



American Society of  
**Anesthesiologists™**

Central Line  
Episode Number 43  
Episode Title: Inside the Monitor - Flattening the Curve  
Recorded: March 2021

(SOUNDBITE OF MUSIC)

VOICEOVER:

Welcome to ASA's Central Line, the official podcast series of the American Society of Anesthesiologists, edited by Dr. Adam Striker.

DR. ADAM STRIKER (HOST):

Welcome back to Central Line. I'm your editor and host, Dr. Adam Striker. Today, we're tackling the topic of climate change and what the specialty can do to address the problem. And we're joined today by Dr. Jodi Sherman, Associate Professor of Anesthesiology at Yale School of Medicine, Associate Professor of Epidemiology and Environmental Health Science at Yale School of Public Health, Medical Director of Sustainability for Yale New Haven Health, and a Co-Chair of the Subcommittee on Environmental Health. Dr. Sherman's also contributing a regular column in The Monitor titled Flattening the Curve, which is all about sustainability. Welcome to the show, Dr. Sherman.

DR. JODI SHERMAN:

Thanks for having me, Adam.

DR. STRIKER:

Well, let's start off just by getting to know you a little bit and getting a little bit of background, not only your medical background, but where your passion comes from regarding sustainability.

DR. SHERMAN:

Yeah, I mean, I've been in, interested in the environment for as long as I can recall, I grew up in rural Connecticut and spent a lot of time in nature. So I think it's just quite natural for us to have an affinity for the outdoors and flash forward quite a long time to make it to my career in anesthesia. During my training at Stanford University, I did my residency, of course it was such a joy to finally be doing anesthesia care as a resident.

But it was also quite troubling because it's so obvious that we're using so many disposable supplies. We're wasting so many supplies. Materials must be coming from somewhere and going somewhere. It's quite obvious that we must be causing some harm to the environment and that we must do a better job. But at the time there was literally no information about how big the problem was, what we could potentially do as solutions. Other than to say we should use less stuff, there really was nothing that could be said. And so after graduation, when I was looking for jobs, one of the things that attracted me to Yale University is the opportunity to collaborate with environmental scientists in the School of Forestry who could help put some numbers behind the footprint of healthcare practice and to help guide better practice. And I essentially made a pact with myself that I would not practice healthcare, I would not practice as a physician, unless I tried to also make care itself more environmentally friendly.

DR. STRIKER:

Well, let's talk about the scope of the problem. Why do we, as physicians, and specifically anesthesiologists, need to be concerned with this when it's such a global issue?

DR. SHERMAN:

Well, firstly, it's our mission to do no harm. And historically, that has been focused in anesthesia on the patient right in front of us. But really, it's every physician's job to care about all humans and the environment that keeps them safe and healthy. And so starting more broadly, how big is the problem of healthcare pollution? We now know from studies that we've conducted that healthcare globally is responsible for about 4.6% of global greenhouse gas emissions. So that's a huge number coming just from the healthcare industry. And about a quarter of that is coming just from the United States, even though we're about 4% of the global population. So we have an out of proportion contribution to the problem. We know we spend more on healthcare than any other industrialized nation, and yet our health outcomes do not reflect that investment. So there's some opportunity for improvement there.

Within the US, about 8.5% of our nation's greenhouse gas emissions are coming from healthcare about similar fractions of toxic air pollutants in both air pollution and greenhouse gas emissions come from burning fossil fuels. So the cause is the same. The problems are related, that the care that we provide is energy intensive. Our health system as a whole has much higher emissions than any other health system in the world. So we average between 1,700 to 1,800 kilograms of carbon dioxide equipment per capita in the US, which is much more than, say, France, for example, which is

around 450 kilograms of carbon dioxide equivalent per patient, but they have a similar level of outcome of care.

One of the studies we did, and this is with the Lancet Countdown on Health and Climate Change with the University College of London has looked at national health sector emissions and correlated it with the global burden of disease, healthcare access and quality index. So if more care results in better outcomes, if more emissions result in better outcomes, then one could argue that that's the right thing to do, and at least until we find lower emissions way of delivering the same care. But what this showed is that at a certain point, more emissions and more expenditures does not result in better outcomes. Also, some of the drugs that we use, namely inhaled anesthetics, are very potent greenhouse gases and they are just blown off facility rooftops and, and released directly to the outdoor environment without any care or treatment. It turns out that inhaled anesthetics are a significant portion of our footprint, so we don't know what it is globally because of absence of data. The best data sources we have are out of the UK, where inhaled anesthetics are responsible for about 3% of their, their national health sector footprint.

Similarly, they found, and this has been also discovered in certain institutions that have looked here in the US, namely Kaiser Permanente has done a lot of work around this. And Kaiser Permanente, their health system, about 3% of their emissions are coming from inhaled anesthetics. So that corroborates what the UK has shown in their national health system. Within a health facility, inhaled anesthetics are typically around 5% of a health facility's emissions. So the numbers are getting bigger proportionally.

When you delve into perioperative services, there are a couple of different studies with similar findings that about half the footprint coming from perioperative services, that's all the medical equipment that we use on the surgical side, all the energy to run all the equipment, the HVAC systems, which are very energy intensive and inhaled anesthetics, inhaled anesthetics account for about half the footprint of perioperative services. So we're contributing to a big part of healthcare's problem. And since it is our duty to do no harm, it is our mission to try and improve that.

DR. STRIKER:

Does the US, even on a per patient basis, seem to use more of inhaled anesthetics?

DR. SHERMAN:

Well, I can't say that we use more inhaled anesthetics, but I will say one of the things we do in the US that other nations don't seem to abide by, and that is this two liters fresh gas flow requirement for sevoflurane. Now, this is an FDA requirement based on

theoretical interaction between sevoflurane and the carbon dioxide absorbent material producing the theoretical compound A that might cause nephrotoxicity at low flows, it's, it's higher concentrations produced. But this is a, a very wasteful practice to use two liters fresh gas flow. This is not common practice globally. And in fact, there's a, a nice paper out there that shows that, you know, after millions of anesthetics, there's been no tie of nephrotoxicity stemming from low flow sevoflurane. So in that regard, you could say we are quite wasteful and have higher emissions. We also probably have higher consumption of desflurane than many other countries who, when they have socialized care, are more cost conscious. And we know that desflurane is much more expensive. So outside the US, desflurane is probably less common for that reason. So those might explain why the US would have a higher inhaled anesthetic footprint. But there is no, no study now looking at that comparison.

DR. STRIKER:

Well, I think it's fair to classify the footprint that anesthesiologists might leave into two categories. One is you've already articulated, is inhaled anesthetics. The other is, I would think, would be disposables. Before we get into the disposable side, let's follow up on the inhaled anesthetics. But as a practicing anesthesiologist, if I'm listening to this and I don't have the knowledge about the global health impact or even necessarily a passion about sustainability, do I really care about this? I mean, how much difference is it going to make if I'm adjusting my inhaled anesthetic flows a tiny bit? I'm trying to take care of that patient in, in the acuity of the setting is such that, that needs to be down the list of my priorities. What would you say to that argument?

DR. SHERMAN:

Well, I would say, of course, when we're in the midst of a trauma or things are acutely requiring our attention, we're not going to prioritize environmental footprint. We're going to prioritize the safety of the patient in front of us. So I work in a major trauma hospital. I take trauma call. I do a lot of trauma care. That said, a lot of the time I do have the ability to make choices that are better for public health and don't affect the outcome one way or the other for my patient. So if I can deliver similar care for my patient that is safe, but do it in a way that is better or worse for public health, it is my duty to prioritize that care which is also better for public health. So it's not instead of the patient in front of me, it's in addition to when I'm able, which was the vast majority of the time.

DR. STRIKER:

Well, you brought up a, a couple of good points. One is the concern about compound A and low flows of sevoflurane. At our institution, we had a project where one of our

anesthesiologists championed the changeover in carbon dioxide absorbance to one where you don't worry about formation of compound A, such that we could justify the lowering of flows and make everybody comfortable with that. And it's worked very well in terms of our overall consumption. Is that a good alternative for many that might be concerned with that, even if the evidence doesn't bear it out?

DR. SHERMAN:

So I would say that it's pretty common now that our carbon dioxide absorbance no longer interacts with CO<sub>2</sub>. Right? So, so I'm not sure what the statistics are, but I would say anecdotally, CO<sub>2</sub> absorbance now have very limited concentrations of any product that might cause compound A or formaldehyde or carbon monoxide. So this is quite common. So, so not only globally do people not really subscribe to this two liter fresh gas flow minimum, even based on why we were asked to do that to begin with, no longer seems necessary. And so, for example, University of California, San Francisco did an initiative where they created a fresh gas flow alert that if you go above point eight liters per minute, you get a, an alert warning you to lower your fresh gas flow. MGH created a policy that very clearly stated you can use whatever fresh gas flow you require to keep your patient safe, that you do not need to use a two liter per minute minimum. So thankfully, this is starting to catch on and become more common practice.

DR. STRIKER:

Great. Well, it certainly sounds like the most conventional absorbents that are distributed now by the manufacturers have lowered their concentration of the, the critical base to the point where it's, we're talking theoretically, rather than practical. But I know there's the ones out there which do market themselves as zero formation to, I think, try to capitalize on that concern. But it sounds like just the studies bear out the fact that it, that may not even matter per se, if you're depending on whatever absorbent you're using that's commercially available currently.

DR. SHERMAN:

That, that's correct. Many places have a CO<sub>2</sub> absorbent now, moderate CO<sub>2</sub> absorbent, that isn't even of concern for this issue, but are unaware and out of fear of regulatory oversight requirements are still subscribing to two liters. So this, this is an opportunity for people to examine what product they're using. Do they actually need to even use two liters fresh gas flows? And by and large, the answer is probably not.

DR. STRIKER:

Let's circle back a little bit about desflurane, because I think this is a, a huge topic and one that's certainly gained a lot of traction as of late. You mentioned that it's the biggest contributor of our inhaled anesthetics, greenhouse gas with its potency. Do you feel that des is not very useful at all, or do you think that there's still circumstances where desflurane should be utilized or at least stocked, depending on where you are?

DR. SHERMAN:

I would say that desflurane is not an essential drug, it's not on the World Health Organization's list of essential drugs, there's nothing unique about that drug that cannot be accomplished with other drugs. So I am of the firm opinion that it does not need to be on one's formulary. At Yale New Haven Health System we eliminated it from our formulary back in 2013. I think we are the first in the world to do so on environmental grounds. It was also as a cost saving measure. We substituted sevoflurane utilization and we saved an estimated 1.3 million dollars annually across our health system just from getting rid of the drug in the vaporizers.

There are several studies following suit, including one by (sic) from University of Wisconsin. There's a nice study by the Alexander Group in British Columbia that looks at several institutions throughout British Columbia similarly substituting sevoflurane getting rid of desflurane. Kaiser Permanente has largely gone, it's gone from Northern California. It should be mostly gone if not already gone from Southern California. I mentioned to you that inhaled anesthetic that 3% of their footprint, they've already cut that footprint down by, I think it's 1.5% by getting rid of desflurane. Now, the other big offender is nitrous oxide. And that's a tough one to crack because we're not the only ones that use it.

DR. STRIKER:

What do you think the (sic) for the use of desflurane? Is it simply the pharmacokinetics that, you know, that the perception is you can just, you know, wake up people quicker or is there something else to it, or, well, what are your thoughts?

DR. SHERMAN:

Well, yeah, I mean, I think, you know, people who use it, they like it for a number of reasons because it is easier to titrate. But that's for, you go to the original literature. Firstly, it showed that it comes off faster for anesthetics that are less than a hundred, and I believe it was, a hundred and ten minutes, after which it does not come off any faster than other drugs. It's about the same. But importantly, they kept the drugs at full MAC until the end of the case and then turn them off. That's not how we practice, right? We titrate our drugs to effect. We titrate our drugs down at the end of the case. So that

study was a little bit rigged in favor desflurane to begin with, but it's astonishing to me. So when we had desflurane go into a room that I was taking over, let's say, you know, an eight hour breast reconstruction case, and I go to relieve a colleague at the end of the day and see they've had sevofluane going on all day long. And when I say out of curiosity, why did you choose desflurane? And the answer is, oh well, so the patient will wake up faster. Well, if you read the literature, you know, after that amount of time, it doesn't get you any beneficial faster wake up. And furthermore, because we titrate our drugs to effect, no matter what drug we choose, no matter what drug combination we choose, whether it's TIVA whether it's isoflurane, our job is to titrate to effect. And when the drapes come down, our patients wake up. That, that's part of the, the finesse and artistry that we do. And it shouldn't matter what drug combination one uses. That's the goal. And it's certainly achievable.

DR. STRIKER:

Before I get into our impact as anesthesiologists and physicians, I want to get into a little bit of specifics with disposables and hear your thoughts on should we be using as much as we do? What are the downsides of the way we're practicing in general? And your thoughts on the use of disposables versus reusables?

DR. SHERMAN:

Well, let's back up for a moment and, and say that infection control is paramount to our jobs as clinicians. Preventing infection is essential to every aspect of care that we give. Healthcare acquired infections are often preventable, cost our health system enormous amounts of money, cause a lot of morbidity and mortality, and they also increase emissions because patients require more care. So sometimes disposables are the right thing to do. So when it comes to materials that are difficult to clean, let's say angiocatheters, IV tubing, of course those can't be reusable. There's no way to define the, design them in such a way that they would be easy enough to clean. That said, those materials could be collected and recycled. With certainly IV tubing, there's a, a lot of institutions are now starting to collect IV bags and IV tubing for recycling. So it is possible to collect, sometimes vendors will require decontamination first, and, and so there is an extra step that may be involved.

But back to the question about reusables, what's happened is in the name of infection prevention, we've gone way out of bounds in terms of what needs to be disposable. This is a form of technology creep or indication creep, and it's more extreme than other locations in the world. I mean, this idea, you know, for example, I was just talking to a colleague in Australia who was asked what he thought about disposable pulse oximeter probes, and he thought that that was ludicrous. And when I said, well, that's really the

standard of care in the US. He was shocked, he's like, who says this should be the standard of care? It's, it's crazy. So we go from disposing very complex surgical equipment like laparoscopic robotic equipment. Those are virtually all single use disposable, and they cost hundreds and sometimes over a thousand dollars apiece, to simple low risk devices like blood pressure cuffs, things that have very low probability of cross contamination when proper cleaning protocols are followed.

So to answer your question, sometimes disposables are the right thing to do, but we're way out of balance in terms of what the indications are for disposable goods. And it's costing our health system money and it's causing harm to environmental and public health.

DR. STRIKER:

What is the driver of all the disposables? Is it regulatory bodies or is it the companies themselves or governmental regulations on preprocessing? Why here are we using so much more than other places?

DR. SHERMAN:

Well, I, I think that it's a multiple factors, including perceived benefits around infection control that are, that lack evidence. The assumption is that having zero possibility of infection is the proper guiding principle. And that's not realistic from a cost perspective. It's not realistic from a materials management perspective. We have finite resources in this world. Organizations have finite resources. So this a, assumption that disposable is better for patient care is by and large not borne out by the evidence. And to operate on that assumption without considering the harm that that's doing is missing the bigger picture. So part of it is our perception. We want to do what's best for our patients and that, you know, more is better and that disposable is better for our patients. Often that's not the case or there's no evidence for it. Part of it is regulatory. You know, when there are outbreaks, obviously we have to do a root cause analysis. Is it because our policies were deficient and we need better policies? Or is it because locally there was a lack of adherence to that policy? Unfortunately, what happens is that there's a lot of knee jerk reactions when there's a bad outcome to just, to just make everything disposable without actually looking at, doing a root cause analysis, and looking for ways that not only prevent those outbreaks from happening in the future, but are also mindful of the fact that we have limited resources, both material and fiscal, and that we also have to be thinking about public health when we make these decisions. So oftentimes these decisions are made in silence. And so that's another part of the problem.

Another is regulatory complexity or, or lack of consistency in professional guidelines and regulatory guidelines. And it's, it's very complicated. And a lot of times there's a lack of consistency. And so when there's difficulty interpreting what the right thing to do, the default is to just throw things away.

And then to your point, yes, industry is driving a lot of the problem. There's a whole phenomenon that has been well described many decades ago, manufactured obsolescence. Single use disposables, is not a regulatory designation, is an industry designation. Just because something is single-use disposable does not mean it can't be cleaned and reused. What the label means is that whomever cleans that assumes the risk that that device functions as if it were a new device. And essentially hospitals don't want to assume that risk and that's why they throw things away. But that doesn't mean that they can't be cleaned and safely reused. And so a third party industry has sprung up called reprocessing, which is essentially outsourcing the cleaning to a company that has applied for FDA approval to clean those devices and assumes the risk of function. And so hospitals can save money by selling these devices to these companies and by buying them back at a discount. But what a lot of manufacturers are now doing are designing their devices such that they cannot be disassembled. So they're, they're trying to prevent reprocessing. So there's a lot of manufactured obsolescence that is occurring that is also contributing to this drive towards single use disposables.

DR. STRIKER:

I'm so glad you brought that last point up, because I have always been bothered by the fact that a lot of misunderstanding occurs around that designation of single-use and what that really means. I think that's a very important point to bring up, and I think that's a very misunderstood point about the single-use items.

The one other point I wanted to ask about is with regard to regulatory bodies, let's say you're worried about getting a, a visit from The Joint Commission or CMS and you bring consultants in who go over with a fine tooth comb, every one of your guidelines, your policies, your behaviors, and then they're going to air on the conservative side and say, oh, well, I see that you were just washing down your blood pressure cuffs. Really, you should be disposing of them. And then the organizations or the hospitals might say, well, actually, yeah, we don't want to be cited for anything. So we're just going to air on the conservative side. Is that an issue as well?

DR. SHERMAN:

Well, it's, there's an opportunity there, right? Because the, the important thing is that a hospital has a policy in that it abides by it and that there is evidence to support it. So in

the case of blood pressure cuffs, just because something is single-use disposable, again, doesn't mean it can't be cleaned and reused. In, in fact, we don't clean enough of our blood pressure cuffs that are disposable. That's a whole nother interesting discovery. You know, we use these, these blood pressure cuffs for, you know, days to weeks on in-patients, particularly in intensive care patients, thinking we're reducing our risk of transmission. And I have yet to find a single lo, location when I tour through hospitals that has a policy or not where people clean those blood pressure cuffs. In fact, there's an interesting study comparing reusable versus disposable blood pressure cuffs and infection transmission. And what they found was, they, they didn't intend to find this, but what they found was some evidence of patients re-infecting themselves after they've been cleared of an infection through their own dedicated blood pressure cuff that wasn't cleaned. So, just because something's disposable doesn't mean that we're preventing infection transmission.

But to the point about the, you know, oversight bodies, as long as a hospital has a policy in place that is evidence based, they could certainly reuse blood pressure cuffs. So they have to be justified in what that policy is. So it could be blood pressure cuffs that could be laryngoscopes, it just has to be evidence based. And there has to be a clear policy and evidence that those policies are known and being followed by the staffs.

DR. STRIKER:

One other specific piece of equipment I want to touch on before moving on is the use of reusable versus disposable laryngoscopes. You just mentioned it. What is the current evidence out there or is there any supporting one or the other?

DR. SHERMAN:

In terms of infection control, there's nothing to say that a disposable is safer than a reusable. The question that has come up is what level of risk and therefore what level cleaning is required for these devices. So for the tongue blades, they are uniformly considered intermediate risk because they touch mucous membranes. For the handle they have historically and throughout the rest of the world been considered low risk devices because they touch in tact skin, our hands. Now, there is conflicting interpretation. This is an example that I set up because of conflicting professional guidelines and lack of clarity and regulatory, specifically the CDC guidelines, around how to classify the handle. The oversight bodies have basically just come through and said basically we're required to follow what's called the IFUs, that's what the C, The CDC doesn't say what to do, they say do what the manufacturer says, the IFUs are the instructions for use. Now, if you look up what the purpose of the instructions for use are, it's not for companies to tell us what the infection risk is. That is clearly the responsibility

of our epidemiologists and, and our public health experts. But because there is this loophole, suddenly you see that, now, IFU's start to say what infection risk the handle is, and, and they are ratcheting up what that is, many are now calling it intermediate risk. That, that has never been shown or proven. I, I don't know any study that has actually said that they are intermediate risk. But now that's what the, the, a lot of the companies are doing.

So what that means is that in order to be compliant, one has a choice. If it's intermediate risk, it must go down to the central sterilization department for a minimum of high-level disinfection, if not sterilization. Or alternatively, you can use single use disposables. So those are your choices as opposed to if it's a low-level risk classification, it gets cleaned at the point of use, meaning we wipe it down with our chemical cloths, cloths as we do as we do with our blood pressure cuffs. And so because of this lack of clarity and conflicting guidelines, and now the oversight bodies such as The Joint Commission are very interested in our compliance with this particular device, institutions have two choices. Either they go with the disposable or they start sending their materials down to Central Sterilization and Supply for, for handling. And so this is placed a lot of burden on health institutions and, and, one we can handle, right? Because we already clean and, and re-process a lot of instruments every single day on the surgical side. So, you know, one or two more, you know, coming per case from the anesthesia side is really a very small burden. But nonetheless, it adds level of infrastructure. And so a lot of institutions have just defaulted to what's easiest, which is just throw them away.

DR. STRIKER:

Well, let's shift gears a little bit and talk about your series in The ASA Monitor, it's entitled *Flattening the Curve*. Can you tell us why you chose that name?

DR. SHERMAN:

Well, with the COVID pandemic, it was really quite a crisis that was overwhelming our health system and still continues to do so in parts of the world, in most places where we are managing. But we were being overwhelmed, particularly Lombardy, Italy, New York City, just being completely overwhelmed beyond our health systems' capacity to handle these patients. And so the public health measures that were instituted quite early included social distancing, hand washing and eventually mask wearing. So, and the public health message, why we need to do these measures, is to flatten the curve of the pandemic, meaning that the curve of incidence that was overwhelming our health systems. And by doing these measures, we would essentially flatten that curve to a point where the health system could deal with the patients that they were seeing. So we weren't overwhelming their capacity to handle this crisis. So it's just, just essentially

elongating that curve. And so applying that to this concept of the climate crisis right now, the Intergovernmental Panel on Climate Change, which has, you know, thousands of scientists that have contributed to our understanding and recommendations, there's a special report that came out in 2018 that basically said that we need to aim to try and reduce our average surface temperature warming to one and a half degrees centigrade by mid-century. We're already at one degree centigrade and that's rapidly rising.

And so in order to slow down that rise, to avert the worst public health anticipated harms by the end of the century, of which we're already starting to experience, in order to avert the worst possible harms from a changing climate, so more storms and flooding, wildfires and droughts, food and water insecurity, population displacement, emerging and changing patterns of vector borne diseases, in order to avert the worst possible scenario, we need to act now before it's too late. And what that means is that we need to cut our greenhouse gas emissions by 45%, by 2030 and by 100%, or get to net-zero by 2050. And so the concept of flattening the curve applies in the sense that we're not going to make climate change go away. We can't make it go away. But the idea is to reduce and slow down its impact so that civilization has a time to adapt to and maintain a more civil society.

DR. STRIKER:

Your January column touched on the goal of net-zero medical society meetings and the impact of COVID-19 on ASA's most recent Annual Meeting. Talk a little bit about that specifically and also what you think this means for the future of medical society meetings.

DR. SHERMAN:

Well, firstly, you know, one of the worst emitting behaviors that we do is flying. And so one of the best things we can do is reduce our amount of flying. And now certainly, it's nice to travel places and it's certainly great to meet people in person. And, and I would not advocate for stopping meetings in person because there's, there's something that happens between the spaces, as you, as it were, from our human interactions. And so I would not advocate for doing away for in-person meetings, but we can certainly do a lot more meetings virtually and maintain the option of virtual meetings even during in-person events.

And this is good for a number of reasons, including it reduces emissions by reducing flying, but it also increases access to education. So for people who are coming from far away distances, from low- and middle-income countries, it is very difficult and very expensive for them to be able to afford to travel to the United States. That said, we want

to elevate the level of education, the quality of care, not only within the US, but globally. And so we increase the ability to access education and therefore can help elevate the safety and quality of our specialty by maintaining virtual access to our events. But quarterly meetings of The Association, other meetings within The Association could be done virtually, and it also has the benefit of saving money and saving time.

DR. STRIKER:

Well undoubtedly, we've seen effects both positive and, and negative with regard to meetings from the pandemic. And I, I have to imagine that it's going to lead to some alteration in what we're used to when it comes to society meetings, professional meetings going forward. And I hope that we take the best of both worlds or make the most of what we've learned to accommodate all the, the benefits that are, that are there.

Well, let's broaden this out a little bit. Talk about anesthesia in general regarding sustainability. What do you wish most anesthesiologists understood better about sustainability and the specialty?

DR. SHERMAN:

I think one of the biggest messages is that we really need to be very mindful of the materials that we use, and this is a, another big lesson from COVID, that our resources are limited. Now we live in a wealthy society and tend not to want for any material. And unless one has done a medical mission or serves in some capacity in a low-middle income country, it's hard to tune in to the fact that in these places, you can only take care of as many patients as you have materials for.

The COVID pandemic was a wake up call that resources are in shortage globally. And this isn't just during times of pandemic. This is always. We are using more resources than the Earth has and can restore in a given year. And so really we ought to be aware that we're always in shortage, whether we feel it or not. So we need to be very, very mindful of every single thing that we use. We need to think, do I really need this? We need to be in close communication with the surgery team to know where they are within the procedure, when they're going to finish before we open supplies, and, and open large vials of drugs that we may not need because the case is coming to an end.

Of course, we need to limit use of inhaled anesthetics, avoid nitrous oxide, avoid desflurane. Personally, and I do about 95% percent TIVA, but there are instances where I think inhaled anesthetics are of choice, but to the extent possible, we need to reduce our fresh gas loads, avoid nitrous oxide and desflurane and avoid inhaled anesthetics

altogether. And we need to open less supplies and be more mindful about what we need and what we don't need.

DR. STRIKER:

Well, let's talk about the impact of cost and whether cost savings are aligned with these measures. Can you speak to how taking these issues on can lead to cost savings?

DR. SHERMAN:

Right. Well, you know, I will say that each institution has different purchasing prices. And so their opportunity is going to be specific to their own institution, both in terms of contracting capabilities and also in terms of where they are already at in terms of waste control, meaning excessive use of supplies.

And so, but certainly reducing waste is going to save money. That's in everyone's interest. Now, is it possible that disposables are cheaper than reusables? Sure. But you have to look at the life cycle of the device. It's not a one to one comparison. You have to think about how, what is the lifetime of this reusable device? That's how many uses I'm going to get out of it. That's how many uses I compare to disposables. So in all the studies I've seen that have done that in the healthcare literature, the disposables have been unfavorable from a cost perspective. Is that always going to be the case? Not necessarily. But when you, you have to look for it, you can't just take what the vendor tells you at face value.

And you also have to look beyond your own cost center to the cost for the entire institution. Now, if our Central Sterilization Supply Department had to bear the costs of our using more reusable devices, that's going to look bad for that department. But if you look at it across the entire institution, then it probably is more cost saving. So if we need to shift more money for more labor to that department, then that's the right thing to do. But we have to take a more broad view at costs. And I will say that intravenous drugs in general are more expensive than inhaled drugs. So you could argue that inhaled drugs are the right thing to do from a cost perspective. But I'll say this, we're externalizing the harm we're doing to public health. So that is costing society in ways that we're not accounting for and that are difficult to account for. And I will also say that sometimes doing the right thing costs money. Preventing harm is our duty. And even if it costs more money, it's the right thing to do.

DR. STRIKER:

What is the impact globally in terms of inaction on these issues with regard to global health? What are the numbers like? Just to give everybody a perspective of what we're talking about when, when we talk about global health and, and the impact on individuals around the globe?

DR. SHERMAN:

Well, I will tell you that the, globally that study hasn't been done, yet. We're actually doing it this year. So stay tuned for the Lancet Countdown on Climate Change and Health's 2021 issue, which will come out probably in, in November of this year.

But we know in the US we've done that study and we've done it a couple of times now. And the order of magnitude of disease burden from healthcare pollution in the US is around the same order of magnitude as disease burden from preventable deaths due to medical errors as first reported by the Institute of Medicine. And why this matters is that when the Institute of Medicine found that tens of thousands of people were dying each year because of preventable medical errors, it was a wake up call that sparked a patient safety movement that led to funding, metrics, institutions. It changed the lens through which we practice our care to focus consciously on patient safety. We have not done that same thing with healthcare pollution yet. We've just been ignoring it. We can't ignore it any longer. The harm we're causing to public health from healthcare pollution is on the same order of magnitude as deaths from medical errors. And this has been called the new patient safety movement.

DR. STRIKER:

Well, how are hospital administrators on all this? Are they up to speed on not only the environmental impact, but the cost savings that can be borne out from some of these measures, whether you talk about cost savings on a public health scale or even locally?

DR. SHERMAN:

I will say that there is an encouraging interest amongst clinicians and staff in hospitals for doing environmentally sustainable practice. There are a number of institutions now that have full time sustainability officers, and in fact some national leadership around this, through anesthesia, including through Providence Health in Oregon, University of Wisconsin in Madison, and also Yale. We have a lot of leadership, hospital leadership through our anesthesia departments around sustainability.

There are a number of health institutions that are, have dedicated sustainability programs across their entire health system. I mentioned Kaiser Permanente as an, as

an exemplar, another is Cleveland Clinic, Dignity Health is another, but I will say not enough. And in fact, there's a whole trend in corporate social responsibility reporting to demonstrate and move toward citizenry responsibility. Some, something like 80% of Fortune 500 companies now are doing carbon assessment reports and mitigation efforts. But if you look at healthcare organizations, it's closer to 12%. So we are lagging behind in our systematic efforts to improve our organizations' footprint.

DR. STRIKER:

Do you think that it's a problem with, it's a great thing to get behind publicly, but when the rubber meets the road and you actually have to appoint individuals to be in charge of these measures, you have to maybe invest some money to account for these things at the local level, I'm talking about institutional level. Do you think that that's where it falters?

DR. SHERMAN:

Well, that might be a, a perceived barrier. In fact, organizations can save money by investing in sustainability officers who have oversight for this work. When it's haphazard, it's impossible to have any sort of goal or any good measured outcomes. So it's definitely an investment. But I will say that you also have the ability to have more transparency and a public face on this. And patients like it and staff like it, too. There are studies now that demonstrate new business school graduates want to work for companies that have clear, transparent, socially responsible practices and also studies that demonstrate greater staff retention when organizations have socially responsible practices. And a great study done through the UK National Health Service said the vast majority of their staff are very passionate about this topic and, and think it's important as part of their mission.

DR. STRIKER:

Ah, well, Dr. Sherman, two things that I want to finish up with here. Number one, what can the ASA specifically do as an organization to help with environmental sustainability? What do you see their role as? And then the second part is going to be individually, each of us. But let's start with the Society.

DR. SHERMAN:

Well, I think that the Society can start by proving that it is a good corporate citizen as an organization, by measuring its own footprint and developing mitigation strategies and aiming to be a net-zero organization. Since it doesn't have any particular consumption

of resources like a healthcare organization would, but more as an administrative organization, it would be very doable to, to tackle its footprint. But it needs to set an example and do the right thing.

The other thing it can do is be more public about its commitment to environmental sustainability. It can sign on, to example, there's a Medical Society Consortium on Climate Change in Health, which has organization representations for more than half of the physicians now in the United States. So it can sign on to that. And it can also get involved with public policy. I mean, this is, this is about public health. Climate change is being called a global emergency. This is a public health crisis. And it's really all hands on board for organizations.

We can also mandate more education of our, both continuing education, and also for our resident trainees on this topic on how to be more sustainably practiced. And so those are some of the things that the Organization can do.

In terms of individual practices, I think we are, you know, there are definitely a lot of unknowns. It's not as if this is a, a well mapped out field, but of the specialties, anesthesia is one of the most well studied specialties. And so what we can do as individuals is firstly in our own personal practice, and that includes being more mindful of the resources and frugal with the resources, obviously not to compromise patient care, but to really avoid excessive utilization of materials. And so that's waste reduction.

And the other thing we can do is environmentally preferable practices, as I mentioned. So, avoiding inhaled anesthetics when possible especially desflurane and nitrous oxide, low flow anesthesia, doing more regional and TIVA techniques when, when feasible and safe for patient care.

Other things we can do is leadership within perioperative services, leadership within our organizations to raise awareness and do more initiatives around this work in the healthcare sector.

And then we can certainly get more involved in public policy if we feel so moved to do so, either through the ASA or through local governments or wherever one feels called to, including school boards, where, wherever one is and feels called to. Every aspect of our personal and professional lives presents opportunities for getting involved.

DR. STRIKER:

And are there any specific resources the ASA has where someone can go read up on all these things more?

DR. SHERMAN:

Right. So we have a Subcommittee on Environmental Health which falls under the Committee on Facilities and Equipment and also on the Occupational Health Committee. And so there we have a website that has some resources, including a Greening the OR handbook, if you will. Also some references, and we're also about to add some case studies that we've collected of interventions that people have done. So there's a, a resource there for people to turn to for more information.

DR. STRIKER:

If I'm a group, I'm listening to this podcast and I'm, have some influence in a group or I'm in charge of a group, and say so you know what, I want to change my practice. I want to make this a priority, at least to think about or address. How important is it to appoint a champion, if you will? Get someone who is going to follow up on these issues in a number of realms in their organization?

DR. SHERMAN:

It's fundamental to have somebody who is, who's driving the change, who's taking on a leadership role. It doesn't have to be a physician. It can be a nurse. It can be an administrator. But there absolutely needs to be someone who's driving things forward. And the good news is that there's a lot of interest in this topic. There are allies everywhere. There are people who are passionate about this work everywhere. So we're not alone. And it's a lot easier to get things done when we do things as a group and enlist the help of others.

DR. STRIKER:

Finally, you've touched on it a number of times throughout this interview, my perception of the larger perception of environmental sustainability and specifically regarding anesthesiology is that some people say this is so important, I want to get involved. I want to know what I can do. I want to make an impact. And there's another subset, which as soon as they hear the term, turn it off, say it's not my problem, I don't have time to deal with it. I don't want to deal with it. I worry about, you know, what's in front of me, each individual patient. And correct me if I'm wrong, but the, the ultimate goal of all of your work and all of this work is to increase awareness, but implore everyone to take into consideration the effects on global health and the effects of each individual and department on global health and what they can do. And it's not about dictating practice per se. It's not about trying to streamline practice. It, it's not about telling someone what

they should care about. It's about trying to make them aware and at least take it into consideration. Is that fair?

DR. SHERMAN:

You know, I, I would say that it's not about dictating care because the clinician has to decide based on the patient in front of them, what is the right care to give. That said, there are well known choices that are better or worse from an environmental perspective. And as I said, you know, if you have a choice to do things safely for your patient, then the moral decision is one that is also better for public health. But only the clinician knows whether or not they have that, that choice. So I can't tell a clinician how to do their practice, but I can tell them if they had a choice, what we know is safer for public health.

DR. STRIKER:

Perfect. Well, Dr. Sherman, thank you for a truly fascinating and informative conversation. I share your passion for this topic. And I, I think bringing awareness to as many individuals as possible is certainly vital. And I just really appreciate your time. And want to thank you for joining us.

DR. SHERMAN:

Well, thanks for having me, Adam.

DR. STRIKER:

This is Adam Striker thanking everyone for listening. Please be sure to check out this month's issue of ASA Monitor online at [asamonitor.org](http://asamonitor.org). And you can do that right now. And please watch for Dr. Sherman's next column, *Flattening the Curve*, to appear in the upcoming issue of the ASA Monitor.

And certainly, please join us again next time for another episode of Central Time. Thanks. Take care.

(SOUNDBITE OF MUSIC)

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