

TPWKY

This is Exactly Right.

Mirika

My name is Mirika and I've been a veterinary assistant for almost 4 years and am currently in the middle of completing my veterinary technician diploma. I work in Vancouver, B.C., Canada and have been working throughout the COVID-19 pandemic along with everyone else in the field as we were deemed an essential service. As a veterinary assistant, I am exposed to stress and trauma on a daily basis. I witness pain and suffering of both animals and their owners and I am often holding animals as they take those hard final breaths. It's not all puppies and kittens. Clients are stressed and anxious and they often take it out on the staff.

Throughout COVID we have implemented a client-free policy and only allow patients into and out of the building. While this helps keep us safe it also poses a bunch of logistical obstacles, we went from normal practice to a brand new way of operation we've never had to do before overnight. We split our staff into two teams and spent the next 9 months working short-staffed. Clients were angry, they could no longer come inside with their beloved pets and many thought we were over-exaggerating this COVID thing. I personally was working one month on overnights and one month off overnights for months on end and I was exhausted.

Oftentimes I was on my own and having to deal with an angry client as well as sick patients. Veterinary medicine is hard even in the best of times. Veterinary medical professionals are three times more likely to commit suicide than the average person. Many of us are on anti anxiety or depression medication, I being one of them, and work 11+ hour days with little to no breaks even to go to the bathroom. COVID has only made things worse. Along with the pressures that COVID has placed on our profession, there is often a lot of moral pressure as well. When clients have low funds they expect us to do things for free. If we don't we're seen as monsters who are in it just for the money because aren't we supposed to be helping sick animals? Anyone who works in vet med will tell you that nobody goes into this profession for the money. While we get into this work because we love it we also have bills to pay and families to support, especially here. Vancouver is the most expensive city in Canada to live in with the average one bedroom apartment costing \$2000 a month.

During COVID we have been the busiest we've ever been. We've had to stop accepting new clients as we just don't have the capacity to take on anymore. For a while we had an average wait of 3 months for a surgical procedure and 2 weeks for an appointment which doesn't sound like a lot but it is a very long time in veterinary medicine. With the incredible upsurge in pet adoptions while people work from home due to COVID, emergency and general practices alike were overwhelmed. In veterinary medicine we are all worried about what will happen once people are back to work. We all expect animal abandonment to skyrocket as people realize that their now 9 month old german shepherd cross has horrible separation anxiety because its owners were home all the time and now when they leave for work it destroys their apartment and they can't handle it anymore.

While we are lucky to be able to put social distancing measures in place to keep clients and staff safe, we are not immune to COVID transmission. We are all exhausted physically, emotionally, and mentally. I'm tired of being verbally abused by clients for charging for our time as if it's not valuable. I'm tired of hearing that I'm only in it for the money as I stay late to comfort a pet who is in critical care. I'm tired of being told that I'm a bad person for needing to pay my bills. Please be kind to your veterinary staff. We are all suffering and I promise you we understand your frustration, we deserve to be treated with dignity and respect. And if you're a veterinary worker, I see you, I understand your struggle, and you're not alone. If you need help please reach out to somebody. Thank you.

Adi

My name is Adi, I'm a volunteer EMT in Israel. I've been volunteering for the last 4 years and I've been volunteering even more during COVID. I've got to see some very unusual cases during this crisis whether people who had to go to the hospital but refused due to fear of COVID or people who had COVID but other medical conditions and refused to leave because they couldn't be accepted into the regular ward instead of the COVID unit. I've got to go with pregnancies that had to be taken to the COVID unit or just sit in people's houses for an hour just giving them the company they need and providing them mental relief because they couldn't leave the house. I've been called to so many elderly people just so they could have a social interaction or I've taken elderly people to a mental ward just so they could have the help they need.

When the vaccine came I was actually very happy, thankfully I got my first vaccine dose at the end of December last year when they just started coming out. I am happy that the vaccines are out and I am happy that my family took it and I am happy that I managed to get friends to take the vaccine. I would love to see situation in ambulances go back to normal and people actually having social interactions because I've seen the mental and physical devastation that it causes. People dying due to heart issues that could've been easily solved if they'd just gone to the ER with us or people who just died of loneliness which is something that should've been taken more care of.

Sarah

Hello I'm Sarah, I'm 51, I live in Herefordshire in the U.K. with my fiancé and I'm a Grower Supervisor for a medium-sized wholesale horticultural company growing thousands of potted ornamental plants. When the lockdown came our general manager was all over it. He found work for the seasonal staff we weren't going to keep at a local food factory and everyone who could be spared was furloughed. In the U.K. the government covered 80% of the furloughed wages including my fiancé who works in the loading bay. My department cares for the plants so obviously we couldn't be furloughed. We expected business to drop through the floor. It wasn't a walk in the park but what we didn't expect was that the moment people were forced to stay indoors, they became desperate for plants to bring nature into their homes. Garden centers were closed but supermarkets increased their orders.

My fiancé was brought out of furlough after only 3 weeks and worked 12 hour days until we got our seasonal staff back in May. It was exhausting. Working during a national lockdown is strange, it's like going to work in the apocalypse. Then you go home with only enough energy to browse social media and no one has the same experience as you. Suddenly you have nothing in common with longtime friends. The one time I tried to express this I got shut down in flames for not just being grateful that I still have a job, which I am. Maybe I should add here that I'm being referred to a chronic fatigue clinic so I may have struggled more than others but we were all exhausted. Now we're in the second lockdown. Our wedding got canceled just 15 days before the date but we scheduled for March now.

We can't get PPE suits for spraying so we may lose crops soon on top of losing the Wales and Scotland markets because they're locked down. Horticulture has been previously treated like a poor cousin. Our general manager's daughter was told that she was too intelligent to go into horticulture. For the record, by training I'm a horticultural research scientist, I have a research Master's. Maybe now we'll be less overlooked by schools and colleges as viable careers. We're hiring and any field you might be interested in from the grunt work through to logistics through to science, it all has its place. More than that I hope people remember just how much they needed nature during this time. Thank you.

TPWKY

(This Podcast Will Kill You intro theme)

Erin Welsh

Thank you again so, so much for sharing your stories with us.

Erin Allmann Updyke: And thank you to everyone who has written in to share your COVID-19 experience with us, we really appreciate it.

Erin Welsh: Yeah, we do. Hi, I'm Erin Welsh.

Erin Allmann Updyke: And I'm Erin Allmann Updyke.

Erin Welsh: And this is This Podcast Will Kill You.

Erin Allmann Updyke: And welcome to Chapter 18 of our Anatomy of a Pandemic series.

Erin Welsh: Welcome. I can't believe we've made it this far but also I can totally believe it.

Erin Allmann Updyke: I know, same. I feel the same.

Erin Welsh: Yeah. We are very excited for this episode because it's kind of a continuation of an earlier episode.

Erin Allmann Updyke: We had an episode fairly early on in this series that was all about spillover events where we spoke with Dr. Jonna Mazet from the One Health Institute about the search for emerging viruses, the interface between wildlife, the environment, and human health, and her work with the PREDICT Project which focused on detecting viruses of pandemic potential. It was a great episode.

Erin Welsh: It was really great, I loved it. And today we're talking about similar topics but with a different view. What have we learned now that we're over a year into a global pandemic about how exactly this virus spilled over? And how has it changed the way that we think about the potential for future pandemics and how we prepare for them?

Erin Allmann Updyke: Yeah, it's gonna be a good one. But first of course we have very important business to attend to.

Erin Welsh: What time is it?

Erin Allmann Updyke: It's quarantini time!

Erin Welsh: Wonderful. What are we drinking this week?

Erin Allmann Updyke: Of course Erin, we're drinking Quarantini 18. Aptly named.

Erin Welsh: Well that makes sense.

Erin Allmann Updyke: Which has apple brandy, lemon juice, orange juice, maple syrup, some bitters, and a little bit of grated nutmeg just for, you know, grating nutmeg.

Erin Welsh: Yeah we're running out of different liquors or liqueurs to put in our quarantinis so... (laughs)

Erin Allmann Updyke: Have to get creative.

Erin Welsh	We will post the full recipe for Quarantini 18 as well as the nonalcoholic placeborita on our website thispodcastwillkillyou.com as well as on all of our social media channels.
Erin Allmann Updyke	Speaking of our website, have you checked it out yet? It's a pretty great website.
Erin Welsh	It is, it is. We've got a lot of fun stuff on there. We of course have every reference that we ever use in any of our episodes, we've got some links to some great things like bookshop.org affiliate account, a Goodreads list, we've got transcripts, we've got amazing merch, we've got links to all of the promo codes you hear in our ads.
Erin Allmann Updyke	Yeah.
Erin Welsh	And we also finally set up a Patreon by popular request.
Erin Allmann Updyke	So you can find all those and so much more at thispodcastwillkillyou.com .
Erin Welsh	Yes. All right, let's get to the actual business now.
Erin Allmann Updyke	I am really, really excited. For this episode we were so fortunate to get to chat with Dr. Chris Walzer who is the Executive Director of Health at the Wildlife Conservation Society.
Erin Welsh	Oh my gosh, so exciting.
Erin Allmann Updyke	It was such a great conversation and I honestly learned so much.
Erin Welsh	Oh totally. So we chatted with Dr. Walzer back on April 6th so keep that in mind if there are any numbers discussed. And we will let him introduce himself right after this break.
TPWKY	(transition theme)
Chris Walzer	Hi I'm Chris Walzer, I'm a board certified wildlife veterinarian and I'm the Executive Director for Health at the Wildlife Conservation Society. I work out of the Bronx in New York, we have a global conservation program that spans some 60 countries around the globe and my work is responsible for health aspects across those countries.
Erin Allmann Updyke	Excellent. Thank you so much for joining us, we're really excited to chat with you. So our first question is we actually had an episode many months ago, close to a year ago now, where we focused on spillovers. And we know that SARS-CoV-2 very likely spilled over into humans from an animal reservoir of some kind. But now that we are well over a year into this pandemic, what do we know about the sequence of events that led to this spillover and this pandemic? Can you kind of walk us through the timeline of those early days?
Chris Walzer	Yeah, thanks. That's a really good question and it's really timely as well because just a few days ago the WHO, I think commission they were called, released their report which also provides a really great overview of the timeline. So basically what you have in the last weeks of December 2019, there was a recognition of a severe respiratory disease which we now know is COVID-19. And that was sort of noted by Chinese health workers in the city of Wuhan and within a few weeks by the 10th of January already the causative agent had been identified and the sequence of which was also made publicly available which is really an extraordinarily short time. So basically at the end of December something new is turning up, it doesn't look like flu, influenza tests negative, SARS it seems to be negative, and then by the 10th of January you already have a sequence for what we now know as the SARS-Coronavirus-2.

By looking back now at the data that they collated for example in this WHO report, it seems very, very unlikely that there was any significant circulation of this virus or at least clinical disease, clinically apparent disease, before October-November. There's really no data looking at mortality then, so we're looking at clinical respiratory disease outbreaks in the city of Wuhan and the associated province. But you do see very clearly from the data from the national notifiable disease reporting system in China that by the end of December the virus plus the clinical disease was definitely circulating in the community within the city of Wuhan, initially in the central districts and then started to spread outside the central districts. And then with about 2 weeks time delay you start seeing the increase in mortality in clinical events also in the province of Hubei.

So the other thing that's quite interesting that we now have summary data, as you remember back in January-February there was this very, very strong signal from the Huanan Seafood Wholesale Market, the key was that this market was selling live wildlife species, so there were seen bats in previous outbreaks like SARS that it may be a strong link here. And initially many of the cases were directly linked to that market and then as the weeks went on there were more and more reports while some of the cases were linked to this market and there was a lot of questions around what was the role of the market if at all. What we see now though is that in these early days, some people also had contact to other markets and I find it particularly compelling that there are 13 sequences available of SARS-CoV-2 with an onset in December and of those 13 all of them had contact to a market, I think 11 of them had a contact to the Huanan market and then the other 2 to other markets.

So that's a really strong signal. And we also know now from some 900+ environmental samples that most of the positive samples came from this western part of the market where the wildlife was housed and traded. But we still do not know at this point in time how the spillover event actually happened. The timing is pretty good but what happened, was there an intermediary species? Was it the traders? Was it humans that brought the virus into the city and into the market? That's still pretty unclear at the moment, I think there are two main hypotheses at the moment from the ancestral host which is in a horseshoe bat species as I'm sure you've discussed previously.

This virus either spilled over directly into humans with cryptic evolution, for example in a rural area and then no one noticed and then was brought to the market where there was an amplification event. Or the more likely theory, and that's the one being favored at the moment, is that it spilled over into an intermediary host and there's a lot of those available and then at the trading site or along the trade value chain it came to spillover into humans.

Erin Welsh

Mm-hmm, that makes sense. Yeah. So people have been studying spillovers and the emergence of novel viruses for a very long time and they have been saying also for a very long time that a pandemic just like this was almost inevitable. And so knowing that, knowing that something like this was almost inevitable, where do you think that we went wrong on either a national level or an international level in terms of preparedness or control?

Chris Walzer

So I think one of the most important things that we've learned is that the known science has been inadequately translated for policymakers and decision makers. So this was known and we all pat ourselves on the shoulders for saying well this was no surprise. But what we should really be saying is if we knew this, how come we were unable to or unwilling maybe to communicate this adequately so that decision makers and policymakers could prepare use better for this measure? That's sort of one aspect, I think it's a general aspect from science and researchers that we need to make more efforts to translate our science findings beyond publishing it in the highest impact journal that we can find. Just having this X buried somewhere in some report is obviously inadequate in this case.

This is compounded by the fact I would say that humans in general or societies, humans and societies basically are always discounting the future. We're obviously always taken by some short-termism, immediate gains, and investing into the future, into the next generations, especially for events which have a low probability of happening is something we always discount. That is definitely sort of the foundational problem and we need to get over that if we want to move forwards. This is a viral spillover we're talking about now but climate change is on the heels so to say, I mean it's here now plus the problem is growing every moment and we're also discounting those effects at the moment and still think we're gonna get over it somehow. So I believe the lack of investment, the lack of understanding of long-term investments with low immediate returns of investment, I think as I said that's a real problem as well.

But the other one is one thing we all underestimate and I am sure I use this sort of royal 'we all' is the impacts, the broad and wide impacts that a single event like this is gonna have on a global scale. Who would've thought that we would not have enough PPE, gloves, needles as a prevention measure on a global scale and who would've known that 6 months later, 8 months later you still can't get spare parts for multiple products. The interconnectedness of the world I think was sorely underestimated. So the obvious one was that the virus was able to spread super, super quickly across the entire globe but also the interconnectedness of our economic interdependencies I think was something we really underestimated.

Erin Allmann Updyke

Yeah, definitely. So kind of on the flip side of that, although we've done things wrong or maybe missed things, discounted things, at the same time we've also seen over the last year massive biomedical accomplishments that've happened on a timeline that's really never been possible before. So could you talk a bit about what things we did right or what things we maybe actually had prepared for quite well?

Chris Walzer

So mainstreaming messenger RNA vaccines I think is one of the greatest achievements that we have managed in this past year and generally the development and the deployment of multiple vaccines within 12 months is really extraordinary, that's absolutely extraordinary. So that's a huge gain and remember that things like messenger RNA vaccines are not only gonna help us in this present pandemic but it's also gonna help us in the future not only for infectious disease but generally.

If we reflect based on maybe a 10,000 year view, then one of the things that the pandemic has really done and I think this is one of the great opportunities that we have moving forwards is the pandemic has at a great cost of course but has humanized the fact that destruction of our planet, destruction of our environment impacts each and every one of us. Basically it has made it real that destruction of a habitat halfway across the globe is gonna potentially kill my neighbor in the Bronx. And that is something we have never had before I think. Each and every person I meet at least has some inkling that events on the other side of the globe in the environment have potential to harm each and every one of us, impact our wellbeing, our economic security, and in the end our lives.

Erin Welsh

Mm-hmm, yeah. Absolutely. So just to play with hypotheticals a bit, a pandemic is such a product of its time in both the policies that are in place in terms of how interconnected the world is and so I kinda wanna dive into what might this pandemic have looked like if it happened in say 2003 when SARS happened. So instead of SARS-CoV-1, what might've happened if it was actually SARS-CoV-2 in 2003. Are there ways in which we've made scientific progress that might have changed the pandemic either for the worse or for the better? But in any case, how do you think it might have played out differently than it could have let's say 20 years ago?

Chris Walzer

Yeah so obviously this is very hypothetical to think about how it would've played out. But based on what we know from SARS back in 2002-2003, one of the biggest differences is the interconnectedness of the world. The amount of people moving around the globe has just increased exponentially. So that enabled the virus to spread very, very quickly. There was obviously you know bad luck around the New Year as well, there was gonna be more people traveling anyway, all that to be said there's just so many more people traveling. So I think that's the biggest difference. On the flip side of course, if you remember back, I think we were a year and a half into SARS before we knew what the virus was and certainly took a long time to even establish that it had a source in wildlife. That now as I said is only three weeks probably after the official recognition of this new respiratory disease that we had a full sequence, had a phylogenetic tree that showed that the sequence was very close to bat sequences and so on. So that's changed a lot.

Interestingly from the therapeutic side, while that is certainly not my expertise, there's not that much new at least as what I can see from the literature. You know the mainstay, a good old veterinary drug that we use widely for respiratory disease when it gets dire, dexamethasone, is still a mainstay halfway through this pandemic. And then as I've pointed out before, of course what's new as well is that we have a vaccine in one year. Remember the SARS vaccine development basically petered out after a decade of no cases of SARS. So I think that's my take on what would've been different.

Erin Allmann Updyke

Yeah. So kind of going back to something you were talking on earlier today about the kind of large scale commercial markets that sell and trade in wildlife, these type of markets have been implicated not just in this pandemic but like you said in other large epidemics before this. And so they've kind of gotten a lot of press which has led to some controversies with some people saying we should ban the wildlife trade, ban hunting on wildlife completely, and other people pushing back and saying well these are sources of protein for people who need it for nutrition, etc. But this is a much more nuanced problem than just like to ban or not to ban. So could you talk us through some of this nuance and the interplay between these commercial wildlife markets and spillover events and wildlife hunting for subsistence purposes?

Chris Walzer

Yeah I think the key point here is there's a lot of nuance in the use of wildlife for consumption, there's a lot of nuance in the use of wildlife generally but let us focus on use of wildlife for human consumption. And there's a huge gradient here. In Southeast Asia and China specifically, wildlife for consumption has certain attributes. First of all the wildlife is often sold alive which as you can imagine, when you sell in a large industrial-sized market where you have hundreds of species potentially mixing with the consumers but also with domestic livestock and poultry provides a really dynamic and very, very dangerous interface for virus exchange.

That's quite special though in Southeast Asia and China, the animals are alive. Across all of China there is no subsistence hunting anymore. The wildlife is produced for a middle class and up and coming middle class as a luxury item, as a status symbol. The wildlife is always more expensive so it's estimated that wildlife, you know bamboo rats and civets and so on cost between 2-5x as much as pork of the same volume or the same weight. So it's definitely a luxury item, it doesn't meet any dietary or nutritional needs.

Now that's starkly contrasted to for example the use of wildlife meat in Central Africa where there are millions of people who are absolutely dependent on having access to wildlife meat to meet their simple nutritional needs and that's protein and also micronutrient needs. They need that access because there are absolutely no alternatives. Now the way these two markets and similar markets in Latin America and other parts of Asia as well, but taking these to the extreme, as you are hunting out the forests in let's say Central Africa, part of that meat is being used in large cities where there is no longer a nutritional need. Some of it is being shipped across the globe to end up in markets in Asia. And so what you're doing with the commercial trade of wildlife for consumption is that you're actually depriving the people who need it the most which is mostly indigenous peoples in local communities of that resource which is so important to them.

So the two are interconnected. And the bans and the curbing of wildlife for human consumption from our point of view, from the point of view of the Wildlife Conservation Society, focuses very, very strongly on the urban commercial wildlife markets while at the same time recognizing and supporting indigenous peoples and local communities and their need and their right to access wildlife meat. So it's not complicated but it's very nuanced and it does require a clear understanding of the dynamics in different contexts. Now as I pointed out, the fact that the animals are alive is definitely the biggest risk. Once the animal has been killed and smoked and processed in any way, the risk drops by orders of magnitude, of course once it's been cooked there's no worry there at all.

But with the live wildlife trade, you do have this issue that as the animal moves along the trade value chain from its site of capture or the farm where it's being produced to the market or the kitchen in the restaurant, the prevalence or the positivity rate to a specific pathogen actually increases. So we've been able to show that for field rats for example along the trade value chain in Vietnam, at the field site where it's captured or bred, it's only every 5th rat which would be positive for coronavirus, by the time it gets to the kitchen in the restaurant in an urban setting, every 2nd one of those rats is coronavirus positive. And the sad thing is this has already been shown back in 2004 for civets. Civets on farms in China had practically no antibodies to SARS but by the time they'd reached the market site I think 80% of them were positive for SARS. So this concentration and amplification along the market value chain is something that's really, really important to consider.

Erin Welsh

Yeah. That makes sense. And so kind of going along with this discussion of wildlife hunting and biodiversity and interconnectedness, can you talk a little bit about the measures that we have in place to prevent spillover events and/or maybe just prevent spillover events from turning into another pandemic? And can you discuss that sort of in the context of wildlife and forest conservation? How do those things fit into this equation of spillover events and pandemic control?

Chris Walzer

Yeah. So when you talk about pandemic control I think it's also important we want to prevent epidemics as well, we don't always have to go all the way full blown, full monty pandemic but epidemics as well is something to prevent.

Erin Welsh

(laughs) Yeah.

Chris Walzer

Now the most important concept, we're so focused now on the markets because obviously this is an interface that is of particular concern to us but on a much more basic level it's all about interfaces. 75% of all emerging infectious disease have their origin in wildlife. So it's about this contact, these interfaces between wildlife and their habitat and humans. And the more contact we allow or enable on these contact areas, the greater the chance that one of these spillover events is gonna be successful.

So you have a compartment that's wildlife in an intact habitat, a lot of different species, hundreds of thousands of viruses which are being shared and the animals are not sick, they're just the reservoirs, it doesn't bother anyone. You put a road into that compartment or you put a road alongside there, you're starting to deforest and you're trying to bring out the logs. Right and left of that road you've created an interface with the formally intact forest and along that interface, there's gonna be incursions. People will go into the forest, they will hunt there, they need to go hunt, they'll be trapping animals, they're getting firewood. And within a few hundred meters there will be repeated contacts with wildlife. They will return to the road and then they will try to sell surplus wildlife. That animal will then move down the road and can be consumed and used as you can imagine there's a possibility for a spillover event to occur.

Now these spillover events are happening all the time, viruses are spilling over constantly, the point being though that for the most part they do not cause disease, they are not able to replicate in human cells and they certainly aren't able to transmit from human to human. But the more opportunities you provide at these interfaces, it's like a numbers game, the more opportunities you provide the greater the chance that eventually one virus is gonna make it across the multiple barriers that stop that naturally. So these would be interfaces in forests and at the edges of agro and industrial expansion where you have cattle pastures, those are the classic interfaces. But then we as humans of course we're particularly good at this so what we do is we'll go in a forest and catch animals from all over the globe and then bring them together in a room at a marketplace, so we create these basically superinterfaces.

That is probably one of the worst ideas that you want to prevent spillover in, is to bring animals that are never together normally into one place alive and let them exchange viruses and then add in several thousand people a day into that environment. That's just looking at it from a risk side of things, that's just a very, very bad idea. If you asked for a permit and you had a BSL-4 lab and you said, 'Well you know what I'm gonna do, we're gonna get 50 species, we're just gonna put them in there and we'll just let them poop and exchange blood and we'll see what comes out of it and that's what we'd like to do.' You'd never get a permit for it. But that's what you're basically doing in a market. So it's interesting that we don't consider or we had not considered those threats adequate in the past and no one's obviously going to pay for them now.

Erin Allmann Updyke

Mm-hmm. So kind of along those lines, when we talk about epidemic or pandemic preparedness and also epidemic and pandemic response, these are two very different aspects dealing with a pandemic and of course as part of the Wildlife Conservation Society you're dealing more with the pandemic preparedness and identification aspect. But I wonder if you could touch a little bit about how these two different aspects really differ and maybe touch a bit on the importance of working across different sectors when we are looking at things like epidemics and pandemics.

Chris Walzer

Yeah so the Wildlife Conservation Society as the name implies we are a conservation organization with a very robust and longstanding health program. So inherently we are working at what is perceived as the frontlines of spillover. WCS is protecting forests and landscapes and especially those high biodiverse areas where we can expect and where models have shown that spillover is going to be more likely. So the first barrier against spillover and the next pandemic is recognizing when spillover does happen at a very, very early stage. And even more importantly is of course preventing spillover to happen at all. So it is well known and it's been documented in numerous studies that intact landscapes, intact forests generally do not constitute such a threat as disturbed landscapes. Spillovers happen predominantly in disturbed landscapes on the edges of these intact areas.

The WCS's mainstay is protecting areas and the communities that rely on them, that's the mainstay of our work. But around the edges of course and these edges of destruction, that's where the land is being changed and this is the areas where we would expect future spillover events of importance to occur. And since we're already working there, we're sort of the eyes and boots on the ground in some of these areas where with our tools which we're using for conservation, they're easily adapted and have been adapted in this past year to also pick up early indications of a spillover event. And that can now be paired at frontline community health centers, can be paired with innovative technology to get very early diagnosis of something awry, and I'm saying that on purpose because what you want to actually notice is that there's something going on here which we cannot diagnose but it has potential to be dangerous.

Basically it really breaks down to something very simple. When you have a febrile disease which is being transmitted in a community somewhere on the edge of a forest or disturbed landscape, you wanna be very attentive to that. So that part, that pre-pandemic, pre-spillover is really the mainstay as we move forward. Protecting landscapes, protecting our forests, protecting environment in general, maintaining ecosystem function and biodiversity is probably one of the best investments we could make into the future and we pair that with frontline diagnostics and information networks. One of the things we've learned about working across sectors, our organization is just inherently transectoral and governments you would think that all the administrations and different ministries are talking to each other constantly and coordinating and stuff, but the reality is that's not happening. Most basic would be the agricultural sector is completely siloed from the public health sector.

So spillover for example from wildlife to livestock and then onto humans would actually need to be addressed by different sectors. Interestingly enough, as an organization we actually work already with both sectors. So we're often a great convener and a great place to share information and to make people aware of how these different areas are interconnected. So as we talk about frontline diagnostics and early onset sort of diagnostics, we also need to make sure that that information is made available into the existing public health networks and that is really a challenge at the moment we need to address as we move forward. We really need to find out how to streamline that information and how to use that information. It's not that simple.

Erin Welsh

Yeah. We know that this isn't going to be the last pandemic or the last epidemic that we see unfortunately, so this is kind of a multi-part question. But what are people like you, people who work in this field most concerned about when it comes to the next potential pandemic? And what are the areas that you feel we still have really big improvements to make either in how we prepare for or how we predict and try and prevent pandemics like this?

Chris Walzer

I think I believe one of the things we really need to address is the siloed structure of our governments and decision processes. Definitely if we want to address future pandemics and epidemics, we need what is called a one health approach. And so one health approach is an approach that does acknowledge that the health of humans, the health of animals, plants, and the environment are all entangled and interconnected and by trying to only deal with one pillar, you'll never be able to address these complex issues as a pandemic has shown us. So a one health framing, this kind of framing is essential and I am seeing that across the globe as governments and administrations and multilaterals are scrambling to see how they're going to be able to implement that. So there's a broad realization that this is necessary and that's a great thing.

On the other hand we do have a problem that we're obviously, I mean calling it a problem is really an understatement, we do have this issue that we're talking about unknowns. As you will see in the media and in discussions there's always this talk about zoonosis in the sense that the classic description, we have an animal reservoir and pathogens spillover, known pathogens spillover into humans. Well what we're dealing with with these pandemics is what are actually just zoonotic origin potential pathogens, they spillover and then they don't need that animal reservoir at all anymore because they've got into the best host there is out there with nearly 8 billion humans. So zoonotic origin is just a small point in time and then all subsequent evolution and spread happens in humans.

And to recognize which virus is gonna become a pathogen of importance is a very, very difficult process at the moment. So I would say if we had described SARS-CoV-2 mid 2019 from one of the species we caught in Southeast Asia, probably wouldn't even have published the paper. I mean it wouldn't have surprised anyone to find something, it would've maybe been interesting cause it was so closely related to SARS but it would've just been another one. So how do we characterize these discovered pathogens quickly enough or these potential pathogens quickly enough that they can actually inform policy and decision makers? So that's gonna be a tricky discussion and process in the next hopefully shorter than later but that's something we definitely need to work on. A lot is known about cell entry and replication in human cells and transmission but how do you process that information which is often basically searching labs so that it can actually inform policy and decisions? So I think that's one of the really big challenges moving forwards.

Erin Allmann Updyke

Mm-hmm, yeah. Absolutely. So the pandemic has changed a lot of our daily lives, both from a big picture in terms of how we understand spillover events to how it's the day-to-day change, maybe working from home or saving a lot on gas this year or doing grocery pickup. And so our last question kind of focuses on... It's a more personal question. So what do you hope that we keep or learn from this pandemic? Either something personal to you or maybe as a society.

Chris Walzer

I think my main wish would be that we don't go back to where we were before. That's I think very, very important. The pandemic had provided some extraordinary opportunities to make our world and our society the better place. The pandemic of course isn't alone. The pandemic comes together with biodiversity loss, with climate change, global crisis and inequities and injustice, and now this health crisis. So we have multiple crises going on, they all are symptoms of an ailing planet. And I think the pandemic because it has impacted the wellbeing and the health of each and every family across the globe makes it more tangible that the planet is ailing. So I do believe that it's gonna provide an opportunity for us to have a more respectful and humble approach to our planet.

TPWKY

(transition theme)

Erin Welsh

That was so great. Thank you so much, Dr. Walzer, for taking the time to chat with us about spillover and conservation and viruses and policy and everything.

Erin Allmann Updyke

It was like all the things we love to talk about.

Erin Welsh

Yeah, exactly. And I also wanna give a shout out to Nat for helping us set everything up, that was so helpful. Thank you, thank you, thank you.

Erin Allmann Updyke

Yes. Would've been impossible without, thank you so much.

Erin Welsh

All right should we go over the top 5 things that we wanna take away from the interview?

Erin Allmann Updyke

I think we should, Erin. You wanna start us off?

Erin Welsh

I will. All right number one. So we know now from retrospective analysis that the SARS-CoV-2 virus didn't likely emerge until November 2019 or perhaps at the very end of October of that same year. And it was December 2019 when it was first noticed that a new to us, unidentified virus was causing a febrile illness in Wuhan in China. And by January 10th, that virus had been sequenced which is like amazingly fast.

Erin Allmann Updyke

So fast.

Erin Welsh

And today we still don't know the exact sequence of events or the precise spillover event or events that took place that led to this new virus emergence. But we do know that the ancestral host of SARS-CoV-2 was likely a bat but we can't pinpoint yet whether this virus spilled directly over from bats into humans or whether there was an intermediate host involved which is probably more likely because that has been the case with other coronavirus epidemics. But one thing is certain and that is that it's very likely that large-scale wildlife markets where live wildlife are housed and sold such as the Seafood Market in Wuhan and others nearby, that these markets likely played an integral role in the emergence of this particular virus.

Erin Allmann Updyke

Mm-hmm. Number two. We often seen scientific developments inadequately translated into something policymakers can actually use to develop and implement public health policies. This may be in large part due to issues in communication which of course we've touched on in every single one of our COVID episodes. But it also has to do with the fact that as humans we are always discounting the future.

Erin Welsh

Oh yeah.

Erin Allmann Updyke

Yeah. Especially when that potential future has a low probability of happening, like spillover events turning into global pandemics, for example. We have known about spillover events and the scenarios in which they tend to occur, we have seen epidemics unfold countless times before yet we still underestimate the potential impacts of a pandemic on a global scale. And the thing is it's not just translating between scientists and decisions makers or even scientists and the general public, it's even getting information to flow smoothly between different sectors of government and these different agencies that actually make public policy. Often these different groups work with entirely different sets of information which makes making collective, large-scale decision making really difficult if not almost impossible.

Erin Welsh

Yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

Number three. In some ways this pandemic has brought to the forefront the fact that events that degrade or affect the environment thousands of miles away from where you are have the ability to directly affect our lives and our economies and our health. Not only does global travel make it possible for someone to be on three different continents in a span of 24 hours and during that time they've been able to interact with thousands of other humans, over the past year we've also seen the impact of globalization in so many other ways. Everything from not having enough PPE or testing equipment or in terms of vaccine development, like we're still seeing supply chain difficulties and even outside the realm of healthcare we're seeing supply chain difficulties. Remember the toilet paper?

This interconnectedness that we often underestimate has been impossible to ignore during this pandemic and while this interconnectedness is the exact thing that allows pandemics like COVID-19 to flourish, it also has a flip side because it's the same global network that has led to scientific progress, allowing us to identify and sequence this virus, trace its origin, and develop tests within a matter of weeks after its emergence. Despite how much havoc this pandemic has wreaked, we have achieved a heck of a lot. Amazing new vaccine technologies have been tested, scaled up, and deployed all around the globe in record time.

Erin Allmann Updyke

Number four. Speaking of scientific advancements, we have the technology to detect novel viruses and people have been working for decades identifying these new viruses in wildlife. But how do we characterize and decide where to put our funding to know which ones would really have pandemic potential? That is still a really big challenge. It's theoretically possible that someone could have found or identified a very similar virus to SARS-CoV-2 in its original host but couldn't have predicted that it would then cause this pandemic. We need new tools to be able to process this massive amount of information, not only to identify these pathogens early but this also then has to be paired with working with community health centers, with people who develop diagnostic tools to be able to identify on the ground in humans when things are awry or when risks pop up. And then those networks have to also be paired with larger information networks to share this data across the globe and then translate it to policy makers and on and on and on.

Pandemic preparedness really has to be very transectoral work for it to be effective. What we need is a one health approach which acknowledges that animal, human, and environmental health are all very interconnected and we have to address all of them not just piecemeal but all together to ensure that the planet and us humans living on it actually are healthy. The good news is that this is starting to happen. This pandemic has I think led to a broad realization that this approach really is vital going forward but like we said, even in an earlier learning point, getting all of these different sectors to talk to one another is still a challenge.

Erin Welsh

Yeah. Number five. Conservation is an integral part of pandemic prevention.

Erin Allmann Updyke

Yeah!

Erin Welsh

Conserve the forests, conserve the planet, conserve wildlife, and we will likely incredibly reduce the potential for a pathogen to spillover and cause another pandemic or epidemic. 75% of all emerging infectious diseases have their origin in wildlife. But not every spillover event results in a global pandemic or even an epidemic. Viruses are constantly spilling over but for the most part they don't lead to epidemics or pandemics because they don't cause disease in humans, or if they do they aren't transmissible from person to person. And it's not intact forest habitats that pose a threat, it's the edges, it's those disturbed habitats. The more that we increase the number of interfaces between wildlife, their habitats, and humans, the more we're playing a numbers game. We're just increasing the chances that a spillover event can occur and we're increasing the chances that it will be successful, as in resulting in an epidemic or pandemic.

Keeping live animals in cages at large-scale commercial wildlife markets is one example of a place where you're really increasing the numbers of potential contacts and it's why urban wildlife markets pose such a greater threat in terms of zoonotic disease than wildlife that is consumed by local communities for subsistence, for example. Conservation of our forests not only decreases the contacts between humans and wildlife, it also preserves habitat for wildlife populations in areas where people actually depend on wildlife as a food source. Dr. Walzer said that this pandemic is one, just one of the symptoms of our ailing planet. Conservation has to be one of the treatments.

Erin Allmann Updyke

Oh yes. That's I think my favorite take-home point.

Erin Welsh

Oh yeah.

Erin Allmann Updyke

Thank you again so much to Dr. Walzer for taking the time to chat with us and to Nat for all of your help in getting all of this interview set up.

Erin Welsh

Yes. And thank you again to everyone who has provided a firsthand account in this episode, just in our email, in filling out the form. Thank you to everyone.

Erin Allmann Updyke

Yeah, we really feel very lucky to get to hear so many stories from you all. Thank you also to Bloodmobile for providing the music from this episode and all of our episodes.

Erin Welsh

And thank you to the Exactly Right network of whom we are a very proud member.

Erin Allmann Updyke

And thank you to you, listeners! We have what, two more episodes of this series Erin?

Erin Welsh

I think so, yeah.

Erin Allmann Updyke

I think so. So stay tuned.

Erin Welsh

Stay tuned. Thanks for sticking with us this whole journey.

Erin Allmann Updyke

I know, it's been a long one.

Erin Welsh

It has. (laughs) Well until next time, wash your hands.

Erin Allmann Updyke

You filthy animals.