

Paul: We've got two very special guests to talk about emergency response preparedness, especially in light of COVID-19 and the pandemic. So our first guest is Dr. Nino Kharashvili. She's a global expert in health security and health system emergency preparedness and resilience. [00:00:30] And she serves as the principal of the healthcare resilience practice for Jacobs. She has more than 15 years of healthcare systems consulting experience supporting the United States department of defense, and most recently the Defense Threat Reduction Agency's biological threat reduction program. Dr. David Franz serves as commander of the US Army Medical Research Institute of Infectious Diseases, and as deputy commander of the Medical Research and Materiel Command. He was chief inspector [00:01:00] on three United Nations special biological warfare inspection missions to Iraq. And his current focus is on the role of international engagement in public health and the life sciences as a component of global security. So Nino and David, thank you both for joining me today. To start us off, I've got a question for Nino. And the question is, Nino, what are the characteristics of the COVID 19 pandemic, and how does that compare [00:01:30] to other epidemics and pandemics in the past?

Dr. Nino Kharai...: Thanks, Paul. Thanks for having me. I think I need to start with a little bit of a description of what COVID-19 is. That's a disease that is caused by severe acute respiratory syndrome, coronavirus 2, and it's a single RNA virus that belongs to a very large virus family. And the most of those do not affect the human population. Only seven of those viruses are known to affect the human population, and most of them are causing [00:02:00] a very mild symptoms. However, three out of those seven viruses cause pretty devastating diseases. And first of them, and probably you all know, it's SARS that started in 2002, 2003. And the second virus of this family that is known to us is MERS CoV, and it's a Middle East respiratory virus that originates and kind of circulates in camel population, and time to time affects [00:02:30] the human population as well. And the last one definitely is the SARS CoV 2 that everybody knows now. And it's a novel pathogen just emerging, so we are still learning about this pathogen. So there's not a lot of commonalities there that I can bring up.

To the second part of your question, to other outbreaks and pandemics, the one that definitely comes to mind is 2009 [00:03:00] pandemic. In 2009, H1N1, a so-called swine flu pandemic that affected many people around the globe. And it's estimated it claimed like 150,000 to half million deaths around the world. And another one pandemic that comes to mind is definitely the HIV AIDS pandemic that claimed 36 million lives around [00:03:30] the world. And other smaller pandemics, but no less important are [inaudible 00:03:38] Ebola, West Africa Ebola outbreak, DRC Ebola outbreak, Zika virus outbreak that we've seen recently.

And a lot of the commonalities that I can bring here, I want to say that a lot of infections, the most of infections that affect human populations, 75% of this infections are originating [00:04:00] from animal populations. So I want to say that it's really critical to pay attention to, one, health, and this is the approach

that is multidisciplinary and collaborative approach with the aim to have a positive health outcomes, but taking into account the ecosystem and connectedness. Ecosystem of where we live and connectedness of human animal and plant population. So I would stop here and just say that's the commonality that I [00:04:30] could bring between the different types of the outbreaks that we've seen in the past, in the recent past.

Paul: Interesting. And I think we're going to touch on it a little later in terms of why our response to this pandemic has been different from maybe the others that you just mentioned, especially some of those others that had higher death tolls or higher infection rates.

Dr. David Franz: Hey, Paul, I'd just like to add one note to that summary. And I think one thing that's really unique, [00:05:00] not totally unique, similar to flu in some cases, but there have been so many subclinical cases here that shed the virus. So finding out who has the virus and who's shedding it has been really difficult.

Paul: So what does that mean when you say shedding the virus or subclinical? So for some of us who are not medical experts, what's that mean?

Dr. David Franz: Subclinical means you feel or look normal. You don't have clinical signs. And shedding the virus means [00:05:30] that you are infectious. If someone is around you or you cough in their face or sneeze in their face, you're infectious, even though you may not have clinical signs. And I don't know that we know the percentage in the whole community like that, but certainly that's an issue that's made this really tough. If you only shed virus after you were ill, as with Ebola, for example, we could quarantine you and put you away so that you're protected [00:06:00] from other people and other people are protected from you as soon as you become ill or show clinical signs or a fever. But the lines are blurrier with this virus.

Paul: So you're saying that I could have had coronavirus, gotten better, but then have been shedding it after the fact and not been aware of that?

Dr. David Franz: Well certainly during the time and maybe before, a few days before. There's some evidence that [00:06:30] some PCR, well, here we go with technical things, but there's some evidence that people have at least fragments of RNA from the virus after they've recovered. So with a routine test, you might look positive to the test, but you need to be careful because those might be RNA fragments from the virus and not intact viable virus.

Paul: I gotcha.

Dr. Nino Kharai...: I think, Paul, also to add to what Dr. Franz was explaining, [crosstalk 00:06:58] had mentioned about the infectious phase, [00:07:00] and I think the most critical to healthcare workers and the people around you is the part when you don't have fever, you don't exhibit symptom, but you go around and infect

everybody. And that's the critical phase that mostly starts, even in the symptomatic patients, the first few days before you become full symptomatic, those are the critical parts. And I think it's also worth mentioning that this particular virus has a high contagiousness, a high [inaudible 00:07:29] number, [00:07:30] and that's what's causing the concern in the healthcare workers, because one person can, infect four people around you, and then four infect another four. So they become 16 and so on and so forth. And that's very concerning, the speed of transmission.

Paul: Okay. So David, your background is in understanding the threats posed by biological warfare and how to safeguard a country and safeguard a homeland. [00:08:00] How does COVID-19 compare to biological weapons? What are the similarities and what are the differences?

Dr. David Franz: Yes, you're right. I started in the mid-'80s in what we called biosecurity, cold war biological warfare defense, and then later management of high containment lab virology and bacteriology research. And then eventually after I left the military, I got [00:08:30] involved in policy issues like dual use research and gain of function and some of those buzzwords that we hear. To answer your question, my answer now is different than it would've been 20 years ago. I think there's not that much difference, actually, between a naturally occurring event, or at least how we prepare for it, a naturally occurring event and an intentional event.

We still need to discover [00:09:00] the index case or the early cases. We need to diagnose it, we need to treat it, we need to look at the population. And in, in a natural occurring event, we tend to call it epidemiology. In a warfare or terrorist event, we might call it forensics. And those are very similar things. So I think one of our problems in this country is [00:09:30] that we were focused during the Cold War on what we called the dirty dozen biological agents that the Soviets were preparing to use against us in the Fulda Gap, or later we learned even in this country.

And what we didn't switch to, or we didn't realize, after the cold war was over, was that, although we didn't have this focused enemy in the former Soviet [00:10:00] Union, almost anything is possible from terrorism or from biological warfare or from nature. And they're really more similar than we once thought. One big difference is we did not produce highly contagious agents for biological warfare, either in our old offensive program, nor did the Soviet Union, except we both worked with smallpox a little bit. But almost everything else was not highly contagious, [00:10:30] which differentiates it from what we're seeing today. But I think now anything's possible and we should prepare for anything.

I have a friend, former secretary of the Navy, by the name of Richard Danzig, who some of you may know, who wrote a really interesting piece 10 or 15 years ago called Driving in the Dark. It's really hard for us to predict. So my sense is that we [00:11:00] should work on natural, manmade and accidental, and it

won't be inefficient if all of us kind of think about all of those possibilities and prepare for what might be just one of them.

Paul: And that's interesting because you mentioned the old school biological warfare mentality was to create non-contagious agents so you could infect a certain population without it just being this spreading to [00:11:30] a global pandemic. But now it sounds like the shift and mindset is treat everything as if it can be highly contagious and prepare for that. And so I was going to ask you, Nino, in your opinion, what are the best practices for preparedness? And can we truly be prepared?

Dr. Nino Kharai...: Yes and no. I know it's not a very encouraging answer to hear, but I would like to explain what I mean by that. Yes, because we [00:12:00] do have a lot of lessons learned from naturally or man made pandemics and outbreaks and whatnot, and just learning, science went really far. And so we know how pathogens behave, therefore we do have a frameworks plans, the recommendations, those are mostly that if I need to find something, I always go to health and human services, [inaudible 00:12:25], CDC, as well as World Health Organization has a lot of frameworks and [00:12:30] recommendations that health agencies around the world can use. So that's the part where I say, yes, we have some preparedness. And quite a lot of has been written about pandemic flu preparedness, because flu has devastated the population many times. So we have a lot of versions of that pandemic preparedness.

However, the part where I said, no, we can't be prepared. For example, it was very evident [00:13:00] that we were not prepared to withstand this particular pandemic. And that's not only because that people forgot that preparedness is very important, and I think we got a little bit too relaxed about that, that's one component. But also, let's not forget that this is a novel pathogen, it's evolving. And we simply couldn't have the counter measures to combat this disease. We are still learning and research is still ongoing. So we don't have the [00:13:30] vaccine. We don't have the preventive measures, so to speak, other than just regular keep the distant and wash your hands. We don't have the vaccine. We do not have effective medication to use in the cases. Also, we are still learning how to use certain procedures, like intubation of patient has attracted a lot of attention around the globe. There's different indications went to intubate, went to extubate, how to use it. So again, [00:14:00] certain factors, we couldn't influence, but there are certain things we could have done better. And that's why I say we are half prepared, maybe a little bit not prepared as well. And I'm sure David has some suggestions and thoughts there.

Dr. David Franz: Just one thought. I totally agree, but if I could prepare in one way, only one way, what I would do is try to prepare subject matter experts that could sit around my table [00:14:30] when the problems arise and that could work together and develop approaches and plans, even after the fact. And subject matter experts is something you can't do overnight. We think it takes a long time to make a vaccine, it takes even longer to make a subject matter expert. And yet to my

mind, that is probably the most valued asset in a time of crisis. It sounds simple, [00:15:00] but it's very important.

Paul: And I've got a question here in a little bit. I'm going to ask you about inter-agency communication. I think we'll touch on that. But my question for you, Dave, we kind of talked about it in terms of the similarities and differences between a biological weapon and a natural occurring pathogen. But this one maybe is a little bit of a nuance there, but what would the response to an outbreak caused by [00:15:30] a bio weapon differ from an outbreak that is caused by a natural occurring pathogen? Where would you see there being maybe some differences? Or does it really not matter, other than in the forensics trying to determine the index of where it came from?

Dr. David Franz: It's funny, we used to teach a course on medical management of biological casualties at the Institute when I was commander. And one of the things I remember [00:16:00] the instructors teaching in that course was you can tell a bio weapon from a natural event because in a bio weapon, it may very likely be multifocal. And so the bad guys might release this in two different subway systems or in a stadium or something like that in different areas. And a natural event, we would say dogmatically, was always just starts at one spot and it spreads.

And if you look at what has [00:16:30] happened in this case, because of transportation and because of this silent shedding of viruses that we talked about, the virus was seeded all over the world in our cities and destinations for air travel and so on. So our old definition didn't work at all in that case. But I think in with regard to preparedness, I've already said, SMEs, subject matter experts, is [00:17:00] what I want. We can have platform vehicles available, platforms for diagnostics, a system where all you have to change is the reagents, the machine stays the same, or platforms for vaccines. We can have medical material and disposables. We need to think about those things. Do we want to offshore and buy them all from overseas or do we want to have our own systems in place?

And then another place [00:17:30] that is really critical, and I think it's similar, if you take 9/11 or the anthrax letters, or now, the coronavirus, is public information and education. It's so critical helping the helping the public know how to calculate risk. Should I go by groceries? Or in the case of post nine 11, should I fly on an airplane? Or is there going to be another terrorist on my airplane? [00:18:00] Those kinds of things. So I think, again, I know this is a boring answer, but I think we've got to look at them as similar problems, because we can use the same kinds of expertise and we can use many of the same responses to natural, intentional or accidental events. So kind of shifting a little bit, Nino, you'd kind of started to allude to this, and I want to press further on this topic, but what [00:18:30] are the most pressing challenges, both in the US and internationally, with regards to pandemic preparedness that are not receiving enough attention?

Dr. Nino Kharai...: I think David started talking about this a little bit, but let me start saying with explaining that pandemic has a different phases. So as we are going through the different phases, the challenges are changing a little bit. So two months ago we were struggling with the certain things, and I'm not going to [00:19:00] bother you with listing all of this. But currently, Dave started mentioning that understanding the full scope of the disease is a challenge. For example, understanding how many active cases we have, how many asymptomatic patients we have, and how to deal with those numbers, because that directly impacts your ability or state's ability or country's ability to reopen and it reengage [00:19:30] the society. So with that, I think for example, understanding or tackling the challenges of testing, that could be more also. Acute testing, as well as serological testing, to understand like what's the percentage of immune population.

And they've mentioned a little bit about shedding of RNA particles after the person goes through the disease and is recovered. Still there are cases [00:20:00] that have been, I would say, captured that the person is shedding the RNA particles. So it confuses the science, or so to speak, the machine. Like are you actively being sick right now? Or are you actually cured but you are still exhibiting some particles or shedding some particles? So understanding those will be very critical.

Also, contact tracing. Think about it. If we are preparing for a second wave or any other waves [00:20:30] coming to our way, or any other type of contagious pathogen that could spread in the future, understanding contact tracing in a massive country like United States, it's a really huge undertaking. And in traditional sense, contact tracing can be done by humans. Just go around with a piece of paper and checking how many people you contacted [inaudible 00:20:53]. As you can imagine, this is a huge human resource investment. So [00:21:00] I think that that's a challenge that we are facing currently.

And the last one I want to emphasize is just mobilizing of resources on the right time, right place. And Dave also touched on that, where to get those resources. And that includes not only the PCR machines or diagnostic kits and et cetera, but also human resources, because those are the people who need to get this done. The machines are not going to run the tests by themselves or take the samples and et cetera. [00:21:30] So that would be my try to be short on the challenges. It's now internationally, Paul, all the countries are in a different phases of pandemic. That's why I mentioned the pandemic phases in the beginning. So Germany might be facing a different challenges right now versus Singapore and versus United States or versus African countries, because they are in a different stages of pandemic right now.

Paul: Yeah. And that's interesting. And you touched on it, going back to David's point about subject matter expertise, then [00:22:00] it's is it a matter of as countries come through it or whatever it is, moving people around within healthcare system, like, "We don't need more beds, we need more doctors. So send us

doctors from different parts of the country or the community," or whatever. So then that puts added healthcare challenges on existing communities who are having to maybe consider moving their experts and whatnot. So that's kind of interesting.

Dr. David Franz: [00:22:30] Paul, what you bring up there reminds me that leadership is also a pressing challenge, I think, at all levels. At our Institute and our science levels in some cases, but also nationally, and at WHO, at CDC, we need to work on rewarding enlightened leadership, I think, in our institutions. And [00:23:00] what leadership brings then is some of that organizational piece that you were just talking about, but also open communication between experts in between organizations, which is critical. And the long term goal is to build trust between all those people that are working together, so that they work as a team. And you don't have to look forward to find some challenges that we've faced in all of those areas in the last three months.

Paul: So [00:23:30] you kind of teed this up, it's this idea of how the current pandemic may change the way that healthcare systems in the United States, and probably internationally, meet future pandemic challenges. So where do you see that going? Where do you see changes being made? The lessons that we're learning now the hard way maybe that we can apply or we will apply going forward?

Dr. David Franz: [00:24:00] I just wrote a short paper for an Indian friend from the Indian defense studies and analysis center in New Delhi, and we've been friends for many years. And I entitled it Biologic Security and Health in the Post Pandemic World. Then a question mark as the subtitle, is this the infectious disease communities [00:24:30] mushroom cloud? Our nuclear scientists and policy scientists throughout the years have had a mushroom cloud to say, "This is really important. What we're doing with regard to nuclear preparedness is really important." Maybe this will be our mushroom cloud for infectious disease scientists and healthcare providers. I think it will provide awareness among our leaders. If this didn't get their attention [00:25:00] this time, nothing will, I think is pretty obvious.

Technically, I think maybe electronic delivery of healthcare will get a big boost out of this. We used to call it telemedicine in the '90s. I've heard it now called cyber medicine as well. And down at the population level, I hope we see more awareness among our citizens with [00:25:30] regard to preventive medicine, simple things, healthy lifestyle. We've all seen that if you had comorbidities, obesity, which is rampant in this country, diabetes, heart disease, which are often related to obesity, these are preventable things. And I hope that we, as the citizenry, take another look at our lifestyle and say, "Hey, are we doing the best we can?" So I think at all levels, from leadership, [00:26:00] down through technical, hopefully to the citizens themselves, we might look at life a little bit differently.

Paul: So picking up the tack on the technical aspect, and you mentioned cyber medicine, my question for you, Nino, is around the technologies that we might see coming forward. And so what technologies do you see becoming even more critical in addressing future outbreaks? And what should administrators be looking to do now to be ready for [00:26:30] the future?

Dr. Nino Kharai...: Thanks, Paul. And Dave already mentioned about this digital medicine. Digital technologies will be, I think, booming in the next coming years, if not decades. And the reason for that, first of all, the speed of delivery and also touchless technology, because you don't have to be in a common space where the potential of infection spread is higher. And I see it [00:27:00] amongst my friends who are practicing so-called telemedicine more frequently than they used to do it. But they also do complain about certain quality and certain aspects of telemedicine that we have currently. I don't think the telemedicine has caught up with the needs of the society or the needs of healthcare needs, so I think there will be a lot of the development in that regards.

Also, thinking about, Dave, I believe we touched about bringing [00:27:30] supply chain and production back. Whether or not we have a production and supply chain owned by individual countries, and those technologies will develop, and we will not be offshoring those capabilities to other countries. I think that will be a change in mentality, or some actions even seen there. And not necessarily technologies, but I believe, again, pandemic preparedness mindset hopefully is improving. And [00:28:00] as Dave mentioned, if this is not changing people's mind and showing the importance of preparedness, I don't know what else will be. We can write and research and write a lot of great speeches and show a lot of good evidence, but until people experience it and they see truly what devastation the pandemic can bring of this extent and the scale, I don't think people understand or realize how deadly it can be. So pandemic [00:28:30] preparedness, if that can become a little bit more, like always be on a back burner for the health providers or health administrators. And therefore, then thinking about how to mobilize the critical resources, manage this space, manage safety, manage healthcare worker, as well as the public communication, I think those would be the critical changes that we would be seeing coming in short and near future.

Paul: Okay. And then Dave, you had mentioned, we kind of touched on this a little bit, [00:29:00] about the need for communication. And so what lessons in inter-agency communication and collaboration are especially important to be mindful of when an outbreak is first identified? And how can we ensure agencies optimize their ability to cooperate?

Dr. David Franz: Yeah, so much of this is about people, people and leadership. I look back to a time when Tom Frieden ran the CDC, [00:29:30] Andy Weber was at OSD policy, Peggy Hamburg was at the FDA, Nick [inaudible 00:29:34] was at ASPR, Tara O'Toole was at DHS S&T. They used to get together informally, they were all



friends, they knew each other, and they used to collaborate on a Friday night, get together. And they did that for weeks or months.

That kind of thing is pretty rare today, I think. [00:30:00] With regard to organizing and keeping the communication open, unless you have an unusual situation like I just described with five personalities, it all comes together at the White House with the national security council. And unfortunately, the White House tends to get rid of their health security office, almost with every president. It happened with Bush II, it happened with Obama, and now it happened with Trump [00:30:30] some months ago, only to be reinstated after the Anthrax letters or after Ebola 14, or after some big event. The White House just, through administrations of every kind and color, just doesn't place national health and international health and security at a very high plane of importance.

Something that has helped educate over the years, I think, or some exercises, [00:31:00] John's Hopkins has been pretty good at these exercises to try to make leadership aware of what's going to happen and how they're going to have to communicate when the problem arises. But that's not a total perfect solution either. I think it was President Eisenhower, who said, "Plans are useless, but planning is indispensable." So we've got to do this planning. It may not [00:31:30] turn out just like we said it would, but we've got to get together as sub-organizations within the government, plan together and exchange business cards, anyway, so that we have open lines of communication when this does occur.

Paul: So it sounds like it's not really a red state or blue state problem. It's just kind of a political landscape, they're just not putting enough emphasis on, on health security and they're focused on other things. [00:32:00] And then when there's an emerging threat or problem, then they activate, but that they really need to get in in advance of that and encourage communication and collaboration at a personal level.

Dr. David Franz: It's not like they don't have anything to do, normally. They're swamps and they're overloaded. But we can't forget about these health security issues at the national central level.

Paul: Gotcha. Okay. So my last question for the day I have is really for both of you all. [00:32:30] And it's kind of looking beyond pandemic preparedness, as we've really been focused on how we're addressing COVID-19 and whatnot. But obviously this has been kind of a watershed moment for the healthcare system globally. And so this question is kind of like in terms of where we go from here, and I'll start with you, Nino, and then, David, I'll ask you the [00:33:00] same question, but are there any changes you see occurring in health systems across the United States or internationally as a result of the current pandemic beyond just pandemic preparedness?

Dr. Nino Kharai...: Yeah. Thanks, Paul. I think the changes are definitely there, and it's not only in the healthcare. And I think we can see it at the different levels and different groups. So let me start with the public. The change in public is awareness and behavioral [00:33:30] change. As I said before, people don't understand the severity of the situation until you are in the middle of the situation. We can talk as much as we want and explain, but I think the best example is when you are part of the example. So as 9/11 changed everybody's lives and how we view the international or actual air travel, I think this will change, and we are seeing the impact of public population [00:34:00] behavior. I will be interested to see how this is going to stick with the public in a year or two. I'm curious to see if it's going to have a long lasting effect.

But definitely awareness about infectious diseases improved. And I think people started to learn a little bit of the risk assessment concepts. I always joke, I've assessed so many different healthcare systems around the world, and when I go into unrecognized [00:34:30] spaces or hospitals or whatever and I don't know what I'm facing there, we specialists do have a little bit of OCD about risk assessment. You are constantly checking what you're attaching, where you are going, where you are stepping, what are you breathing in? What type of the precautions you need to use to protect yourself and others? So that's the type of the OCD I think that public is a little bit developing. So that's what I was referring when I said people are changing their [00:35:00] behavior. Funny, I see a lot of times I go in a grocery store, people are not properly using the PPE and they still don't know how to use it and how to get the benefits out of it. But I think we are on the learning path. That's when it comes to public.

Now, on the healthcare administrator side, I think healthcare system will learn, and again, go back into the preparedness mode. And I believe Dave mentioned, something hits the system, [00:35:30] like Ebola, and everybody now all of a sudden starts developing the Ebola preparedness plans. Then we have a flu, then everybody starts preparing for the flu. I think this is, again, another trigger and lesson learned when administrators will start thinking about how to dust off their old plans or develop the new plans. However, the critical component that I want to emphasize, it's not about having the plan on a paper, but having that muscle memory that when you have a plan, you don't have that much time when something hits to think about, " [00:36:00] What do I need to do?" You need to exercise those functions. When you have a plan, healthcare administrators, healthcare system, needs to be exercising this regularly. So when you're a doctor and there's a patient in front of you, you don't necessarily have time to run around and refresh your memory. The procedures and your actions need to be at the muscle memory level. You need to be ready to act. I think that's what I would like to see the more preparedness. And I think we will see that happening, the change happening in the healthcare [00:36:30] system.

And at the government levels, both in US and internationally, I think is there is, again, going back to awareness and awareness is improving so that you see a lot of actions that reversing, for example, funding going to the certain research

communities or certain actions that were critical for preparedness are reinstated and they're going back, if not more forcibly. So I [00:37:00] call COVID-19 pandemic as a huge [inaudible 00:37:07] to top exercise, it's a better comparison. But honestly, I could never have designed the scenario like this. And it was very hard when I would run preparedness scenarios with other countries, I would say, "Hey, what if your pandemic or epidemic in the country hits this level?" And the people always used to telling me, "It's never going to happen in my country. It will never happen in my country." [00:37:30] And all of a sudden the entire world got stopped in its tracks. So yes, it can happen to your country. It can happen to really powerful countries. It can happen to less powerful countries, low resource, high resource, doesn't matter. This pandemic hasn't spared anyone. So we need to learn a lot of things from this. And that will be probably my parting words here.

Paul: All right. And then, Dave, same question for you.

Dr. David Franz: Yeah. Well, Nino's done such [00:38:00] a great job of covering that space. I am not a clinical person. All of my work has been research and preclinical kinds of things throughout my career. But we'll probably change the way we build hospitals in the future, with more flexibility, I would think, maybe different air handling systems and redesigning entryways and things like that. We may even do the same for hotels in the future, should they be needed as hospitals. [00:38:30] Nino has also mentioned the behavioral lessons that we will have hopefully learned, to include familiarity with PPE and all of those little thoughts that she had as she's walking through a healthcare setting about what can jump out and bite you, and you need to keep that in mind.

Maybe antimicrobial resistance, as well. This is another [00:39:00] huge problem that doesn't get much press in this country, but it's a big one. And we need to keep that in mind as well, going forward. So I think in summary, you've already heard that I believe that people are hugely important. People understand people with wisdom, people with technical knowledge. So I would reward sound leadership, and sound leadership will encourage mentoring, [00:39:30] and we can build subject matter experts that way. Sound leadership will also build teams, where people are comfortable working together. And those teams, of course, will be domestic, but I think we need to think about international teams, particularly with regard to infectious disease.

So in one sense, this will cause us to circle the wagons a little bit and say, "We need to be more dependent for certain of [00:40:00] our supplies and medical material on ourselves. We need to take care of ourselves in this regard." But I think from an epidemiological standpoint, we need to reach out all the more and work internationally to build teams and networks of people, of trusted relationships with open communication. I always say, when you have a trusted relationship, you can hear the bad news as well as the good news. [00:40:30] And it's important in these cases that we hear all the bad news that's out there so we can deal with it. And then, practice, practice, practice. We probably won't

end up, as we said, and as president Eisenhower said, we probably won't practice the right things, but practicing will make a mindset. And it will also, importantly, bring the right people together so that it will [00:41:00] be easier for them to work together in a real situation.

Paul: Excellent. Well with that, I want to thank you both, Dr. Nino Kharashvili and Dr. David Franz, for joining me today and talking about healthcare preparedness in light of the pandemic and sharing your expertise with our viewers. So thank you very much.

Dr. Nino Kharai...: Thank you, Paul. Thank you, Dave.