# Episode 100: You Can't Stop the Wind

**Chris Dall:** [00:00:00] Hi everyone. Before we get started, please note that the CIDRAP and Osterholm Update podcast Spring Merchandise Collection is now available to purchase, including new T-shirts and tumblers. Please visit cidrap.umn.edu/shop. Hello and welcome to the Osterholm Update COVID-19, a podcast on the COVID-19 pandemic with Dr. Michael Osterholm. Dr. Osterholm is an internationally recognized medical detective and director of the Center for Infectious Disease Research and Policy, or CIDRAP at the University of Minnesota. In this podcast, Dr. Osterholm will draw on more than 45 years of experience investigating infectious disease outbreaks to provide straight talk on the COVID-19 pandemic. I'm Chris Dall, reporter for CIDRAP News, and I'm your host for these conversations. Welcome back, everyone, to another episode of the Osterholm Update podcast. Two years ago, if you had asked Dr. Osterholm or any of us involved in this podcast what we'd be talking about on the 100th episode of the Osterholm update, I don't think any of us would have been able to process that idea. At that point, just putting out a single episode was an adventure, and we certainly didn't think we had 100 episodes in us. But we've learned a lot over these two years, and here we are on our 100th episode. Thank you to all of you who have been with us on this journey. Of course, the main reason we're on our 100th episode is because this pandemic just won't quit. COVID is raging in China despite that country's zero COVID policy, new Omicron variants are emerging, and here in the United States, the long awaited wave of BA.2 infections is causing national case numbers to climb again, perhaps more than we know, given the lack of testing. And one of the last mitigation measures we had in this country is now gone. Those will be among the topics of discussion here on this April 21st episode of the podcast as we assess the state of the COVID-19 pandemic in the US and around the world. We'll also talk about some new data on long COVID, answer a COVID query about wastewater data, and share the latest beautiful place submission from one of our listeners. Also, be sure you hang around to the very end to hear some special messages celebrating our 100th episode. But before we get started, as always, we'll begin with Dr. Osterholm's opening comments and dedication.

**Michael Osterholm:** [00:02:23] Thank you, Chris. And welcome back to all of you to another edition of The Update. This has truly been a journey, one that, as Chris just emphasized, was not one we anticipated when we started out with that first episode. But since that first episode, we've learned a lot. We've learned a lot from you. We've learned a lot from the science community, from the public health community. We've learned a lot by just watching people. We've learned a lot by listening. And I hope that today in this podcast, we can reflect on the wisdom that we may have gained over the last 100 episodes with regard to how best to share information with you as to what has happened, what is happening and what will happen. And with that, it is with great humility that we say thank you for being with us throughout the course of much of this pandemic. I know there are some of you who have listened to every episode. This is also a time for us to continue a reflection on where are we going, what does it mean? And I think that it's fair to say that none of us have that crystal ball. You've heard me talk many, many times about my crystal ball caked with five inches of hardened mud, and that's not gotten any clearer over the recent months. But today, we'll give you our best shot at understanding what's happening, why it's happening, and where we're likely to go. Now, before we get into the podcast, I do want to mention a program that I participated in on Tuesday night at Luther College in Decorah, Iowa, my alma mater, in which I had the good fortune to moderate a session of the David Jay Rosen Distinguished Lecture in Science and Leadership. And the Primary Speaker of the Night and the person I got to ask the questions of was Neel Kashkari, the president and chief executive officer of the Federal Reserve Bank of Minneapolis, a position he's held since 2016. Neel has been a real leader among the Federal Reserve community in terms of understanding what is happening with COVID and what the fiscal and monetary policies of our government and of the world must consider in terms of trying to move through it. The title of our session was "Pandemic Economics: A Conversation with Neel Kashkari." We provided a link to this hour long program on our website. Please consider taking a look at it. I think that President Kashkari provided some really, really important insights into the impact that this virus is having in our economy and what we might expect going forward. Now, today's dedication is tied also into a point of information. And what I mean by that is over the course of the past several weeks, there's been a lot of discussion and even debate about just how many people have actually died from COVID since its earliest days in Wuhan. And in fact, as you may have read in a number of news media stories, the World Health Organization has a report that has not yet been released formally, as many of us have seen it, because India does not want to have a W.H.O. Document list the number of deaths that they believe actually have occurred in India, as opposed to the official numbers from the Indian government. But suffice it to say, the numbers are staggering when you think about what we've been through the past two years. The W.H.O. estimates that around 15 million deaths have occurred worldwide, and that's just through the end of 2021. That does not include much of the early surge activity in 2022 from Omicron. They do estimate that more than 3 million of these deaths occurred in India, and that's why they don't agree, because their official number is 522,000. Let me add context to what all these numbers mean. If you look at the number of 15 million deaths globally and you consider in the United States, we're now at an estimated 990,000 deaths. If we were to take a moment, step back and say each person's name out loud who are among those that have died. If you did that nonstop, 24/7, just for the United States would take 34 and a half days. If you did that for the entire world, it would take over 520 days. One name every 3 seconds, nonstop for 520 days. That is absolutely stunning. And if you were to say the names of those people who are grieving, those who have died. Oh, my. How many days would that take? Because for so many of the people who have died, there are many people who are grieving. Parents, children, grandparents, grandchildren, cousins, aunts, uncles, friends. And today I dedicate this podcast to all of those who are still grieving. You know when the case numbers tend to go down or the deaths go down, everyone feels like, ah ha, we've arrived. You can never, never, never reduce the pain by just time alone for those who have died and those who are still here are grieving. And so this podcast is really dedicated to you and for you. Now I would be remiss, of course, in the opening comments here, Chris, if I didn't also add that moment of light to our discussion. I heard from many of you who actually really enjoy those. There are those of you that think it's really stupid and so be it. Suffer through for a minute. But I am so happy to report on April 21st today here in Minneapolis-Saint Paul, we will have 13 hours and 48 minutes and 7 seconds of sunlight. Compared to just last week, April 14th, where we had 13 hours, 27 minutes and 20 seconds. We've gained almost 21 minutes of sunlight just in the last week. I can feel that in my blood. I swear I can. It's wonderful. So keep celebrating. We've got almost two months yet to go of increasing sunlight before we find that June 21st date. And for those of you in the Southern Hemisphere, we continue to send our sunlight to you. And based on this, there surely is a one very important reason, at least in the Northern Hemisphere, to have a sense of optimism. Bring on the light.

**Chris Dall:** [00:08:50] So Mike, what is the latest from the two areas of the world that we've been focusing on over the last few months, China and Europe.

**Michael Osterholm:** [00:09:00] Well, Chris, let me actually start out by taking a quick step back and sharing the overall global numbers, because I think that there are some points worth noting before we discuss where China and Europe are at. This is all about, again, adding perspective. What have we experienced, what are we experiencing, and what might we experience? First, if you take a look at overall global activity the past couple of weeks, you'll find that as of last Wednesday, April 13th, average daily cases continue to fall below 1 million. Why do I point that out? Well, believe it or not, that was actually the first day since last December when the worldwide average was below 1 million. In other words, last Wednesday broke a streak of 106 consecutive days in which the average daily cases worldwide exceeded a million. Fortunately, global cases have continued to decline even further over the past week, falling to 746,000 as of Tuesday. Of course, this is well below the record high 3.4 million cases reported a few months ago when we were at a peak of that initial Omicron surge. Now, I've discussed the notable limitations of using cases as a metrics for tracking what's happening, and those are still a reality, which I will touch on more in a moment. So I'm hesitant to read into the cases too much, but I wanted to point out that although global daily cases have reached their lowest point since the start of the new year, 746,000 reported on Tuesday, this would have ranked among the highest case levels reached ever before Omicron showed up. At the same time, the reality is that it's a level four and a half times lower than what we saw with the peak. So it's been interesting to see how perceptions have changed, all about shifting baselines. Of course, even with the limitations that can complicate using cases to monitor this pandemic, they still matter a great deal for obvious reasons. As we know, infections beget further transmission, ongoing viral replication and the risk of new variants and of course, long COVID, serious illness and death. It's a reality that's happening every day, and we really shouldn't minimize it. At the same time, I think it's worth noting that the average daily deaths globally have fallen to their lowest levels since the start of the pandemic. Let me repeat that. That's an important, important point. It's worth noting that the average daily deaths globally have fallen to their lowest level since the start of the pandemic. If you look around two and one half months ago, we hit an Omicron Peak that brought about an average of almost 11,000 deaths a day, the third highest peak ever reached. Since then, average daily deaths have dropped below 2,600. Again, the lowest we've seen since the beginning of the pandemic. Of course, at the end of the day, there's still almost 2,600 people dying from the virus. And I hope we never forget that. Never. Ultimately, there's a lot of things we could and should be doing to see even more progress in this area. But after more than two years with levels above this, often far above this, it's progress. And as you might have guessed, this progress isn't exclusive to any one region of the world. In fact, all six W.H.O. regions have documented declines in both cases and deaths for at least the past month. For most of the regions, including Africa, the Americas, Southeast Asia and the Eastern Mediterranean, these declines have gone on for quite some time. Otherwise, the Western Pacific faced a delayed Omicron surge, which peaked just over a month ago, and Europe saw a temporary bump in cases. So some improvements in these regions have been a bit more recent. That being said, for Europe, the overall uptick in cases occurring last month, which was largely driven by a selected handful of countries, fortunately wasn't followed by a regional uptick in deaths. In fact, the European region has documented more than two consecutive months with declining deaths, with the weekly toll now going from more than 26,000 in early February to around 8,500 as of last week. If you look, the weekly total is the lowest they've reported since last July when Delta was just starting to take hold. However, even with those overall regional improvements, there are some countries in Europe that don't exactly feel any relief. For example, according to an analysis done by the Financial Times, the National Health Service hospitals in England have had the lowest number of vacant beds available since the start of the pandemic, the lowest number of vacant beds. Why the strain? Well, there appears to be quite a few things playing a role. First, the U.K. happened to be one of those European countries that experienced a recent resurgence. In fact, due to the latest surge, which peaked in the country just a couple of weeks ago, the number of UK patients admitted to the hospital with COVID reached a peak of 20,500. Although that's crept down a bit since, it's actually slightly higher than the total reached at the peak of their initial Omicron surge in January. And while this latest peak is almost half as low as the country's all time high, which approached 40,000 in January 2021, it's important to remember that certain elective or non-urgent procedures were postponed and continue to be postponed in order to free up more space for COVID patients. Well, because those procedures were postponed, a backlog of patients with non-COVID issues have been building up. And in fact, as of last Thursday, a record high, 6.2 million Brits were waiting for non-urgent treatment. Thus, between clearing the backlog and dealing with the rise in COVID patients who have to be placed in areas where they're kept separate from other patients, even if they're an incidental admission with COVID, the UK health care system is under a lot of pressure. So while 9.2% of the adult beds were vacant during their record high surge in January 2021, just 6.3% were vacant at the peak of the first Omicron surge, and 5.4% were vacant as of this last week. In addition, on top of the heightened demand, the National Health Service is still experiencing staff absences, many of which are being attributed to COVID infection among workers. As a result, less staff are seeing more patients, or at least trying to. In a Financial Times article published this past Sunday, Dr. Katherine Henderson, who serves as the president of the Royal College of Emergency Medicine, likened the situation in the UK emergency departments to flying a plane with half the crew and three passengers to every seat. Later in the article, she shared the following, "Every single metric in emergency care is worse than ever before, and it's going to take a huge change to get things better," unquote. Right now, a record high number of patients showing up to emergency departments face long waits before they're admitted. According to the latest monthly totals, more than 20,000 patients have had to wait more than 12 hours to be admitted. For context, that number has never surpassed 5,000 prior to this year. Finally, according to Dr. Henderson, ambulance delays were the thing that freaks us out the most. The NHS has always been there for you in life and death situations and now there is a real worry that we're struggling to get ambulances out to people, to get people into emergency departments simply because the system is so clogged up. Whether it's for urgent situations, emergency situations, or even immediate life threatening situations, ambulance response times in England are longer than they've ever been across the board. So clearly the UK remains in a vulnerable position and the situation there offers some insight on challenges that other places could very well experience moving forward as they attempt to live with COVID. A big question, is this the future of our US experience or is it limited to the UK and maybe only in a few places in the United States? We don't know. But remember Alpha. Alpha also wreaked havoc in the UK a little over a year ago. We worried very much that that variant when coming to the United States, would redo here what it was doing in Europe. Well, it got here, but only Minnesota and Michigan, of all the states, really were hit hard by alpha. Others reported little or no activity at all. Will that play out again with Omicron and these variants? Will our experience in the U.K. be similar in other areas? We just don't know. And anyone who projects what the cases will be like in this country in the next 30 to 60 days, as you've heard me say time and time again, be careful. They have a bridge to sell you too. So having said that, let's go to China. Of course, as most countries push forward with various approaches to living with COVID, which largely depends on their interpretation of what exactly that looks like, China continues to refuse any and all considerations of that idea. On Tuesday, their National Health Commission reported a total of just under 21,500 locally transmitted cases. Of course, around 95% of those were from Shanghai. However, the remainder were scattered across 19 different provinces, and several cases were also reported out of Beijing. Nevertheless, Chinese officials remain committed to a familiar zero COVID policies that they relied on to date. Let me add one caveat here. I think that's very important. It's just as I shared with you in last week's podcast, I continue to believe without any question, the Chinese government is cooking the books with the numbers. We have clear and compelling evidence from people on the ground that there are many more illnesses occurring, including serious illnesses and deaths. And why would we expect that to be any different than that? Look what happened in Hong Kong. Hong Kong is not different than the Guangdong province, just across the border from Hong Kong. And yet they too, are showing this very diminished actual number of cases or large numbers of asymptomatically infected individuals. I don't believe the numbers coming out of China right now, but let's take a look at what they are reporting. In Shanghai, which is clearly the country's current hotspot most residents remain confined to their homes. Since early March, when the city's outbreak first started to gain traction, a total of more than 350,000 local cases have been identified there, not to mention ten official deaths as of the past couple of days, which, as I just pointed out, is no doubt a fraction of the true toll. And of course, as cases grew, so did the response. By late March, the city really started turning to those more sweeping lockdowns. And here we are several weeks later with no clear end in sight for the restrictions there. Well, officials also recognize the precarious nature of the situation. In fact, with mounting public anxiety and challenges to things like food supplies, one Shanghai official described it as a critical moment. Born out of this recognition is a push to stamp out local transmission by this week, with leaders calling for an accelerated daily testing and expedited transport of cases to isolation facilities. Now, I don't want to say that that's impossible, and ultimately we'll see what happens. But remember, this is a city of 25 million residents. For context, that's three times the size of New York City, which happens to be the largest in the US. In fact, Shanghai's population exceeds that of the state of Florida. Clearly, China has had a lot of control over its population, and they're committed to stamping out transmission. But I come back to the fact that all it takes is one missed case for any hard earned progress to be undone. And even if the numbers reach zero, it's hardly a permanent fixture. Residents of a different Chinese city, Xi'an, are learning that this very month. Several months ago, they endured a widely publicized lockdown in response to an outbreak of Delta, which ultimately took more than a month to control. Well, earlier this week, city officials told residents to avoid unnecessary trips after cases were identified there. So I understand why they're hoping to buy more time. I'm still left wondering what their long term solution is. Do they have a real long term game plan? We've seen Chinese leaders acknowledge the vulnerabilities of their health care system and the low vaccination rates among elderly residents in recent weeks. But in Shanghai, where nearly two in five residents over the age of 60 have yet to receive even two doses of vaccine, officials are simply asking older individuals to get three doses of vaccine after the city lockdown is lifted. Well, when will that be? We don't know. And how many will actually end up choosing to get vaccinated? Again, we don't know. Overall, I still fail to see how exactly the current zero COVID policies are sustainable and it's somewhat puzzling to see China's unfettered commitment to these draconian policies balanced alongside their apparent tolerance of many elderly citizens remaining unvaccinated. Now, I'm not saying or implying that they should force their population to get vaccinated. But if their unwavering reliance on lockdowns is being done to protect the most vulnerable and in turn, their health care system, then I am somewhat surprised we haven't heard of a similar level of insistence to ensure that all citizens in China are covered with a three dose vaccine as soon as possible. Long story short, I'm not sure what China's path forward is, and at this point, based on what I've seen, I'm not really sure they do either. At the end of the day, I think their national commitment to zero COVID only translates to more uncertainty. For city officials it's become a matter of when, rather if they should lock down. In fact, there are dozens of cities that are under some form of lockdown, which are impacting an estimated 400 million people. While as a result of this uncertainty, everyone from citizens to business owners are on edge. Ultimately, I continue to believe that such heavy reliance on these same zero-COVID policies without any long term strategy will merely delay a flood of cases and at the same time exacerbate things like humanitarian issues and critical supply chains for the world. And let me just reemphasize one more time that even with the challenges that are presented with the data that we do have, I continue to very sincerely believe that the Chinese government is actually not reporting many of the cases that are occurring in their communities, and these are cases they are fully aware of. So we can only take what we know about China so far as kind of the minimal level of activity that's occurring out there. And that, in fact, likely much more is actually happening.

**Chris Dall:** [00:24:25] As I noted in the introduction, here in the U.S., we are starting to see a more pronounced increase in cases nationwide, with the seven day average of new daily cases now above 41,000. And that number can actually be much higher given that we're not doing anywhere near as much PCR testing as we were just a few months ago. So Mike, how much do the current case numbers really reflect what's going on in the U.S.?

**Michael Osterholm:** [00:24:49] Well, Chris, I spent an extra amount of time today chipping that five inches of caked mud off my crystal ball to give us a sense of what's happening now or what might be happening. And please take these numbers in that regard. I'm not sure. Overall, the US has seen a 47% increase in cases over the last 14 days, now averaging just under 42,000 cases per day as of this past Tuesday. 75% of these cases are BA.2 and 19 are the variant BA.2.12 that has been identified in New York, which I'll discuss in more detail later in the podcast. 34 states and Washington D.C. have all seen an increase in COVID-19 cases in the past two weeks. Remember that last week overall, we were still seeing an 8% increase compared to a 43% increase now in US cases compared to two weeks prior, with 26 states and Washington, D.C. all documenting these increases. The increase in daily cases is now over 50% for 22 states and the District of Columbia. And just for reference, last week the rate of increase was only 20% for 21 states and the District of Columbia. Last week I mentioned that we're still talking about low absolute numbers of cases, but these absolute numbers are starting to creep up. Last week, nine states and the District of Columbia were seeing more than 15 cases per 100,000. This week, 14 states and the District of Columbia are reporting over 15 cases per 100,000. Vermont is seeing the highest daily average of 42 cases per 100,000 population. Like you mentioned, Chris, these case numbers do not give the full picture of what is happening here in the US. The numbers that are reported are likely much lower than the true case counts for a few reasons. First, they do not include at home test numbers, which seems to be the way that a large proportion of people are now testing. Next, people may not be testing at all if they assume their symptoms are just a cold or if they assume they've had COVID and simply don't need to take a test. Like I mentioned last week, I think the hospitalization numbers are a much more accurate measure of trends given the challenges with testing. But they cannot tell us much about the current state of the pandemic, as they tend to lag behind cases by at least several weeks. This brings us to the hospitalization data. While case numbers are increasing, hospitalizations in the US are still declining and are 4% lower than two weeks ago, sitting at a daily average of just below 14,800. And 16% fewer people are in ICUs compared to two weeks ago. 15 of the states seeing an increase in cases are also seeing an increase in hospitalizations. Like I mentioned last week, the high percent increases in hospitalization seem alarming, but these numbers are actually still quite low. Delaware and Washington D.C. are the only two places with double digit hospitalizations per 100,000 at 13 and ten, respectively. Deaths are also down 32% over two weeks, with a daily average of 410 deaths compared to 530 last week. 11 states have seen increases in their seven day rolling average of daily deaths per 100,000 residents. But again, these numbers are low relative to what we saw earlier in the pandemic. We remain in a stay tuned type of moment and cannot predict what will happen with new variants. But many people's attitudes seems to be shifting from the severe and overwhelming stages of the pandemic to a chronic must live with a pandemic. There seems to be a lack of concern about severity and risk associated with future outbreaks. For example, despite the more than 70 breakthrough cases that resulted from the Gridiron Dinner in DC, which we discussed in some detail last week, the White House Correspondents Association is still planning to host its scheduled correspondents dinner. Both the president and first lady have indicated they would attend. While none of the 70 cases from the Gridiron Dinner were severe, each of the attendees had been vaccinated and had access to antiviral drugs. So let me just reiterate, the correspondents dinner is set to continue as scheduled, and each of the 2,620 people will have to show proof of a negative test within 24 hours of the event. We have seen how that has turned out in the past and can only hope for the best. So to summarize where we're at today, I don't know. Clearly, we're seeing increasing activity. Will in fact it take off more like the U.K. or will it be like the situation in Spain, Sweden and Poland, where BA.2 has gone up but case numbers have not gone up nearly in the same level? We just don't know. We have our work cut out for us, and it's our hope that we won't see a substantial increase in cases with this particular BA.2 variant. And if they do occur, at least, hopefully they won't require a hospitalization for severe illness. We can only at this point say again, we don't know what's going to happen, but we're following it closely and we'll keep you alerted.

**Chris Dall:** [00:30:06] On Monday, a federal judge in Florida struck down the Biden administration's mask mandate for airplanes and other forms of public transportation. Mike, any thoughts on this?

**Michael Osterholm:** [00:30:18] Well, Chris, I have lots of thoughts about this, but they're thoughts that I have been sharing with this audience for the past two years. First of all, I acknowledge on Monday that the announcement about the end of the federal transportation mask mandate has been a big news story. I also believe that because of it, it does challenge the potential for the CDC under the authority of the Public Health Services Act of 1944, to put in place public health measures to protect the public against events just like we're seeing. Unfortunately, I think that this is the wrong issue to be applying the yes or no, thumbs up or down to the impact of such an act. As you know, I have stated over and over again, I strongly support respiratory protection. And I have said over and over again to those who are immune compromised, those who are at risk for serious illness, one of the ways, in addition to getting your four doses of vaccine you can protect yourself is consistently and correctly wear N95 respirators. Some cases the KN95, depending on your face size. But all along we have been generating more and more information, supporting the fact that face cloth coverings and surgical masks pose very limited, if any, levels of protection. On top of that, there is no standard within this mask mandate to say how you wear that particular protective device, whether it be a face cloth covering, a surgical mask, or N95. As you know, we have been continuing to watch new shows with large audiences and the public setting, and we freeze frame these, count the number of people wearing respiratory protection devices, and more specifically, look to see how they're wearing them. And from the beginning of the pandemic, right up through today, we continue to see 25 to 30% of the people wearing them under their nose, effectively becoming a chin diaper. That's it. It's not protective. Fixing three of the five screen doors in your submarine, whatever analogy you want to use. So why mandate that? Why mandate that? Then on top of it, if you're on an airplane and the several airplane flights that I've taken, I have had the experience of sitting next to someone who had very prolonged consumption histories of food, nuts, you know, all the kind of condiments you see in airport settings and the whole entire time having their quote unquote, mask off, because it was also allowed with this mandate that if you're eating, you can basically take it off. Well, who honestly believes that the virus takes a vacation when you are eating? So it doesn't matter, right? That's crazy. So to me, this mask mandate has been a mistake. And I you know, I get very frustrated seeing all these public health officials, people from academia, who say, oh, this mask mandate is so important at protecting lives. As you know, we have actually critiqued the studies the CDC have used to indicate that face cloth coverings or surgical masks are effective in reducing transmission. And without exception, these studies all have severe challenges. It's as if somehow the CDC preordained what the results needed to be before the study would be considered successful and published in the MMWR. I think that's wrong. I think it's just wrong. This is a aerosol related virus transmission model where the use of respiratory protection at the level of an N95 or KN95 is essential. So you know, let's stop having a debate about whether we have a mask mandate or not. It's not necessarily going to make much difference. If everyone today would be made to wear an N95 effectively, then you'd have me at hello. I would strongly urge that we support those kinds of mandates. But for now, all we're really doing is window dressing with this entire menagerie of face cloth coverings, surgical masks, etcetera, that we use, and in the guise of the fact that we have major public health benefit. So Chris, to me, the real story here is this ongoing message that anything you put in front of your face basically works. And I think that the CDC and W.H.O. are largely responsible for this confusion in terms of what they've put out, how they put it out. This is a real challenge. So I am concerned about what the precedence is set here in terms of undermining the Public Health Services Act of 1944, where public health may in some instances, have the tools that they absolutely need to reduce disease transmission and must enforce them. And now they can't because they don't have the clear line of authority to do so. That, to me, is what the real challenge is here. But please, no one out there will you take for a moment that I'm anti-masking. I'm not, just the opposite, but you've got to use high quality masks. Otherwise you really are not protecting yourself at all.

**Chris Dall:** [00:35:38] So Mike, if you are in an immune compromised person and you're getting on an airplane tomorrow, can you feel pretty good about your level of protection if you are wearing a well-fitting N95 or KN95 respirator and other people on that flight are not masked?

**Michael Osterholm:** [00:35:56] Well, first of all, let me make it really clear that if you're immune compromised, you need to, first of all, have your four doses of vaccine. Because to me, success may be not the fact that you do or don't get infected, but the fact that you don't ever end up arriving at a hospital needing to be hospitalized. That, to me, is the most important message. Secondarily, if you're looking at respiratory protection, yes, it's ideal if everyone were to wear a N95 respirator tightly fitted. But if they don't, you still have substantial protection from you wearing your own. And that's what I do on a plane. I wear my N95. I don't take it off for a moment to get a drink of water or for any kind of beverage or meal. And I do feel that at that point, you can be pretty confident, along with the air ventilation system of the plane, to reduce the likelihood of transmission. But remember also that that includes not just in the airplane, but the time you spend in the terminal, the time you're with people in the cab, whatever. And all of those must be accounted for in terms of protection with an N95. So what I tell someone who might be at increased risk for serious COVID, that they can do certain events based on their vaccine status and their regular and effective use of a respirator, I'd say yes, go ahead and travel. This is part of learning to live with COVID and knowing that your your chances of becoming infected and becoming seriously ill if you do, all we talk about with vaccine and use of a respirator should be minimal.

**Chris Dall:** [00:37:40] Well, there are pundits out there suggesting cases don't matter as much anymore. We are continuing to learn more and more about long COVID. And there was a meta-analysis that came out this week suggesting that nearly 50% of COVID-19 survivors reported persistent symptoms four months after their infection. Doesn't that support the argument that cases, in fact, still do matter?

**Michael Osterholm:** [00:38:03] Well, Chris, this is a very important issue. And let me remind everyone that a meta-analysis is a type of study where you take all the previous published studies that have been reviewed and if there's no evidence of some type of bias or inherent conflicts in how the data were collected and analyzed, you combine these to actually get more power in terms of understanding by sheer volume of numbers what is happening. And so the meta analysis that you just mentioned, which was quite well done, was published last week in the Journal of Infectious Diseases, and it found that 37% of COVID survivors were experiencing symptoms one month after their infection and 49% were experiencing symptoms after four months. It's notable here that there was actually a higher rate after four months than just one month, which suggests that, in fact, you may have onset of long-covid symptoms in some cases more than a month after you're initially recovered. The most common persistent symptoms identified in the study were fatigue, with 23% of people reporting fatigue after recovering from acute COVID, followed by memory issues, sleep issues, difficulty breathing and joint pain. They were all experienced by more than 10% of COVID survivors. Prevalence of long COVID was higher in hospitalized COVID patients 54%, but still very high for non-hospitalized patients at 34%. The meta-analysis found that being a female and having asthma were both risk factors to develop long COVID. In addition, there were other risk factors identified in the study that were not included in the meta analysis, including obesity, older age, hyperthyroidism, and severe initial illness. So what does this mean? First, it means that long COVID is not a rare event, and there are unfortunately many of you listening to this podcast that can attest to that very fact. Even for those who are not hospitalized with their infection and even those that are young and relatively healthy, long COVID can be a very stark reality. While hospitalization, age, and underlying conditions were shown to be risk factors in some of the studies, including the analysis, it is clear that many people without those risk factors are still getting long COVID. Second, it means there's a lot more work to be done in understanding what this means for those individuals suffering and for our society in general. The study did not touch on the severity of the symptoms that these individuals were experiencing or the extent to which their symptoms interfered with their everyday life. These are both very important things for us to understand as we learn how to navigate such a large proportion of our population experiencing these symptoms, both in terms of providing them with adequate treatment and understanding the broader economic, social and other impacts that they could have. Finally, it means that even though the numbers of hospitalizations and deaths are relatively low right now, these cases still matter. Cases matter. We can still celebrate the fact that vaccines and better treatments have greatly reduced the amount of severe illness, hospitalization and death, while also acknowledging that even non-severe, non-hospitalized cases are still of major concern because of this issue of long COVID. Until we better know how to prevent, treat or cure long-COVID, we cannot even begin to consider declaring victory over this virus, even if our number of hospitalizations and deaths fall. Finally, I would just add, as someone who actually knows a number of individuals who are suffering from long COVID, I can tell you this is a huge challenge. A huge challenge. I've seen people who are physically very capable, mentally very sharp, who just 4 to 8 weeks after their initial infection are now not themselves. And this is a huge issue. So this study really provides further definition and ammunition for why we need to do so much more about long COVID.

**Chris Dall:** [00:42:11] There is some new data emerging on the Omicron sub-variants BA.4 and BA.5, as well as a BA.2 sub-lineage that has emerged here in the United States. So, Mike, what do we know about these new additions to the age of the variants?

**Michael Osterholm:** [00:42:27] Well, let me be very clear in terms of answering this question, that after months and months of studying these variants, I think I know less about them now than I did that year ago or two years ago. This is surely an area that is rapidly evolving, and therefore it's no surprise that we are seeing this virus evolve into a number of new variants and even into recombinant viruses, viruses that actually come together, such as an Omicron and a delta to form another new virus, often like we see in influenza. Though there are many things we still don't know about this virus, one thing that we do know is that these variants will continue to challenge us. And much like the wind, we cannot stop them. In the United States, we're seeing by BA.2.12.1, a sub-variant to BA.2 sub-variant, become even increasingly more prevalent. The variant made up 19% of US cases last week, compared to just 1.5% of cases a month ago. It is particularly prominent in New York, one of the first US states to experience now what appears to be a major Omicron surge. 52% of cases sequenced in the New York region last week were BA.2.12.1. Internationally, variants BA.4 and BA.5 are starting to spread. Combine the variants make up half of South Africa's cases. BA.4 has also been identified in Botswana, Belgium, Denmark and the UK, and the BA.5 has been identified in China, France, Germany and Portugal. The question we need to ask ourselves when thinking about these variants or any new variants that emerge, is how significant of a threat does this pose to us? There are three major questions within the question that help us assess the risk of each new variant. I've talked about these on many occasions, but let me review them again. First, is it more transmissible? Second, is it causing more severe illness, hospitalizations, and deaths? And finally, three, is it evading the immune protection from vaccines and/or previous infection? Of course, with Omicron, the main concerns were about its transmissibility and ability to evade immune protection. Let's take a look at what we know about with BA.2.12.1, BA.4, and BA.5 in regards to these questions. We'll start with transmissibility. Unfortunately, the global reduction in testing and surveillance may make it difficult to assess the transmissibility of these variants. This is truly unfortunate. Even if the virus is more transmissible and more cases occur, this will likely not be fully reflected in the official case numbers. That said, the data we do have on BA.4 and BA.5 though incomplete is still promising. South Africa, again where BA.4 and BA.5 combined make up over half of the cases, has not seen any significant rise in cases as the prevalence of these variants have grown. Of course, we don't know if that will change as the variants become more prevalent, but it is important to note that by the time that the original Omicron variant was dominant in South Africa, the country was experiencing exponential growth in daily case numbers. Clearly, this is not happening with BA.4 and BA.5, or at least not yet. BA.2.12.1 is a different story. As I said earlier, the variant is now dominant in the New York region, and New York and New Jersey have both seen cases rise over 60% in the past week. However, many other states in the Northeast will BA.2.12.1 is not yet dominant, are seeing similar rises in cases. So it's difficult to know if BA.2.12.1 is partially responsible for New York's surge, if their surge is just a reflection of current trends in the Northeast as a whole. That said, we do have additional reason to believe that BA.2.12.1 could be more transmissible than the original BA.2 strain. Ba.2.12.1 has two mutations in addition to all the other BA.2 mutations. One of these mutations, L452Q, was present in a lambda variant and a similar mutation, L452R, was present in the Delta variant, both of which were more transmissible than the original Wuhan strain. This means that it is likely that BA.2.12.1 could even be more transmissible than BA.2 due to the presence of this mutation. But we do not know what the extent to which this will be the case. And as I said before, the decline in PCR testing and other surveillance will make this difficult to assess. Now let's talk about severe illness, hospitalizations, and deaths. There is very little data available on this as these variants are just becoming dominant and hospitalizations and deaths tend to lag behind surges in cases. But again, the little data that is currently available out of South Africa is promising showing no surge in hospitalizations and deaths. Since we will likely see far less testing done during a BA.4, BA.5 and BA.2.12.1 dominance, we may see inflated hospitalization rates since many people with no symptoms or mild symptoms will likely opt for rapid testing or no testing at all. This will make it even more difficult to assess if these variants are causing more severe illness. But so far we have no reason to believe that that is the case. And finally, let's look at whether or not these sub-variants are evading protection from vaccines or from previous immunity related to infection. We already know that Omicron has evaded immune protection far more than previous variants like Alpha and Delta. The question is, will this be any worse with these new sub-variants? Well, we're still in the process of trying to figure all this out. As of right now, there is some limited data suggesting that BA.4 and BA.5 could better evade immune protection. However, this is largely being based on the presence of a specific mutation on the spike protein in these lineages. That mutation is F486B. That has been linked to a loss of neutralization by antibodies in lab-based studies. Otherwise, BA.2.12.1 lineages harbors a mutation in a different location on the spike protein that has also previously been associated with heightened immune evasion. In fact, although this particular mutation isn't exactly the same as the mutation that appeared to give Delta growth advantage through evasion, it is located in the same position. So we'll see what is borne out with this more real world data moving forward. But some of the lab-based data and our previous experience with mutations in these positions have raised some early concerns of possible immune evasion, which is what we're all now trying to monitor. All of this to say we really don't know whether or not these sub-variants pose a major threat. It may be difficult to determine what exactly the role of any of these mutations are in increased transmission, severe illness, and evading immunity given the potential lack of testing. We worry very much that we could find ourselves slipping back into more susceptibility to this virus if immune evasion becomes true. That is obviously a scary reality to consider given that we want our vaccines and for those who have had previous infection, the immunity from that, to provide us with ongoing protection. We hope to learn more about these variants in the coming weeks as they become more prevalent and we're able to see the impact they do or don't have on cases, hospitalizations and deaths, even if we're working with incomplete data. I know this is frustrating. We all want to move on. We want to be done. But the variants keep reminding us the virus is still largely in control.

**Chris Dall:** [00:50:38] This week, the CDC Advisory Committee on Immunization Practices met to discuss COVID-19 vaccine boosters. But the FDA has already authorized a fourth shot of the mRNA vaccines for people over 50, and an administration official this weekend encouraged Americans over 60 to get the second booster dose. So, Mike, who's driving booster policy at this point? And are you concerned that this is going to confuse people?

**Michael Osterholm:** [00:51:04] Well, let me provide the conclusion at the beginning and then I'll work backwards. Yes, I'm very concerned. When we look at the current federal process we have for evaluating vaccines, their approval, and how they're used or recommendations made for use it really is part of an entire federal organizational structure, which this is actually considered. The FDA using the Vaccines and Related Biological Products Advisory Committee review data provided to the FDA for approval of vaccines by the various vaccine developers. They review data regarding safety and efficacy of any new vaccines and will use that data to decide whether the product should receive licensure. The ACIP on the other hand, the Advisory Committee on Immunization Practices, part of CDC, a group of 15 medical and public health experts, then develops the recommendations how to use the vaccines to control disease. These recommendations include who should receive the vaccine, the number of doses needed, the amount of time between doses and precautions and contraindications. In short, vaccine licensure and recommendations are two separate processes conducted by two separate government agencies. The FDA licenses a vaccine for use if it is safe and effective, and then the ACIP determines how the vaccine should be used in order to have the greatest individual and public health impact. When making recommendations, ACIP members weigh the risk of the disease with the known risks and benefits of the vaccine. For each vaccine, they consider the safety and effectiveness of the vaccine when given at specific ages, the severity of disease, the number of people who get the disease if there is no vaccine, and how practical the recommendations are to put into practice. I worry very much that the ACIP has become increasingly irrelevant to the COVID vaccine review and recommendation process. We can't be making public policy based on TV interviews of the other administration officials. We need a thorough and transparent review and discussion of the data by the experts. As of today, the ACIP has not made any formal recommendations as to how to use the COVID vaccine boosters. They did meet yesterday and discussed this issue but did not take a vote and come up with a specific recommendation for how they can be used. However, last Sunday, a senior administration official was on the Sunday talk shows stating that everyone 50 years of age and older should get the booster dose. Now, maybe the public doesn't really understand what that statement meant relative to who delivered it. But if you're in public health, you're in medicine, you say, wait a minute, why is somebody from the White House telling us how to use the vaccine and not ACIP via the initial approval by VRBPAC and the FDA? And I think that this just challenges the credibility of review and how we come about making decisions on what vaccines to use, when, and where. I encourage the administration to stick with the system of VRBPAC and ACIP input. I don't at all believe that the CDC or the FDA should take each of the committees as a actual veto power recommendation group. But they need to get the input. And the fact that the administration was strongly encouraging these vaccines before ACIP had even considered them says one of two things. If it was that important, ACIP should have reviewed it weeks before, or the administration should have held off until they had more clarity. And this is really to protect the administration, not just us, because then it adds that level of credibility. It adds that level of review that then makes people believe that it was not a political answer that caused this vaccine to be recommended, but it was truly a public health science answer. And so I do worry, I think, that they need to get the house in order right now and make it much more clear as to how we make recommendations about these vaccines, what goes into them. I am confident right now personally that you should get a booster dose if you're 50 years of age and older. That's my own personal understanding of the science and my conviction about that. But that doesn't mean it should become national policy. That's where we really need to have this kind of discussion in the formal review process. And then I think we have much more of a scientific basis for standing our ground on any and all issues that come up around the use of vaccines and drugs.

**Chris Dall:** [00:56:00] That brings us to this week's COVID query, which is from Mark. And it regards the use of wastewater data for COVID surveillance. Mark wrote, "Should we be using wastewater data rather than increasingly inaccurate case counts as our best metric for gauging the state of the pandemic in real time, both in Minnesota and beyond, rather than hospitalizations which are a lagging indicator? Or are there issues with the accuracy of those measurements as well?" And Mike, I would add another question to this. Do we even have the capacity to use wastewater data as a consistent surveillance tool?

**Michael Osterholm:** [00:56:33] Well, first of all, let me be really clear. Wastewater data, I think, is a great tool for which its potential is yet to be really fully realized. And we can use it to predict upcoming trends and it can help us monitor populations of COVID. As most people in this audience know, typically wastewater levels tend to be indicative of trends in the days and weeks to follow. While the wastewater data can be helpful, though in tipping us off to where we should expect to see case numbers rise, there are still really several very important limitations. First of all, let me be clear. We have not standardized wastewater data analyzes. We have a number of different groups doing wastewater data surveillance. And yet they're using different measures for what they're testing for in the wastewater. And it's not standardized in terms of the actual level of activity in that wastewater or in some instances even which markers of the virus that they're using. Secondly, we cannot quantify cases based on the wastewater data. What I mean by this is that when we see an increase in COVID-19 presence in wastewater, we can't use these data to predict how many cases that are in the area or if it will definitely result in an uptick of cases and hospitalizations in the days to follow. We saw an example of this when we discussed this concerning wastewater trends in early March. A third of the sites that the CDC monitors wastewater were showing increasing trends, but in the weeks following only saw slight increases in cases in these areas. The alarm bells rang, but there fortuitously was not much of a change in the overall COVID cases detected or large increases in hospitalization, a lagging indicator that reveals the tip of the iceberg of transmission. So to answer your question, Mark, we don't currently have a great way to quantify the state of the pandemic in real time. We do need that. It would surely be very helpful. We have to triangulate what we know from numerous sources wastewater monitoring, case numbers, and hospitalizations taking into account their various limitations. I do believe that with further refinement of the wastewater data testing program, that this may become a much more important tool going forward. But for now it's a crude indicator, but one that cannot be ignored. And we must do what we can to improve on how wastewater data are used in our communities to understand the future of COVID in those communities, particularly as we see an ever increasing drop off in the number of people being tested by PCR for infection.

**Chris Dall:** [00:59:18] Mike, I understand our latest Beautiful Place submission was inspired by your dedication last week. What can you tell us about it?

**Michael Osterholm:** [00:59:28] Well, Chris, first of all, one of the most gratifying aspects of this podcast, as I've said time and time again, is the feedback from the listeners. And boy, did we ever hit some kind of a moment last week with the dedication to our companion animals that has gotten us through this pandemic. The mail we received was remarkable, remarkable. And so many people actually found in their hearts as well as their heads, that same sense of dedication that it was meant for me and our team with regard to companion animals. And so I just have to go one more week on that theme, because we received a number of beautiful submissions about our companion animals. And one of them, I thought, really captured just what the pandemic itself was all about and what it was doing to us, and how the companion animals were able to be a part in such a wonderful way of helping us get through. This particular beautiful place submission came from Amanda and she wrote, "Dr. Osterholm and CIDRAP team, I especially enjoy the dedications at the beginning of each podcast and the one you shared in April 14th episode touched my heart in a special way. Dr. Osterholm I can hear and feel the emotion in your voice as you spoke about your beloved Max." That was absolutely true. That was a hard one for me to get through. "As you shared, all of us who have been blessed to love a companion animal know the joy they bring to our lives as well as the deep pain of losing them. In December 2019, my husband and I lost our first Sheltie, Simba, who had been with us for 16 years. We were all a little lost without him, especially our younger Sheltie, Shadow. As we spent more time at home throughout the early weeks of the pandemic. Shadow was a constant source of companionship and joy. We lost him quite suddenly to a suspected stroke just two days after Thanksgiving in 2020, less than a year after losing our Simba. I did not know my heart could ache that much. Pre-pandemic, my husband and I love to travel, something we hoped to resume after being vaccinated. So he was in no hurry to get another dog. We especially love to escape. Wisconsin winters and Hawaii had become our favorite wintertime destination, so we hoped to go back in December of 2021. When the Delta surge began last summer, despite being current on our COVID vaccines and having access to N95 respirators, we decided not to travel after all. We had talked about getting a puppy in the spring of 2020, but in August of 2021, just as we made the decision not to go to Hawaii, a Sheltie puppy became available. His sweet face in the photos melted my heart and even my husband couldn't deny he was adorable. Everything fell into place in a way that I can't explain other than to say it was meant to be. We made the decision to welcome into our family and brought him home a week later. We toiled over his name and finally decided on Hilo Aloha. Hilo is the city on the island of Hawaii and is the Polynesian word for navigator. Aloha is the traditional Hawaiian greeting, and it reflects the spirit of kindness and hospitality we felt when visiting Hawaii. It felt like the perfect name for our little guy. And now I say aloha at some point every day, which always makes me smile as I remember our travels of the past. My beautiful place is not so much a physical place rather anywhere that I go or I'm able to spend time with my precious Hilo. We love to hike and spend time outdoors and reminds us of the simple things in life, like the wonder of new snow or the fun of chasing a blowing leaf, one of his all time favorite things. He has given us the opportunity to build a new relationship with another precious soul and bring this immeasurable joy each day. I'll always love my other dogs and no one can ever replace them. But Hilo has healed my aching heart in a way that nothing else could. I've shared a couple of photos of him as a pup, surrounded by leaves on a hike, and how beautiful he is at the current age of ten months. Thank you for sharing the story of Max. This is a special bond shared among all of us who love or who have loved companion animals. Your work means so much in so many ways. I'm beyond grateful to the entire CIDRAP team. Sincerely, Amanda." And we have included the pictures of Hilo on the website. So please go take a look. They will warm your heart. Thank you, Amanda, for this wonderful, beautiful place. There are many people I know listening to this podcast who can relate exactly to what you have just shared with us. For those that can't, there's still a chance for you. You can always go get a puppy and you know, it's amazing what they can do to your life. So thank you very much for another beautiful place. And. We look forward to receiving even more from all of you.

**Chris Dall:** [01:04:32] Mike, what are your take home messages on this 100th episode of the Osterholm update?

**Michael Osterholm:** [01:04:39] Well, my first message is not actually included in the outline of messages, but wow, how do we get to 100 episodes? You know, back at the very beginning, when I talked about this lasting 18 months to 24 months, I knew it intellectually, but there was no way I could have felt that emotionally to understand what it would be like to have to go through a pandemic of this nature with its uncertainty, with its pain and suffering, the grieving that I talked about in the original dedication. How many parents? How many grandparents? How many sons and daughters have lost someone? How many friends? How many colleagues? It's just hard for me to get my arms around that it's been necessary for us to stay current with the pandemic, to have 100 episodes. But let me move into the three points I think that are most important today. Number one, China is in trouble. They're in trouble. Zero-COVID's not going to work. Omicron is like trying to stop the wind. They did stop previous variant outbreak surges because they weren't nearly as infectious as Omicron. They were more like fighting a forest fire that eventually could be put out. Why is this a critical issue? Because the supply chains in China have such a substantial impact on the world. So while I care for what happens to the Chinese population and what they're going through right now, the world itself will continue to suffer immeasurably because of our reliance on these centralized supply chains for everything from automobiles to drugs to medical devices. I can go through the laundry list of all the things that they actually are responsible for. We as consumers eventually having access to. The second thing, I don't know what's going to happen in the US. You know, I've been asked time and time again by the media because they think somehow, you know, I'll have this model or some kind of crystal ball view. I don't know. And if you listen to the data today and what's happening globally, you listen to the data, what's happening in the US with cases, you listen to the data, what we know and don't know about the variants. Anybody who tells you with some certainty what's going to happen, be careful. As you've heard me say time and time again, they've got a bridge to sell you too. Okay, and I think this is really an important notion. And third, let me just say that I am very, very frustrated by and feel very torn by the mask mandate debate, because this has not been really about science. And I think we have unfortunately done a major disservice to the public and to public health in general by not basing our recommendations for respiratory protection on the science. We seem to just continue to shoot ourselves in the foot over and over again, not recognizing that it shouldn't become a badge of public health courage to say you want a mask mandate because it's just the opposite. What it's all about is if you're willing to make the mandate about adequate and truly effective respiratory protection man, you got me at word go. I'm there. But right now to fight over a mandate of somebody wears a face cloth covering part of the time when they're in a setting because it's okay not to wear it when you're eating or drinking. And you know that the whole respiratory protection aspects of face cloth coverings and surgical masks is highly, highly limited. What have we done? What have we done? We have extracted a huge price of public health goodwill based on something that is not effective. And I have to say and I know I'm going to sound hopefully not too pejorative, but I am so frustrated by so many of my colleagues who make these blanket statements about, oh, well, masks are going to be very important protecting us. Masks are what is effective in this, and they don't know what they're talking about. You know, our center has studied this issue inside and out. We've had some of the best world's experts working with us. The documents we've published on the site clearly lay out the challenges of respiratory protection with anything short of an N95 respirator. So just know that that's the last piece. I think we've shot ourselves in the foot this past week, making the statements many people have about masks.

**Chris Dall:** [01:09:10] And do you have a special closing song for us today?

**Michael Osterholm:** [01:09:14] Well, actually, I'm going to divert a little bit from a closing song to a closing poem. This is actually a poem that I'd used before. It was on the special Osterholm Live Update on October 15th of 2020 that long ago. This was a poem by John Greenleaf Whittier. He was an American Quaker poet and advocate for the abolition of slavery. He lived from 1807 to 1892. He was most often referred to as the fireside poet. He was heavily influenced by the Scottish poet Robert Burns. And I believe that where we're at today in this pandemic, these may be the kind of words we need to hear. We want so badly to be done, but we keep getting reminded we're not to the finish line yet. So this poem by John Greenleaf Whittier is "Don't Quit." "When things go wrong, as they sometimes will, when the road you're trudging seems all uphill. When the funds are low and the debts are high and you want to smile, but you have to sigh when care is pressing you down a bit. Rest a few months. But don't you quit. Life is queer with its twists and turns as every one of us sometimes learns, and many a failure turns about when he might have won had he stuck it out. Don't give up, though the pace seems slow. You may succeed with another blow. Success is failure turned inside out. The silver tent to the clouds of doubt. And you never can tell how close you are. It may be near when it seems so far. So stick to the fight when you're the hardest hit. It's when things seem worse that you must not quit." John Greenleaf Whittier. So thank you all for being with us again this week. I wish one episode I could give you all the answers and say, this is it. All you got to do is listen to this and you're all set for the rest of the pandemic. You know we can't do that. But we are trying our best and we so appreciate you and the feedback you give us, helping us be better in terms of what we can do to give you the information you need and want to keep getting through this darn pandemic. Again, I want to remind all of us of the opening dedication. There are so many people who are grieving as a result of losing loved ones, colleagues, friends, family in this pandemic. We must never forget. In the end, that is by far the most powerful outcome of all that this virus is doing to us, making us grieve. So thank you for being with us. Be safe this week. You know, use those N95s and we'll keep you posted. And we look forward to hearing from you. And we also look forward to being with you again next week. Thank you so much. Be kind. Be kind. Thank you.

**Chris Dall:** [01:12:16] And thank you, Mike, from all of us here at the Osterholm Update team and the whole podcast family. To mark our 100th episode, here are some messages from colleagues, friends, family, and those for whom this podcast has meant so much. Take a listen.

**Joan Gabel:** [01:12:33] Hi, Mike. Joan Gabel here. And I have one of the pleasures of my work as President of the University of Minnesota and as your friend, to congratulate you and your team on your 100th episode. Thank you for all you do for your tremendous hard work, for your advocacy, for keeping all of us informed about the pandemic before, during and after. We are so grateful. Congratulations.

**Neel Kashkari:** [01:12:57] Mike. It's Neel Kashkari from the Minneapolis Fed. I want to congratulate you on your 100th podcast this week, and thank you for all of your guidance and advice during the pandemic. You have been a wonderful partner and an invaluable resource to me, to my colleagues, and to all of us. Thank you for everything you do and congratulations on your 100th podcast.

**Sanjay Gupta:** [01:13:18] Mike Osterholm, it's Sanjay Gupta. I wanted to add my voice to the chorus of people who are congratulating you on your 100th episode of the Osterholm Update COVID-19. 100 episodes, that's really saying something. But look, I followed you for a long time. I want to congratulate you on 100 episodes, but more importantly, for a lifetime of telling the truth, calling the balls and strikes as you say it. Thank you for everything you do and for your service. I also want to just thank you for being a friend, Mike. There's no silver linings, really, out of a pandemic, but the fact that we've become friends is something that I greatly cherish. Congratulations.

**Jena Wirt:** [01:14:02] Hi Dr. Osterholm, this is Jenna Wirt. Just want to congratulate you on 100 episodes. Thank you so much for being a trusted source of information during this very difficult time. Thank you also for giving me a voice and the opportunity to tell my story. I'm proud to be part of your podcast family.

**Jan Malcolm:** [01:14:20] Hi Mike. Jan Malcolm here. Congrats on your 100th episode and thanks for everything you do to keep people well informed. You are a treasure.

**Andy Slavitt:** [01:14:28] Hey, Mike and listeners, it's Andy Slavitt. You know, I don't know if there was anybody that could have predicted there'd be 100 episodes of Mike's great podcast. Except for Mike, that is. Mike probably knew and knows exactly how many podcasts there will be because he's known from the beginning when this darn pandemic will end. He's just revealing it bit by bit. No, seriously. Mike, you've been such an incredible source of information for people all over the country and all over the world who just count on you, reliable, straight talk and the Midwestern values. I'll tell you that some of my personal best moments of the pandemic have come from sitting outside on my porch, having long conversations with you about the country, plotting about what to do next to most help people and how to help the people in charge. And your willingness to say the truth at all times has my undying respect and the country's undying gratitude. Keep it up, buddy. I would say 100 more, but let's hope not.

**Ryan Roxie:** [01:15:38] Hello, Dr. Osterholm. It's your friend Ryan Roxy here from the Alice Cooper Band. Just wanted to say congrats on your 100th episode, and thank you again for coming on the "In the Trenches" podcast. Best of luck with everything, and thank you for making the world a more informed and safer place. Cheers.

**Michael Oakes:** [01:15:57] This is Michael Oaks, Vice President for research at the University of Minnesota. I really just want to give you a heartfelt congratulations on your amazing podcast. You and I have been friends for, gosh, too long now, and I'm just so thrilled and honored to be associated with your work, your impact on the public health community and beyond. You're an amazing asset to the office of the Vice President of Research here at this university. And your work engaging in these very difficult issues, being science-based, being honest, and helping the public understand these key issues through this podcast that's so critically important is such a contribution to the whole big game. Congratulations, Mike. It's an honor. It's a pleasure. Best luck for the next hundred.

**Andrea Mitchell:** [01:16:54] Congratulations, Dr. Osterholm, on your 100th update, we thank you for all your straight talk for more than two years, helping us make sense of a confusing and sometimes frightening time. I am personally grateful for all of your wisdom and advice on my program. On "Andrea Mitchell Reports," you've become an essential source of knowledge for all of us. Congratulations.

**Eric Topol:** [01:17:17] I want to congratulate my friend Michael Osterholm on his 100th episode of this extraordinary podcast. One of the real silver linings for me during this whole stretch has been the friendship, the collaborations with Mike. So congratulations on this very important milestone.

**Jenifer Ward:** [01:17:39] Hi, Mike. Jenifer Ward here. Congratulations to you and the whole CIDRAP team on your 100th episode from down here at your alma mater, Luther College. As president, it would be easy for me to concentrate on the distinguished career of one of our alumni. And you sure have had a huge impact in our understanding of infectious diseases and epidemiology. But as president of Luther, during a global pandemic, I've had something my counterparts at other colleges haven't had. And that's the benefit of your friendship and humor, your concern for me personally, as I've worked with my team to navigate COVID and your wise and pragmatic counsel, as we all try to balance public health concerns with what it takes to keep ourselves mentally and emotionally healthy as a society. Thank you, Mike, for your service and for the great work of your team. Well done.

**Ruth Lynfield:** [01:18:29] Mike, congratulations. 100 podcasts. Wow. Thank you for sharing your expertise and insights. With much gratitude, Ruth, the state epidemiologist in your home state of Minnesota.

**Michael Osterholm's grandchildren:** [01:18:45] Congratulations on your podcast. Congratulations on your podcast. Congratulations on your 100th episode, Grandpa. Nice job on your 100th episode. Love you. See you soon.

**Chris Dall:** [01:19:35] Thanks for listening to this week's episode of the Osterholm update. If you're enjoying the podcast, please subscribe, rate, and review, and be sure to keep up with the latest COVID-19 news by visiting our website CIDRAP.umn.edu. This podcast is supported in part by you, our listeners. If you would like to donate, please go to CIDRAP.umn.edu/donate-now. The Osterholm update is produced by Sydney Redepenning, Cory Anderson, Angela Ulrich, and Meredith Arpey.