

David Hartogs:

Hi. Thank you for joining us today to help us celebrate APHA's 150th anniversary. Today, we have a great program with the editors of the Controlled Communicable Diseases Manuals that have been published by APHA for over a hundred years. With us today, we have David Heymann, Omar Khan and Burt Wilcke. We're going to be discussing the past, present, and future of conquering communicable diseases and how APHA and these manuals have played a role in it. I'd like to get started by introducing our panelists one at a time. Right now, we're going to start with David Haman.

David L. Heymann:

Thank you, David. I'm David Haman, and I'm a Professor of Infectious Disease Epidemiology at the London's School of Hygiene and Tropical Medicine. And I'm the lead editor for CCDM, the Clinic Control Manual, sorry, not the clinical manual.

David Hartogs:

Thank you, David and Omar.

Omar Khan:

Hey, good morning, David and good morning everyone. And thank you to the audience, especially for joining us, real honored to be here. My name's Omar Khan. I'm a Professor of Family and Community Medicine at Tom F. Jefferson university in Pennsylvania, in the US. I'm a practicing physician as well, at the Medical Center of Delaware ChristianaCare. And I'm the president and CEO of the Delaware health Sciences Alliance, which means I have less time to do those two things that I just mentioned. But one of the most fun things I get to do is work with my colleagues, Dr. David Heymann and Dr. Burt Wilcke on the Control of Communicable Diseases Manual, especially the Clinical Practice Manual, which is this right here. And it's a pleasure to be with you all. Thank you.

David Hartogs:

Thank you, Omar. And Burt if you want to introduce yourself.

Burt Wilcke:

Thank you very much, David. My name is Burton Wilcke. I'm an Assistant Professor Emeritus in the department of Biomedical and Health Sciences at the University of Vermont. I'm also a former state public health laboratory director here in Vermont. And I served in similar positions in Michigan and California. I have been involved with the clinical diseases and microbiology and public health for 30, 40 years and had the honor of working with David and Omar on this Control of Communicable Disease Manual series and edited the companion volume entitled CCDM Laboratory Practice. I'm very glad to be a part of this. Thank you.

David Hartogs:

Okay. The last thing we have Dan Doody, who is to moderating with me, if you want to say a couple words, Dan.

Dan Doody:

Thank you, David. And I want to echo Omar's gratitude to the audience for joining us today. I am the acquisition's editor at American Public Health Association Press and serving as the co-moderator of this panel.

David Hartogs:

Thank you, Dan. Before we start to get the questions, I do have something special here. This is a physical copy of the very first edition of the Control of Communicable Disease Manual. That was first published in 1917. And you can see how thin it is. With that being said, I wanted to ask David Heymann how has the manual changed? Obviously it's changed quite a bit in 104 years. You've been editing the Controlled Communicable Diseases Manual since the 18th edition. Since that time, what are some of the major breakthroughs and what have you seen in the world of communicable diseases?

David L. Heymann:

David, it made me smile when I saw the first edition, which is so thin because one of the major challenges today is to keep the manual thin enough so it remains a useful tool on the desk. And I started to use the manual when I was a young epidemiologist and it's always been on my desk. And it was useful not only to look up a new disease as it came along and to understand it a better, but also when a journalist called, I always had it beside the table on my desk rather, in case they asked about a disease, a new disease or a disease that I really didn't understand completely. I could always look it up. But now when the journalist's call, they have their own addition they don't ask me those questions anymore. I think the CCDM has spread quite a bit.

David L. Heymann:

And that's good because one of the requests when I took over was that we make it a more international manual, not just appropriate for the US. And as a result CDC, which had previously been the almost exclusive authors of the various chapters, was used in conjunction with others from around the world. We increased the editorial board to members that gave geographic representation. And we also increased the authors number. And for the first time, we let authors have their name attached to the chapter so that people could see which chapter they had either written or updated.

David L. Heymann:

In addition, the manual has been very, very much changing in the fact that new diseases have come along and we've had to add those sometimes during a pandemic itself. In fact, with the current COVID 19 chapter, it was very difficult to find anybody who had the time to write that chapter, because everybody is so busy with the pandemic.

David L. Heymann:

And as a result, I wrote it and wrote it with colleagues from WHO and it's now available within the new manual. We've also taken some of the bulky chapters like the Arboviral chapters and separated out certain diseases, such as Chikungunya and Dengue as they became more important. And we've also reclassified the Arbo viruses instead of by vector, but by signs and symptoms. A lot of changes have gone on, in addition to making sure that each chapter is now peer reviewed by two specialists.

David L. Heymann:

And speaking about vectors and vectors in Arbo virus, we've also added new chapters, including one on vector control. One on health, one on shipment of specimens, which Burt has greatly improved in his manual on laboratory. And it's also been quite a relief to have Omar doing the clinical chapter. Because we've been able then to depend on that chapter for the treatments and refer to it throughout our book.

David L. Heymann:

I think the challenge in the future will be to make sure that we can get all these new technologies into the chapters where they belong, especially the vaccines, the new diagnostic tests and other advances which are occurring during the pandemic of COVID 19. David, I'd just like to close by saying, it's really been an honor to be the author or the chief editor of CCDM. And I'd like to wish the APHA a happy 150th birthday. Thank you.

David Hartogs:

Thank you, David. And it's certainly been an honor for us to work with you all these years and we certainly thank you for the work you've done and continue to do for the manuals for APHA and for public health overall. I'm going to switch now to Omar. Omar, you've edited the clinical version, the Clinical Companion of the manual. But before we get to that, I want you to look back a little bit, what are some of the wins that you have seen in public health in the past 50 years or so that we can really be proud of? And what are some of the challenges that we've had to get there?

Omar Khan:

Sure. Thank you, David. And I echo the thoughts that Dr. Heymann just expressed regarding the wonderful role that APHA has played throughout this, not just infectious disease, but all conditions that affect public health, locally and globally. I think in a way, ironically, the challenges and opportunities have been two sides of the same coin. I'm somewhat biased because I have a particular interest in primary care and also in tropical medicine. And having spent some time at the institution, Dr. Heymann is now at, in London, keenly aware that many of these are in fact conditions of poverty and conditions of social determinants.

Omar Khan:

I think some of the work that we've done in the last many decades have been in improving some of those conditions and thus in reducing the burden, to some degree of certain infectious diseases. Certainly some of the neglected infectious diseases. Unfortunately, I think, sides of the same coin, as we've come up with new technologies for those conditions, such as vaccines for vaccine preventable diseases, I think that we have created new pockets of resistance and thus opportunity for public health.

Omar Khan:

Vaccine hesitancy seems to be at an all time high in certain areas, certainly as we look at COVID 19, but this isn't a condition particular to COVID 19. It actually goes back to another APHA project that David and I worked on several years ago. As several of you know, Dr. Heymann used to head up the Global Polio Eradication Program at the W H O. And APHA asked us to actually write about that because it was on the verge of eradication, the poliomyelitis worldwide. And so we went to those communities where polio was in fact on the verge of being eradicated. And we built a lot of community trust, but over time we saw how some of that was actually infiltrated by other areas such as security forces.

Omar Khan:

And there's some really terrific public health stories around that. And that reduced the trust that communities had in us. And that led to a lot of vaccine hesitancy as well. My point is that it takes a lifetime to build up trust and sometimes only a couple of days to erode that. With COVID 19, we see the same in our communities in the United States, is that long standing issues with institutional racism and with social determinants and inattentiveness to those determinants, has in fact eroded community trust. And that as a physician, as a public health person, that impairs our ability to do the right thing in partnership with communities.

Omar Khan:

I think that's the challenge in front of us, in the face of, of course, many successes as we well. And yet again, I think APHA leadership in that area is appreciated. And the tool that we have, such as the manuals, are a critical part of that fight against infectious disease.

David Hartogs:

Great. Thank you, Omar. Burt, turn our attention to the laboratory practice of control and communicable diseases. Can you take a couple minutes and walk us through how the laboratory piece works in conjunction with the clinical and the epidemiological aspects of communicable diseases?

Burt Wilcke:

Thank you, David. Glad to do that. I was reflecting this morning about how as how APHA is coming up to celebrate its 150th anniversary of its founding, that decade in which APHA was founded, was the same decade during which Pasteur and Koch really revealed the major discoveries around microbial origins of disease. And the field of microbiology and public health microbiology and clinical microbiology has paralleled the history of APHA.

Burt Wilcke:

I would be interested to see in that first Control of Communicable Diseases Manual, what kind of reporting was laboratory based and what was clinical based, in terms of the reporting? I know over time the laboratory based reporting and laboratory based contributions to the control of communicable diseases has only grown. It's a major component, I think, which is why we had discussed carving out laboratory practice as a discrete supplement to CCDM.

Burt Wilcke:

It has been and continues to be, and will continue to be in the future, a major part of the control prevention, surveillance of communal diseases. And I think it's important for everyone, epidemiologists, clinicians, and others in the public health world to understand the value, the importance, and the ongoing contributions of laboratory practice and laboratory testing.

David Hartogs:

Thank you, Burt. A little bit of house keeping. If anyone in the public does have questions, please type them in. We are monitoring them and we'll be doing a Q&A at the end of our program. And we should allow about 20 minutes from that. David Heymann, I'm going to turn back over to you, we've looked back a little bit and now currently we are in a worldwide on pandemic. And I would just like you take a couple minutes, how is the current state of fighting this pandemic going to shape the future of fighting future pandemics and what are some of the lessons that we've already learned? And I'm sure we'll learn a lot more as we go on.

David L. Heymann:

Yeah, well, we certainly are learning a lot, David. There's no question about that. And in the past we thought that dealing with infectious diseases or communicable diseases only required strong public health, good practice in shoe leather epidemiology, and understanding outbreaks, dealing with them, doing the contact tracing and making sure that we could contain that outbreak fully. That was done with good, strong public health, or at least so we thought. But as we move through recent outbreaks and pandemics, we've seen that there are other things that are required as well, if we're going to be prepared and able to deal with these.

David L. Heymann:

In the West Africa Ebola outbreak, for example, we saw that it's not enough just to have good public health. And I have to say that the African public health workers were really performing extremely well in that outbreak in dealing with a very difficult situation.

David L. Heymann:

But at the same time, the hospital and healthcare system collapsed. And people who had Ebola couldn't get treatments, nor could people who had common infections like malaria or other tropical diseases. And so in looking at the control of outbreaks or communicable diseases, we see that the health security we expect, not only includes strong public health, but it also includes the ability to sustain access to healthcare.

David L. Heymann:

And then moving even further forward to the pandemic today, we see that there's a third element that's really necessary as well. And that is healthy populations. We see from this pandemic that it's those populations with comorbidities who are those that are most susceptible to serious illness after infection, those and the elderly. And so we need to use these three functions interlocking in the future as we deal with infectious diseases. We need to make sure we have good, strong public health. At the same time, we have to be sure that we have sustainable access to health during outbreaks.

David L. Heymann:

And that includes a surge capacity in beds. And the third thing is we need to make sure that our populations remain healthy before outbreaks, so that they can individually deal with those outbreaks better and have better outcomes if they do become infected. I think we're learning a lot in the pandemic and moving forward, it won't just be strong public health. It will be those three elements together. Thanks, David.

David Hartogs:

Thank you. Omar, I know you've worked with our books program for many years, as well. I want to ask you, what do you see the future is of manuals like the Control of Communicable Diseases and where do you see the future of them going, as we move into a more digital age?

Omar Khan:

Sure. Thanks so much, David. As you noted and as you started the conversation by holding up the initial manual there, more like the booklet, things evolve and things evolve at the speed of pandemic sometimes and needs change overnight. We've changed how we work essentially in the last couple of years, how we interact and how we even meet with each other and educate each other. And so I think our modes of communication have to evolve, not just in lockstep, but even keeping ahead of that particular curve.

Omar Khan:

I think one thing which is going to keep happening is the increase in the volume of information. And I think we see that in terms of how the manual itself has diversified. No one pocket book can certainly meet the needs of an epidemiologist, a clinician and a laboratorian, which is why we have these three distinct books, which link so nicely with each other.

Omar Khan:

I think one piece is the content. The other piece is a delivery. I think, as we get more and more electronic, but whether we move this increasingly to online formats, such as based on an app for smartphones and other devices or move it exclusively online into the cloud, there'll always be need for being able to grab a book and stick into your white coat pocket and see a patient or to have it, as Dr. Heymann said, when you're speaking with other colleagues who have questions or even to take to the field.

Omar Khan:

Many times, we don't have terrific electronic connectivity in the field. I think the challenge is going to be meeting the needs of multiple audiences, through multiple channels of communication while corralling a great deal of information. And I think your team, David and others led by Dr. Benjamin at APHA have done a great job in helping us get together. But I think you're right. The challenge is going to be how we adapt this to the future. And I think it's always going to be interesting, somewhat unpredictable. But some things I think are going to be for sure, which is volume and type of deliver of information.

David Hartogs:

And thank you, we've all certainly learned to be adaptable over the past couple of years and hopefully our publications will be as, well be. Burt, I'm going to turn back to you. You've been a long time member of APHA. I know you've sat on a lot of boards and for some other organizations, as well. Where do you see APHA's role in fighting communicable diseases and controlling them as we go forward? And what's the overall role of an organization like APHA?

Burt Wilcke:

Thank you, David. As I reflect on that question, I think about in the field of laboratory science, it's a broad field with multiple disciplines, subdivided in a number of different ways. Subdivided by scientific discipline, whether it's microbiology, virology, bacteriology, chemistry, pathology, and it's also subdivided in terms of the way that

the information that's generated by laboratories is used. Whether it's for biotechnology research, public health purposes, clinical diagnoses. And that's true of all of the disciplines, I think, that we're talking about here.

Burt Wilcke:

It's not just the laboratory discipline, but the field of public health broadly and the field of epidemiology and the field of clinical medicine. And if you look at the field of medicine itself and how broadly distributed and subdivided it is. I think APHA and the public health community as Dr. Heymann referred to really can bring together all of these various components and oversee them and coordinate them and help to form alliances and partnerships, which really can address these challenges in a way which is all encompassing.

Burt Wilcke:

It strikes me as interesting that early on in the field of public health and the discipline of public health, that it subdivided and broke away from medicine. But now we're at a point where we need to bring those pieces back together, public health, healthcare, academic medicine, research, those pieces can all be brought together and they all play a role in terms of the control of communicable diseases. And I think APHA and the public health field, generally can serve as that convening body.

Dan Doody:

This is Dan Doody and I'd like to follow up what all three of you have just commented on. At APHA Press we're obviously monitoring closely the pandemic and how we should respond to it. What kind of book or books we should be working on? One of the things that our advisors have commented to us is the unique thing about the pandemic is that this is a situation where infectious disease has met chronic disease.

Dan Doody:

And each of you have talked about that in your own way, in your last comments. And David Heymann specifically said that one of the three lessons learned is that going forward, populations must remain healthy if we're going to successfully combat future infectious disease outbreaks. Here's a really simple question. How do we maintain healthy populations? How do we achieve and maintain healthy populations? And let me turn first of all to Omar and ask that question, and then ask David and Burt to also comment on it.

Omar Khan:

Sure. Thanks very much, Dan. It's a simple but extraordinarily difficult question. How do we maintain healthy populations? And again, I look to the folks who've studied this a great deal, such as my friend and colleague Sir Michael Marmot in the UK whose spoken with us at APHA in fact, several times as keynote speaker about the role of the social determinants of health. And I look to other luminaries who've looked at different aspects of health and healthcare and what keeps people healthy.

Omar Khan:

The social determinants are critically important, as I mentioned infectious diseases classically, have been diseases of poverty, but not always and not exclusively, certainly. But there also are diseases of access and of diseases of choice and by choice, I mean, policy choices. What we do as a nation? Most of our audience today I suspect is American, is dialing in from the United States.

Omar Khan:

And we are the only developed country, to call yourself a developed country that does not have a universal healthcare program that guarantees health as a right, as opposed to a privilege for those of us who happen to be employed or over a certain age or below a certain poverty line, or are elected representatives who, for example, do guarantee themselves healthcare.

Omar Khan:

I think we have to take a hard look at the policy choices we make as a country and as a world. And I think healthcare for all is certainly a big piece of that. You couple that with a social determinants piece, which is attentive to the fundamental determinants, I won't go to all of them. I'll refer the audience to Dr. Marmot's excellent work on this topic, but he detailed this quite well. I think Dan, those are the equally simple, but perhaps equally difficult answers, mine at least, to your question. Thank you.

Dan Doody:

Thank you, Omar. My tongue was certainly in my cheek when I said it was a simple question. David, your thoughts?

David L. Heymann:

Yeah. Thanks Dan. It isn't an easy question, you're absolutely right. But what we need to do is enable our populations to live healthy lifestyles and that involves many different things. First of all, it requires good behavioral science to understand what we need to do. And that comes from focus groups with people and from various other activities, which we, as the biomedical community don't really understand. But which we need to begin to understand, and we need to work with and respect behavioral scientists and the work that they do.

David L. Heymann:

The second thing we need to do is have our governments enabled that by such things as the framework convention on tobacco control, for example, that's a government tool. It's a treaty internationally, which the US government and many others have endorsed and which have added into their own legislation. Which enables people to live better lives because there're some interventions in that that make sure that people decrease tobacco intake, whether it's taxation on cigarettes, whether it's prohibiting advertising at public events or whether it's indoor smoking.

David L. Heymann:

These are very important enablers that help the population to live healthy lifestyles. We have to begin to do the same with other risk factors for communicable disease, to make sure that that environment is right. That good living and good lifestyles are enabled by our governments but not forced upon us. It's an individual choice, but that choice can be made in an environment where it's very difficult to get those interventions, which do cause harm.

David L. Heymann:

Hopefully by understanding behavior and by having our governments understand the environment that we need, working with the World Health Organization and others we can, in fact, enable healthier lifestyles moving forward. The old term of health promotion doesn't really have much meaning. What do you do to promote good health? You can't promote it. You need to enable it. Thanks Stan for asking me that very tough question, but I think there are many answers and Omar gave a part of the answer. I hope I've been able to give another part.

Dan Doody:

Thank you very much. I like that notion of enabling rather than promoting health. But what would you like to add to what Omar and David have suggested?

Burt Wilcke:

So this is an interesting question and an interesting challenge. One of our governors in Vermont several years ago established a policy, the practice of health in all policies. And that is that every department in state government, transportation, education, as well as health, mental health, criminal justice, were all looking at their activities and what they were doing in light of health and how it had an impact on the health of populations? That was a fine aspirational idea, but it hasn't really been maintained.

Burt Wilcke:

I sat on the governor's council for Physical Fitness and Health for a while and the governor at the time actually made the case very convincingly, that businesses had an interest, had an economic interest as well as a humanitarian interest, in the health of their employees. And it was actually better for them if they invested in making sure that their employees were healthy, it was better for their bottom line. So I think we need to, in public health, look for allies in some different places like the business community, like the transportation agencies to find partners to make sure that we realize that good health and good population health actually serves us all in a positive way.

Dan Doody:

Thank you so much for those very provocative answers to such a difficult question. I'd like to follow up if I may David, and just ask the panelists once again, that when 911 occurred, the policy response in the United States was to create a brand new department, cabinet level department, Homeland Security that we've poured billions and billions of dollars into, most visible being what happens when you go to the airport.

Dan Doody:

This is all in response to an unthinkable, unfathomable attack on our shores, that claim the lives of under 4,000 people. We've now been attacked by an infectious agent that's claimed more than 700,000 lives. Is there an opportunity for some major policy shift so that the public health aspect of health and human services and CDC, et cetera, get this kind of backing that we provided to Homeland Security following 911? Omar, do you want to try that one first?

Omar Khan:

Certainly, Dan. I think if I understand your question, it's really about how we prioritize health at the same level as we do other compelling areas of national priority. Is that broadly the thrust of the question?

Dan Doody:

Exactly. Yes.

Omar Khan:

It's a very good question. We were talking about this with our friend, Dr. Don Berwick founder of IHI and for a while, head of CMS in the US, as well. Frankly, we've always been incredibly aspirational as a nation in terms of the pursuit of health, the pursuit of life, liberty, and the pursuit of happiness is in fact, enshrined in our foundational documents, as a country. And you can't have any of those life or liberty or the pursuit of happiness without health. So health is foundational to all that we do. The challenge is simply that we have had trouble reconciling that with everything else that we also believe in.

Omar Khan:

As evidence has come out, as I mentioned, around what actually promotes health, it means making some difficult choices. In the US it's never about the actual funding available, right? Because as you noted, when we have priorities, national priorities, we manage to allocate funding to them. And health has to become a national priority as we've seen in the time of COVID.

Omar Khan:

I'll give you the example of COVID 19. We have in fact, poured billions of dollar into COVID 19 research prevention, control, treatment, not always the right treatments necessarily, but we've put lots of resources into it. Corraling that funding and bringing that to bear on other infectious diseases, I'll give you one small example. One of APHS first priorities after its founding, I think in 1872, was tuberculosis. Tuberculosis is one of the most ancient infectious diseases known to man. Tuberculosis has one vaccine and it's, frankly not a particularly good one, the BCG vaccine.

Omar Khan:

Within two years of COVID 19 coming out, we have had a proliferation of excellent innovative vaccines coming out. Why is TB essentially a disease of the poor and those living in tenements? Why is TB not on the same level, same priority? I think we can actually seize this important opportunity, never wasting a good crisis, to actually advocate for all diseases, all infectious diseases, all the conditions that in fact affect the poor and leverage this amount of money that we've got in this case, for a health issue. And actually having it impact the broader health spectrum. I'll pause there and defer to others on this as well.

David L. Heymann:

Thank you so much, Omar. David Heymann, your views from across the pond.

Omar Khan:

Yeah. Thanks. Well, I've always been that we need to increase health budgets, and I think everybody agrees with that. But it's just not been possible in most countries, in many countries that is health is at the bottom of level of budgeting. When budgeting comes along, health care usually gets less than other segments of the population. What we need to do though, is find other sources of funding.

Omar Khan:

And sometimes it's really distasteful the way we need to do it, but we can do it that way. And that includes making health a real security issue. And that's what's happened in the US where the list of organisms that are thought to be threats of bio terrorism, about 11 of those organisms find themselves on a list. And that list has made it possible for BARDA, which was set up after the anthrax incidents in the United States, to put defense money into research. Research for either diagnostics, vaccines, or therapeutics, for those 11 infections.

Omar Khan:

And that pays off in public health in general. And a good example of that is the Ebola vaccine. Which was certainly not developed for humanitarian purposes. It was developed for defense purposes. And by shifting that money in, from defense into a vaccine, we now have a vaccine that can be used for humanitarian purposes, as well. We just have to look for those opportunities, distasteful as it may be to say that health is a security issue.

Omar Khan:

Make sure that our political leaders understand that it is a political issue and that we need to put the same amount of funding into health as we do into defense. And maybe interact those funds so that both can benefit.

David L. Heymann:

Thank you, David, and be your comments, Burt please.

Burt Wilcke:

Not much to add, except I think David Heymann did hit on something which I think is very important and that is finding ways that health can tap into resources like defense funds to deal with some of these challenges.

Burt Wilcke:

I recall, years ago, being involved in a meeting down in Trinidad of the Caribbean area, Regional and Epidemiology Center. And realized that the US Department of Defense actually had a percentage of its budget, a small percentage, but given the size of the defense budget, it was a significant amount of money, which was dedicated to supporting global health initiatives.

Burt Wilcke:

Again, that may sound distasteful and it is kind of distasteful. But I think to me, if it accomplishes what we need to accomplish, in terms of reaching across a number of different areas of government, to tap into resources that are necessary to promote public health, then so be it.

Omar Khan:

Dan, if I can add a quick piece to that, that's an excellent point that both Dr Wilcke and Dr. Heymann just made about piggybacking onto other great initiatives. In the US for example, we've just had nearly \$2 trillion ARPA fund passed, as well. And states and territories, local constituencies are able to apply for those funds. And I would encourage colleagues who are listening to think about applying for those from the health perspective.

Omar Khan:

These are recovery and reconstruction funds, but not just for a certain kind of infrastructure, there's health implications, as Burt said, health is in fact, in all policies and in all types of work that we do. There are examples on the table right now, Dan, where we can partner with the other agencies, to again, focus on improving the health of Americans and in fact, the globe.

David Hartogs:

Great, thank you. That was a great discussion. We have about 20 minutes left and we have some questions coming in from the audience. I'm going to direct the first one to Omar. And then I'm going to cut and paste it, it's a little long. But Omar, if you want to answer this one. One second. It is, what are your thoughts on the idea that having natural immunity to COVID 19 is as much protected from reinfection of COVID 19, as having been vaccinated. It seems as though there are journal articles available supporting both opposing sides of this, which can be confusing.

Omar Khan:

Sure. I certainly can understand that. And again, I'll defer to one of the foremost leading infectious disease experts on this, which is Dr. Heymann in just a minute. Broadly speaking from the frontline clinical side, we do see lots of these questions around. Essentially, I've been infected with COVID 19 before, does that provide me adequate protection, certainly on par with immunization?

Omar Khan:

The data actually supports the fact that you can have some immunity from natural infection in this case, but the levels of the duration of the immunity that you get from having the, for example, the two vaccine, mRNA series, which we tend to use predominantly in the United States, and then with the booster on top of it. I think is supportive of that being the much more safer, robust, and durable approach to prevention than simply relying on natural immunity.

Omar Khan:

Natural immunity can be unpredictable. It may not prevent against different strains. It may only protect against the strain that you've been infected with. And of course, it may lull one into a false sense of belief that you don't need booster protection. The whole point of vaccination is to more safely provide a more durable level of immunity, than you could from a much less unsafe version of potentially being infected yourself. I recommend using vaccination with boosters as the appropriate method there. I'll defer David, if you want to add something to that.

David L. Heymann:

I really don't, Omar. I think you've covered it very well. I would just say that many times I get the question as I'm sure all of you do. What's the end game for this pandemic? And clearly the end game is endemicity of this virus, SARS, coronavirus too, as for the other four endemic corona viruses. And I think back to a study that was done back in 2005, after the outbreak of SARS in 2003. And that study was a molecular clock analysis by someone named Vegan.

David L. Heymann:

A molecular clock analysis that took known specimens of the human coronavirus, OC 43 from the 1950s forward and genetically sequenced them. They then calculated a rate of mutation and took that rotation, that mutation rate backwards, until it crossed a line where the bovine OC 43 virus, which is thought to have been the source of human infections, was also crossing that line.

David L. Heymann:

And they crossed the line at about 1870, 1880, 1890 somewhere in range. And it was interesting that in 1888, there was a pandemic known as the Russian flu, which caused a million deaths, but it also had neurological signs and symptoms. Not a characteristic of influenza. So Megan in his co-authors hypothesized that this was the emergence of the coronavirus OC 43, which has now, through population immunity, become less virulent and is in fact, an endemic human coronavirus.

David L. Heymann:

So as Omar said, both natural infection and vaccine protection, modify disease. Neither one of them prevents infection. After vaccination, you can be infected, after normal infection or an infection in the community, you can also be reinfected. But those re-infections are less severe in people who have the risk of serious illness. And so vaccines and natural disease, do protect. But as Omar said, it's much better to depend on the vaccines because we can then make sure that we're immunizing everybody with the same good immunization, as well as preventing, hopefully, such things as long COVID, in those people who develop infection.

David Hartogs:

Great. Thank you, David and Omar. Another question came in that is related to the vaccine and also brings polio back into the question. I'm going to send this one back to David Heymann. The vaccination is becoming more political and hesitancy increasing lately, do you see a future with more devastating pandemics or like polio, more almost eradicated diseases coming back with a stronger force?

David L. Heymann:

Clearly the issue that the biomedical community is less able to deal with is the anti-vaccination rumors. And they've been destructive, as we saw in measles elimination programs, when there was a bogus publication in the Lancet, it caused a whole series of anti-vaccination movements to pick this up and promote it in their own countries, before it was removed by the Lancet. But it had already done damage. And measles rates increased in many countries, including here in the UK, where there had been major outbreaks because people were afraid of the vaccine either because they had read the article or because the anti-vaccination movement had picked it up.

David L. Heymann:

Vaccine hesitancy is an extremely difficult situation. And what is most important is that there's a building up of trust between the health community and the people it serves, so that they believe what their health leaders say. It's not the political leaders who can convince the population. It's the public health leaders. And I remember one time, when I was in my early years at CDC, someone told me that every outbreak needs a trusted face and that's especially true with the anti-vaccination movement. There needs to be a trusted face, who can convince people that this is the way forward.

David Hartogs:

Good. Thank you, David. Burt, I'm going to ask a question that came in to, part of the discussion has been on disparities and so this question fits right with that. Marginalized communities tend to pay the highest price when it comes to communal diseases. What can we do to focus resources and attention to bring the most vulnerable amongst us, into the fold?

Burt Wilcke:

When we had some of the first cases of COVID seen in the state of Vermont, one of the earlier populations, which was most vulnerable, besides those in assisted living, was in a town of Winooski. Which is just outside of Burlington, which is a major area of resettlement of refugees in Vermont. It was a large number of people who were living in that community who were working in service positions and had close family ties and were coming down with COVID and the response was, "Why aren't they going out to get tested? And why aren't they going out to practice social distancing?"

Burt Wilcke:

Well, the reason was because they couldn't. They couldn't stop working, they couldn't stop going about their business and they couldn't afford necessarily to go see a physician. That's a problem. I think, to the extent that the laboratory part of the picture has to be supported. There needs to be, as Omar mentioned before and Dr. Heymann mentioned, that there needs to be a no-impediment for individuals who need to access health services, whether they're laboratory testing or vaccine administration or whatever it is. And so until we reach that point, until we address that inequity we're going to continue to have these challenges going forward.

David Hartogs:

Okay, great. We've had a great discussion so far. I'm going to ask one final question for each of you. And if you can each take about a minute or two and maybe tell a story that defines your personal fight in the communicable disease realm. Something interesting that the audience might like to hear and what you would like to see going forward from APHA? David Heymann, if you want to start first.

David L. Heymann:

Thanks, David. Well, what comes to mind is an experience that I had very early in my career in India. I was working for two years in India in the small pox eradication program. And when I first arrived in India, I was driving out with my driver, who was a Brahmin and a medical assistant, who was the interpreter between the driver and myself and between the populations. An interpreter and a medical who spoke English. As we were driving out, I noticed on a hill, a group of women and those women were kneeling or squatting and hitting stones with a hammer in order to make gravel. And this was quite shocking to me to see these women working like this in the field. And I asked the driver, I said, "Why don't you use animals to do this type of work?"

David L. Heymann:

And the driver thought a bit, he was a good Brahmin. And this is not a criticism, it's just the way that he thought at that time. He came back with a reply that my medical assistant interpreted, to tell me that they didn't use animals because animals were costly to buy and costly to maintain. And you had to take care of them if they became sick. And that really impacted upon my thinking. And it's remained in my thoughts to date, understanding that we really need to fight against these inequalities and these difficulties in the world that make some people have much less, good health than others. And that's the story that I would relate, the women on the hill.

David Hartogs:

Thank you, David. Burt, do you want to go ahead with a story or an antidote that you have?

Burt Wilcke:

Well, I will share a story that I recall when I was doing a Post Doctoral Fellowship in California in Medical and Public Health Microbiology, back in the '70s, around '77. And as a Post Doc I was able to participate in the infectious disease rounds that were being held at San Francisco General. And I can remember there was a case that was very interesting. It was presented by the infectious disease fellow, of a young man in his early 20s who had this pneumonia. And they'd gone through all of the various tests for pneumonia that were commonly expected to be the causative agent. And they come up with the only explanation was this agent called *Pneumocystis carinii*. At the time, it was thought to be a parasite. It's now known to be a yeast.

Burt Wilcke:

And I remember leaving that infectious disease rounds being intrigued that this individual who otherwise seemed to be healthy, would be susceptible and actually ended up dying of this *Pneumocystis carinii* pneumonia. It was three years later when I was working in a state of Michigan, when we started to hear about cases of HIV and Aids, and realized that in retrospect, that individual who was in San Francisco, that young man, was undoubtedly a case of HIV, not diagnosed, who had then come down with *Pneumocystis carinii* and died as a result.

Burt Wilcke:

I think those kinds of observations, those unique findings, those interesting new medical events, one always has to keep one's eye open and one's eye on what it might mean and what it requires for investigation to further sort out these challenges.

David Hartogs:

Great. Thank you. And Omar, I know you have a story or two that you can tell.

Omar Khan:

Sure, absolutely. Thanks, David. David, is it okay if I share the screen to pull up a couple photos here? Will that work?

David Hartogs:

I'm not sure. I think it might.

Omar Khan:

Okay.

David Hartogs:

No. It will not work.

Omar Khan:

Okay. Very good. Well one of the stories around this actually relates to folks in this room, as well. One of the former Deans of my school of public health was a guy called DA Henderson, Dr. Don Henderson is widely credited for being one of the leaders around the small pox eradication campaign. And when we were looking to tell the story in concert with APHA and the WHO on polio eradication, one of my fellow panelists, David Heymann here decided to send us off to the wilds of Northwest Pakistan to see why polio could not be eradicated? Why it was one of the last strongholds? And to me, it was an intersection of geopolitics, social determinants and epidemiology, in the story of why that was and remains one of the last two countries on the planet still to have polio.

Omar Khan:

And a fact that too many Americans don't know about is that the story of geopolitics around Osama bin Laden, the architect of 911, it's now been 10 years or so. Sorry, 20 years. It really intersects with the vaccination campaign. Osama bin Laden was found in Abbottabad in Pakistan. And the way he was found was through the US CIA's infiltration of the vaccine campaign. That was how the DNA was collected of his family members. Choices have consequences and by an unethical infiltration of a public health program, one objective was certainly achieved.

Omar Khan:

But another objective was that we lost community trust around polio vaccination and all vaccination. AD polio vaccinator's were gunned down in the next year, following that. Because they were seen as foreign agents and

polio rose sixfold, just in the two years after that. To say nothing of the other vaccine preventable conditions. It was very sad considering we'd actually built a successful program, thanks to David Heymann's team in that part of the world.

Omar Khan:

My point is that geopolitics, health, social determinants, they all intersect. There sometimes are no good guys and bad guys. There are just our choices and consequences. And to me, that was one of the biggest lessons here that we learned. One of the big pieces also was around hope. This was written about in a variety of scientific journals and lay journals, like Scientific American. You can look up, those in the audience who are interested. But it led to a new recognition that public health and this kind of security infiltration should always be separate.

Omar Khan:

The White House issued a statement around this, the CIA agreed to not have this kind of a program done again. So we move forward. We learn new lessons. We learn to rebuild community trust, but we shouldn't forget the past because otherwise it will absolutely repeat itself. And I think we need to learn the same for COVID 19, as well.

David Hartogs:

Great. Thank you, Omar. And we had one final question come in to the panel and then we'll wrap up. Can Just In Time Inventory be used in pandemic context to ensure a consistent PPE supply levels? Omer, I'm going to kick that to you because I know you've been on the front lines of treating COVID and probably dealing with PPE supply issues. If you don't mind taking this question.

Omar Khan:

Sure, absolutely. There's no one great answer to this. It really goes into a lot of the management of health systems and delivery of health services. Yes, Just In Time Inventory can certainly be used for that. But JIT inventory systems are dependent on supply chain and supply chains are affected worldwide in ways anticipated and unanticipated. JIT Inventory is really work best when you control the entire supply chain and then you can ramp up and ramp down production. To some extent, we've been always a little bit behind the curve. We anticipate certain things, to some degree.

Omar Khan:

But under anticipate and don't have enough stockpile. Sometimes we over anticipate and we, unfortunately, can waste PPE and vaccines, as well. So there's no perfect answer to inventory, but the questioner has an excellent point that a lot of pandemic control goes into the management of disease.

Omar Khan:

And I want to give a huge shout out here to all the folks in the front lines of healthcare, not just physicians, nurses, epidemiologists, but a lot of the workers who toil behind the scenes. The IT folks, the supply chain folks, the staff who clean the rooms. And they're part of the unsung heroes of pandemic control, as well. It's a great question there.

David Hartogs:

Thank you. Well, we are about out of time and I want to, first of all, thank everyone for watching and listening today. I especially want to thank our panelists and our moderator, Burt, Omar and David. I can't thank you enough for spending time out of your extremely busy days and lives to join us today.

David Hartogs:

I also want to mention that as we go forward for the next year with APHA, once a month there's going to be a different theme. Stay tuned for those themes and those activities surrounding a 150th anniversary around

APHA. And we're going to have a very big celebration in Boston at the 2022 annual meeting in November of next year.

David Hartogs:

Also, I want to mention the 21st edition of the Controlled Communicable Diseases Manual will be coming out in February and it's available for pre-sale now at www.aphabookstore.org. Go ahead, pre-order your copy. And as soon as it's off the press, we'll get it to you.

David Hartogs:

And lastly, I'll plug the books that Omar and Burt have done, The Laboratory Practice, The Clinical Practice are available now and all three books are up to date and available for digital subscriptions. Again, thank you so much to everyone for joining us. Dan, David, Omar and Burt. And we will see you all soon. Thank you.

David L. Heymann:

Thank you.

Omar Khan:

Thank you, friends. See you soon. Take care.

Burt Wilcke:

Thank you.