educate ourselves about the direct impacts of climate change on our patients' lives, such as how anti-psychotics can increase mortality during heat waves, and how as medics are more vulnerable during poor air quality episodes. We can learn how to do vulnerability assessments with our patients to best prepare them to cope with the coming disasters.

We can advocate for policy change from the local to the global level. Even advocacy within our own profession is immensely valuable, as 10% of the U S carbon emissions come from the healthcare industry. Sometimes doing less is more, and avoiding unnecessary medical interventions can reduce our carbon footprint. We can also get directly involved in the event of climate disasters by joining Disaster Healthcare Volunteering within California or National Health Services Corps, through which physicians and pharmacists can be deployed to the front lines to aid the victims of climate events. Recent legislation even allows pharmacists to dispense emergency medication without prescription during environmental emergencies. How are you going to mitigate the impacts of climate change?