# Episode 85: Smart Testing in the Omicron Surge

**Chris Dall:** [00:00:06] 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. As the world enters a new year, we are once again confronting a new, challenging phase of the pandemic that just won't go away. It was just over a month ago that news broke of a coronavirus variant identified in South Africa that appeared to be both highly transmissible and capable of evading some of our vaccine-derived immunity. Now that variant has spread around the world and is causing a massive wave of infections in every community it touches. The good news is that the Omicron variant does appear to cause less severe illness, and we will explore that further in this episode of the podcast. But the sheer volume of infections we are starting to see and we'll continue to see for the next two weeks is likely to push our hospitals and many of the other institutions we rely on to the brink and how that all plays out remains to be seen. This week on the podcast, we're going to discuss the impact that Omicron is having both here in the United States and elsewhere and what these next few weeks might look like. We'll also talk about the decreased severity of illness observed with Omicron, the continuing issues we're having with testing here in the United States, explore what role testing should serve at this point and answer a COVID query on COVID in animals. But before we get started, as always, we'll begin with Dr. Osterholm's opening comments and dedication.

**Michael Osterholm:** [00:02:00] Well, thank you, Chris, and happy New Year to all of you. Some may find that a term of art that is hard to appreciate, given all that's going on right now. But I'm going to start out by being optimistic and believing that in fact, this next year is going to bring us more good news than it is bad news. Let me start out by adding a context also to that good news piece. I just want to remind everyone that we have come back and revisited the issue about light. I'm holding on to everything I can right now that is going to make for a better day. And I'm happy to report that today here in Minneapolis, there will be eight hours and 56 minutes of sunlight, up ten minutes from the December 21st winter solstice, but not anything close to what's going to happen in June. On June 21st, we will be at 15 hours and 36 minutes and 50 seconds, clearly almost an entire seven hour increase in sunlight here. So we're on the right track, the right trajectory, we're there. Having said that, I want to add a context to this week's podcast. In in trying to help what I would just put together is a psychological transition of where we're at and what's happening. And I've used this quote before from Sir Winston Churchill, and I find it to be very meaningful to me and I'm trying to interpret where we're at in this pandemic. And Churchill once said, "Now this is not the end. It is not even the beginning of the end, but it is perhaps the end of the beginning." And I will tell you right now, even in this pandemic, as much as people don't want to hear that after two plus years, we're just at the end of the beginning, it's a very important end, I think. And that from here forward, we may actually be able to have a very different relationship with this virus than we have now. So we'll try. We'll talk about that. You know, no promises, no rose colored glasses that we won't see a new variant emerge that could surely challenge us just like omicron has. But at the same time, I think that that is a real possibility. But in the meantime, let me just remind everyone we will have at least three to four weeks yet of this viral blizzard. Remember, I talked about that four weeks ago, this viral blizzard, and it's right on track. So far, everything that I thought would happen or could happen with Omicron is happening. So from that perspective, we've just got to get through this next period of time. That's all. Just just look at it like it's just the last ten yards of a 100 yard sprint. We've got to get through it. As we look at this three to four week period, we also have to look forward into the future, which is neither looking through rose colored glasses or assuming that this is a doomsday scenario. And I unfortunately find far too many people who are sitting on either edge of those two extremes and particularly in some in the media, and so that we're not either in a great, perfect place, nor are we in a doomsday scenario. Remember, right now, 73% of Americans are fully vaccinated with two doses. That means, of course, 27% are not. Also, from a standpoint of the third dose, I hate that term boosters, as you know, only 21% of the U.S. population has only not only been vaccinated with two mRNA doses or one J&J dose, but also having had that additional third or second dose, depending on which vaccine. That's a small number when you think about what protection can be afforded even against Omicron, which we'll talk about with these vaccines. Finally, I just also want to mention that only 40% of pregnant women are vaccinated. Personally, I'm so aware of situations that are so painful where pregnant women basically put their lives at risk, being pregnant and getting infected with COVID and being unvaccinated, as well as that, of course, of the unborn child. So please, we've got to do everything we can to get people vaccinated. I want to put one plug in this week before I do the dedication. I've heard from a number of clinicians, as well as the blood banking community. We are in desperate short supply right now of blood. This has been a deferral issue that many of us have appropriately made because we don't want to expose ourselves to go into a blood bank or to a blood unit area. But right now, we need blood. If you're fully vaccinated, i.e. meaning the two doses and a booster or that third dose, please consider going to give blood. You know wear your respiratory protection. But right now we need blood in this country, and that would be a great gift to society for people to go give blood. And finally, the dedication, you know, I want to dedicate this week's podcast to those people who have been in the trenches the last three to five weeks, with Omicron emerging, doing the vaccination, our vaccinators, and those who have been doing testing, support work, taking the samples, making sure they're processed in the laboratory. I want to shout out to Sherri, one of the vaccinators, as well as all of you across the world who have made it possible for us to continue to take on this pandemic by your wonderfully kind and supportive service.

**Chris Dall:** [00:07:23] Mike, we're going to spend a lot of time on this podcast talking about the situation here in the United States. But let's start internationally. We know omicron is well established in Europe and appears to have peaked in South Africa. But what are we seeing in other parts of the world?

**Michael Osterholm:** [00:07:38] Well, Chris, let me first say that as someone who has spent my career studying infectious diseases and tracking the different paths that they can take, which have spanned from localized small outbreaks to situations like this that occur on a global scale, I don't think any two weeks have ever been the same. Now with COVID and I mean this sincerely, I'm not sure any minute has ever been the same. Again, it seems like I'm constantly reviewing new information, and always learning new lessons as a result. I know that there are days that I go to bed where I assume that I know less about COVID at that moment than I did when I woke up in the morning. At the same time, there have been moments in this pandemic where I really gained a better understanding of some of those older lessons I'd absorbed from my time in this business long before COVID ever showed up. For example, if you look at the 2009 H1n1 pandemic that really stood out to me as a prime example of just how fast and how far these viruses can travel and set up shop. The first confirmed cases in the pandemic came out of Mexico and in the U.S. in April. Then, just one month later, cases had been confirmed in a total of 142 countries and territories. So clearly, these viruses don't respect boundaries. And it's why I also mention in my book "Deadliest Enemy" is that all of us are in this together, whether we like it or not. Well, as if that lesson wasn't evident enough in 2009, we've seen it showcase multiple times with COVID. For example, by the end of March 2020, roughly three months after China reported the first cases, we had confirmed infections in 160 countries and territories. And now, less than two months after the first documented cases of Omicron were reported, we've already detected the variant in at least 140 countries and territories. And whether it's Africa, the Americas, Europe or the Western Pacific region, we're seeing a growing number of countries experience the telltale sign of omicron's arrival, which prompts a sharp rise in cases. As a result, the global case numbers have never been higher. In fact, the daily average, which is closing in on 1.6 million cases. Let me repeat that the daily average, which is closing in on 1.6 million cases, is basically twice as high as we've ever seen it since the very beginning of the pandemic. At least 32 countries, including Angola, Australia, Canada, Denmark, Ethiopia, France, Greece, Ireland, South Africa, the UK and Zimbabwe, and I might add, even a research station in Antarctica omicron's arrival has brought about record high cases. This is that viral blizzard that I've been talking about for the last four to six weeks, and we're going to see more places hit by it in the coming weeks. In many of these places, COVID surges aren't unfamiliar. Living here in the U.S., where we've seen record high case numbers of our own, I can surely attest to that. At the same time, we've seen cases quadruple in India over just the past week, reaching their highest level since September. Remember all that discussion in previous podcasts where people said India is now out of the soup. They had their big outbreak. They basically are vaccinating people, they won't have a problem again. Well, here it is. In Latin America, which has reported consistent regional declines for the past six months, daily cases have grown five fold in just the past few weeks, and with mounting infections in countries like Argentina, Bolivia and Mexico. Now, the good news for this region comes in the form of their largely successful vaccination program. Despite a relatively slow start, Latin America has now fully vaccinated 64% of its entire population, placing the region ahead of Europe at 61%, North America at 58% and Asia at 57%. Again, Latin America has done an amazing job. At the same time, one can see wide disparities in vaccination rates between different Latin American countries. For example, while Chile has fully vaccinated 87% of its population, which ranks it among the best in the world, only 28% of Guatemala's population has been fully vaccinated. Even within countries, there are marked differences, particularly between urban and rural populations. We obviously understand that here in the United States. And finally, there are still unsettled questions being raised about the effectiveness of certain COVID vaccines against Omicron. Although we're still waiting for more data, some early studies looking at antibody development have found that Sinopharm and Sinovac, both of which are produced by the Chinese companies along with Russia's Sputnik vaccine, showed little or no neutralization against the Omicron variant. Even after a third dose of the Chinese vaccines, antibody response to the variant appears to be quite limited. Now I do want to note that these studies were fairly small and don't necessarily account for the effectiveness against severe disease. However, even prior to Omicron, we've seen real life data indicating that Sinopharm and Sinovac are less effective than the mRNA vaccines when it comes to preventing symptomatic infection. According to data from the WHO, clinical trials have shown an efficacy of about 79% for Sinopharm and 51% for Sinovac against symptomatic infection, and this was before the emergence of variants like Delta and Omicron. So if we do end up seeing a marked reduction in any protection these vaccines offer against Omicron infection and potentially severe disease, which we will cover later in this episode, the global implications could be significant. For example, China has administered a total of more than 2.8 billion vaccines nationwide, nearly enough to fully vaccinate 86% of its population, almost all of them have been Sinopharm or Sinovac. On top of that, China has reportedly delivered nearly 1.4 billion of their vaccines to a total of 115 other countries, many of which are located in Africa, Asia and Latin America, which I just mentioned. Some of these same countries have been relying on the Sputnik vaccine. So one can't help but wonder how might this play out if these vaccines are significantly impacted by Omicron? This brings me to my next and final point, which has to do with China. As you know, I've been talking about this very situation for the past few weeks on this podcast. As of right now, the country is expected to host next month's Winter Olympics in the capital city of Beijing. Meanwhile, they've been dealing with two separate COVID outbreaks that have recently emerged in different parts of the country. One of the outbreaks was reported this past Monday, after three asymptomatic cases were identified in the city of 1.2 million, prompting a strict lockdown there. At the same time, another Chinese city that is just located over 300 miles away has now been locked down for two weeks. In that city, which is home to 13 million people, a total of more than 1,700 cases have been detected since December 9th. At this point, Chinese officials haven't offered much in the way of details as to what variant the virus is that is causing these infections. However, it's clear that they're sticking with their familiar and heavy handed zero COVID strategy. Again, how long will this last? And whether it's even sustainable with a variant like Omicron remains to be seen. There are already reports of widespread food shortages among residents of the city that have been locked down for two weeks. These same residents aren't even allowed to leave their homes to seek medical care without a negative test. And finally, in addition to the humanitarian issues that this approach has created, there have been several other ripple effects, including major supply chain disruptions. So make no mistake, COVID continues to be a major monkey wrench that will be continuing to create chaos on a societal level around the world. And whether we're talking about is direct or even indirect impacts on everything from public health to the economy. I think these upcoming weeks with omicron will be a challenge. Remember, we're in a global viral blizzard.

**Chris Dall:** [00:15:33] Here in the U.S., the numbers are staggering. On Tuesday, Johns Hopkins reported more than a million new daily COVID-19 cases, a number that had been predicted and could reflect a holiday backlog, but it's nonetheless shocking to see. So amidst this wave of ever shifting numbers and information, Mike, can you share your thoughts on where you think the U.S. is at with COVID right now and what metrics or trends you're focusing on the most?

**Michael Osterholm:** [00:16:01] Well, let's just start with the obvious, and that is, oh my. This viral blizzard is having such an impact in our country. So many people today know people in their lives, people close to them who have been impacted by Omicron just in the last three to four weeks. Unfortunately, many of these individuals have also known someone in their lives who's been seriously ill, hospitalized and even died from this infection. This is a challenge we're going to be faced with, and it just reminds us, as I do every week on this podcast, to never forget, I'm going to talk about a bunch of numbers here. But they're real people, they're our loved ones, they're ourselves, they're us. This is the challenge. So let me just start off by saying there is no doubt that this wave of Omicron activity we're seeing has brought with it a flood of data. And while a lot of these data are very helpful, I must admit that some of it has been confusing and on occasion has almost seemed somewhat contradictory. So as I often say, and I started out this podcast, if you're feeling dazed and confused, join the club. Remember that what we're seeing is the messiness of evolving science playing out in real time. We are learning. We are learning every day, but it's messy. Again, I want to apologize in advance and admit right up front that I don't have all the answers to the questions that many of you might be asking. I promise you, I will not look at this situation through rose colored glasses because some people just want to feel good. Or will I sit here and say we have a doomsday scenario just because we have lots of numbers of cases. Frankly, I don't know anyone in the world who has many of the answers. Regardless, I hope that offering my best sense of where I see us at now and where I think we might be heading in the coming weeks will be at least somewhat helpful to you. First, let me start with cases. As I discussed during the international update, in basically every country where Omicron has replaced Delta as the dominant variant, we have seen the seven day average record breaking increases in cases. The U.S. is no exception to that trend. In fact, as of Tuesday, average daily cases in the country approached 558,000 a figure that's more than twice as high as our previous peak reported last January. It also happens to be by far the highest number of average daily cases reported out of any country in the world since the start of the pandemic. However, while I recognize the cases still have some significance, which I will elaborate on in a bit, I'm not necessarily following them as closely as I have been during previous waves. Like I mentioned during the last several weeks episodes, there are a whole lot of factors that are impacting case numbers. Coming off of two consecutive holiday weekends, we're still ironing out delays in reporting. I'm certain that the number of cases reported on Monday, more than one million was a function of just delayed reporting coming through the system. For health departments located in areas that are experiencing these significant surges, there are delays that have only been furthered by the sheer number of data that are coming in, which is overwhelming the system. Just this past Monday, the Georgia Department of Health couldn't provide its usual daily update for that exact reason. Now, add in the growing reliance on the over-the-counter rapid test, results of which are unlikely to be reported, alongside the constant headlines of long waits for PCR tests in many parts of the country. And I found it relatively easy to stand by the assessment I made last week when I said that case numbers would be terribly incomplete and unreliable. So in that regard, I've been paying the most attention to metrics that are far more stable, including hospitalizations, hospitalizations requiring oxygen, ICU admissions and deaths. Of course, as lagging indicators, these are somewhat imperfect and often lack more informed real time data, particularly on a national level when it comes to things like the proportion of patients receiving oxygen, their vaccination status, or even the primary reason for their admission. Again, I'll cover these types of issues in more detail later in the episode. On a somewhat related note, I also want to share my frustration about a recent situation that really speaks to the consequences that these gaps in data can provoke. In mid-December, we saw early evidence that some of the monoclonal antibodies, including the cocktails produced by Eli Lilly and Regeneron, weren't effective against Omicron. Less than a week later, reports came out suggesting that Omicron was responsible for more than 70% of the cases in the U.S.. Three days after that announcement, the FDA and HHS placed a pause on further distribution of both the Eli Lilly and Regeneron monoclonals, pending more data from the CDC. Although they acknowledge the regional variation on omicron prevalence and recommended that health care providers consider this information when deciding on the best treatment approach for patients, the decision was made. Well come to find out five days later, prevalence of Omicron in the U.S. at the time actually ended up being lower than what was originally thought. In other words, we had a higher number of delta cases in the country for several weeks than we initially believed. Some who would have clearly benefited from these monoclonal antibodies. Following that correction, the FDA and HHS eventually lifted the pause. Of course, hindsight is 20/20, and given the available data at the time, I'm sure they believe that they were making an appropriate decision. But again, we saw firsthand how messy evolving science can be, especially when the data itself is limited. In fact, even with the pause on the Eli Lilly and Regeneron monoclonals now lifted, there are still huge challenges that exist. On top of the general supply issues, many health care systems in this country can't identify specific variants on a case by case basis in a time frame that's fast enough to inform them of which antibody treatment might work best. So we're still being hampered by our own current inadequate systems of information retrieval, assessment, and delivery. Regardless, the latest data on hospitalization indicates that as of Tuesday, more than 113,000 Americans are currently admitted with COVID. For context, on December 21st, just two weeks ago, just over 68,000 Americans were admitted. Let me again just summarize that. Two weeks ago, there were only 68,000 Americans admitted to hospitals with COVID. Today, that number is at 113,000. So in a matter of two weeks, hospitalizations have grown by more than 45,000. We've now surpassed the peak number of hospitalizations reached during the past summer's Delta surge, which topped off at just under 103,000. We're also closing in on the record high number of hospitalizations we hit last January, which peaked at just under 133,000. In addition, we're also seeing a growing number of COVID patients being treated in the ICU. Again as of Tuesday, more than 20,000 Americans were reportedly in an ICU with COVID. However, while this total has nearly doubled from the valley in November that separated the country's two delta waves, it currently sits below the peak levels reached during the summer surge, which surpassed 26,000 and the record high surge last January, which hit almost 29,000. Now, please don't interpret this news as some sort of victory declaration. It's not. In fact, some of our country's health care systems are being crushed as we record this. And with 36 states reporting a rise in hospitalizations over the past two weeks, 17 of which have documented increases of 50% or more, we can expect the national numbers to keep trending upwards. Of course, this also means we can anticipate the daily number of COVID deaths, which is currently above 1,300 to grow. So how high will they go? I'm not sure. I don't know. I still believe that this viral blizzard will probably last three to four more weeks at most, and then case numbers come down precipitously and lagging indicators would start to drop four to five weeks from now. Hopefully, this will happen sooner than later. But again, we just don't know. If our experience with omicron plays out like it did in South Africa, we might anticipate this month or so dramatic activity followed by these declines. Remember, even with the record breaking number of cases, South Africa reported just a fraction of the hospitalizations and deaths they had experienced during previous waves. Ideally, we'll see a similar pattern in the U.S., but there are also some factors that distinguish our situation from South Africa. For example, although the U.S. has fully vaccinated 62% of its population, sitting well above South Africa's rate of 27%, Omicron is building off a much higher baseline in several parts of the country that were still recovering or even in the midst of a delta surge, including the Midwest and the Northeast. So now it's Omicron on top of Delta, which South Africa didn't have. In addition, there are still inherent differences in the population demographics, including things like age, the proportion of people living with comorbidities that could shape what omicron's path might look like. And although there are many other factors that might come into play, the reality is that this variant's emergence in the U.S. almost perfectly coincided with the holidays, which are known for bringing about lots of travel and countless social gatherings. It's also worth noting that these very same holidays have complicated the interpretation of omicron's path in other countries we could learn from including Denmark, Norway and the UK, thanks to many of those same reporting delays I mentioned earlier. I think this is another one of those wait and see moments. As I'll cover in the next section, the available data suggests that the vaccines still offer significant levels of protection against severe disease. So if you've been fully vaccinated, including receiving your additional dose prior to the past couple of days, you've really minimized your risk for a serious outcome from Omicron. Having said this, I want to be cognizant of the fact for those who have underlying comorbidities, who have certain kinds of immune suppression conditions, people being treated for cancer, etc. your threat is still very real of having serious illness, hospitalizations and potentially deaths. For you, I keep thinking about you. I just wish I had better news for you. There is one other thing that really concerns me, which I think we all should be cognizant of, are the impacts that Omicron is already having in this country on a societal level and what that means. This is where the significance of cases I mentioned earlier comes into play. For example, if you kept up with the news this past week, there's a pretty good chance you came across discussions about schools and how we might navigate in-person learning as the Omicron variant circulates. These are important discussions, and I think the vast majority of Americans, myself included, with my five grandchildren, would agree that in-person learning is much more appealing and rewarding than distance learning. Also, it is so much less disruptive on the family working situation, but at the same time, we have to consider the practicality of this request. If you look at the latest report published by the American Academy of Pediatrics, which covers data for the week ending in December 30th, this last Thursday, cases in children are at their highest level since the start of the pandemic, with more than 325,000 reported. For context, the previous peak occurred during the height of our delta surge this past summer, when weekly cases reached almost 252,000. In addition, according to the CDC data, the rate of new admissions for pediatric cases to hospitals is now almost twice as high as it's ever been. Fortunately, children have a much lower risk of hospitalization compared to other age groups, but that risk is still very real. So right off the bat, we should be asking ourselves, what are we doing to make schools the safest environment we can for kids? Regardless, I think we'll see many schools, including some of those that adamantly support in-person learning, quickly pivot in response to absences among staff and lack of available subs. In fact, according to Burbio, which tracks school closures, there are a record number of schools that have already postponed in-person learning this week. Even as recently as yesterday, there's news that public schools in Chicago have postponed reopening after the holiday break. Needless to say, the issue is far from simple, and the ripple effects are very significant. And schools are just one piece of the puzzle. What about the growing staff shortages in health care systems? How will that impact the care of patients, including those who don't even have COVID? As I mentioned in last week's episode, South Africa saw nearly 20% of their health care workers become infected with Omicron. The UK has seen a significant rise in the number of COVID related absences among their NHS staff. In fact, it's reached the point where multiple hospital systems have been declared critical incidents, prompting the deferral of certain priority services, including treatments for cancer and even heart disease. Here in the U.S., I think we can expect similar situations. I'm already hearing about more and more of them. Hospitals in Rhode Island asking health care workers who have tested positive as recently as the last day, but are otherwise feeling generally well to be able to provide care because otherwise there's no one else here to do it. Just this past Monday, a hospital in Florida had to temporarily close its labor and delivery unit simply because too many staff people were out with COVID. As a result, women who had planned to give birth at the facility were forced to seek alternative options. This is not going to be solved by sending in 500 or 600 new National Guard members who are not trained to provide the medical care. We very much appreciate their service. But that can't be a long term answer, so you can see how widespread cases of Omicron can and in many instances, create problems across many parts of our health care system. Again, this could have implications regardless of whether you're seeking acute care, picking up your prescriptions from a pharmacist or even trying to go with an emergency visit to your dentist. Then there are the first responders. Last year, it was reported that more than 30% of EMS workers, 17% of firefighters and 21% of police officers were out sick in New York City, the highest level of absences reported to date. As a result, city residents were repeatedly told to only call 9-1-1 if they were experiencing a real emergency. Meanwhile, EMS workers were asked to avoid transporting any patients with flu like symptoms. that were otherwise stable in order to prioritize others in more critical situations. Similar situations have played out recently in cities including Baltimore and Cincinnati. And finally, there are businesses themselves. I understand that no one wants to consider even hear the term lockdown again. I get that. I understand it. But we're seeing widespread outbreaks in businesses lead to temporary closures despite the fact of no formally declared restrictions. If you don't have ability to work there, how do you turn on the lights, open the door? In summary, I think we're going to experience omicron's impact these next few weeks, and I'm not sure how much of the country knows what that will mean. Even if most people avoid the worst outcomes that can occur with a natural infection, I think it's likely that many will encounter the disruptions we can expect to surface as a result of the variant's ability to transmit to so many people so quickly.

**Chris Dall:** [00:31:34] On the issue of decreased severity of illness from Omicron, can you break that down for our listeners, Mike? Is this reflective of the variant acting differently than previous variants? Or are we just seeing the impact of protection at the population level, whether through vaccination or previous infection can have when it comes to reducing severe disease outcomes like hospitalizations and deaths?

**Michael Osterholm:** [00:31:56] Well, Chris, this is one of those questions that's at the top of many people's minds, including my own. And although we've gained a better understanding of disease severity with omicron these past few weeks, it's an issue that's coded in nuance and context, and God knows we've not done well with either of those in this pandemic. So before I dove into the most recent data, let me remind listeners there are really two key questions that are being looked at as we try to characterize the risk of severe disease from Omicron. As you mentioned in your question, Chris, there's the possibility that for whatever reason or reasons, a variant like Omicron might just inherently be less capable of making a host very sick. We're also two years into this pandemic, and whether it's from the vaccines or previous infection, many populations have built up some walls of immunity. As a result, we might expect to see fewer instances where infections progress to severe disease or even death than if had Omicron first appeared two years ago. Why is it important to answer these questions? Well, first of all, it helps us better understand what this variant might mean from the standpoint of our health care systems, which aren't equipped to handle a massive wave of very sick people. So we can get a sense of what burden might follow a rise in Omicron cases across the population. In addition, solving these riddles can help inform us about the risks that exist at an individual level, which again can have significance at the population level. If we have a situation where the variant itself is inherently less virulent, we might anticipate a reduction in the frequency of severe disease across the population. So whether you're young or old, vaccinated or unvaccinated, a variant that's intrinsically less virulent than its predecessor would lead to lower rates of severe outcomes, less need for hospitalizations and in particular, ICU care. However, we would still want to know what those exact rates were and how they might vary based on things like age or vaccination status. In other words, what's the variant's risk of causing severe disease and how is that risk further shaped by the individual's characteristics? Well, with Omicron, there's a growing body of data that up to this point suggests some reduction in the risk of severe disease that appears to be a product of the variant itself. As of Wednesday, there were seven lab-based studies that all consistently showed a reduction in Omicron's ability to replicate in the lungs. Thus, there might be some biological property of omicron that limits its ability to create severe lower respiratory challenges, which has frequently characterized cases of severe disease. Now, I want to mention that each of these seven studies have their own limitations, with many actually involving animal models as a proxy for humans. That being the case, there are always some concerns about just how representative or accurate these results might be for us. But as of right now, they're at least suggesting that omicron virulence could be lower than that of the previous variants, such as Delta. In addition to those studies, we have some preliminary data from places like the U.K. showing a reduction in the risk of hospitalization even after controlling for things like previous infection and vaccination status. In other words, their results suggest that even those who are unvaccinated and not previously infected saw a slight decrease in their risk of being hospitalized. Again, these data have limitations, but it also supports the notion that Omicron might have reduced virulence. At the same time, we have clear and compelling data showing that the vaccines, particularly following a third dose, can reduce the risk of hospitalization with Omicron even more. In report out of the U.K., researchers found that from two weeks to six months after a second dose of vaccine, the effectiveness against hospitalization with Omicron was still 72%. Notably, that effectiveness dropped to 52% when the time since the second dose extended past the six month mark. However, for those who received a third dose of vaccine two or more weeks prior, effectiveness against hospitalization shot back up to 88%. On January 4th, a thread from John Byrne Murdoch from the Financial Times on the U.K. and Omicron outlined that even with an increase in cases and hospitalizations, the number of patients on ventilators was not increased. This may shift, however, as the demographics of those infected change. We would expect to see more severe cases and potentially more people on ventilators if we begin to see more cases in the older population. Ultimately, while the severity of cases may be decreasing, the sheer number of people with COVID is putting real pressure on hospitals, and it may make it seem as if there's just more severe illness more frequently. When in fact, it's just more cases with less frequent severe illness. Both are still resulting in substantial needs for hospitalization. Let me just say a word on hospitalizations in kids. In my grandfather role, I have an obligation to cover that for all of your listeners who have kids and grandkids. There have been several news headlines about more kids being hospitalized now than any other time during the pandemic. I mentioned that earlier in the national report. Kids are being admitted for COVID at a higher rate than adults, but interestingly, Omicron is still appearing to be less severe in children than in adults. A New York Times article outlined some important points to consider. First, there are more children being infected with COVID than at any point in the pandemic, so we'd expect to see a higher number of children going to the hospital as well. Next, some hospitals are noting that children are being admitted to the hospitals for unrelated reasons, but then test positive for COVID once they are admitted. We still don't understand the extent to which this is a important finding in the increased number of kids being hospitalized. So to summarize the issue around severity, it remains really a murky picture yet. Clearly, I think the data support that this virus is less virulent on a person by person basis. But having said that, with the increased number of cases, even with a smaller proportion of individuals who are infected having serious illness, it still is going to likely be a very substantial number of people requiring health care services, hospitalization, ICU care and potentially dying. And unfortunately, we are at the mercy of this virus, mother nature and time to find that out.

**Chris Dall:** [00:38:22] So let's talk about testing. We have a few issues in this country with testing, one of which is just there are not enough tests. But let's start with the question about the at home rapid antigen tests, which are in high demand right now. The FDA said last week that these tests can detect the omicron variant, but may have reduced sensitivity. And anecdotally, many people are reporting that they've gotten negative results from the rapid tests, then tested positive on PCR tests. So Mike, where are we at with testing?

**Michael Osterholm:** [00:38:52] Well, let me begin by summarizing it in one very short sentence. It's a mess, it is a mess and it's a mess, not just in the United States, it's a mess around the world. And when I talk about a mess, it's a whole number of different factors that have come together, some science based, some policy based, some business based, all of them coming together. And then it's all wrapped up in a package with a big bow with a number of experts who are making comments about testing that, frankly, I believe that is beyond their pay grade to do. Meaning I don't think that they fully understand the complex nature of what's happening with testing. Remember, testing all along had a purpose. What was that purpose? It was to find out who is infected. What else can you learn from testing? Well, we surely have talked about that, but today we're trying to ask these tests to potentially do things that they were never intended to do, nor were we ever intending to have a business model that meant that you could basically scale to the Moon overnight in terms of having testing available. So let me try to take and tease this out and give you a sense of where I think it's at. I will try to give you my most unvarnished, non-personal view of what's going on with testing and let you decide what the challenges are. Again, as I pointed out, what is the purpose? The purpose was to find out who is infected, and while there have been attempts to look at the kind of testing we have to understand, can we also talk about how infectious someone is? Those studies really have been in a second level of effort compared to just finding out who's infected. We currently have two primary test methods for understanding who's infected with SARS-CoV-2. The PCR test, which most of you know well, is basically a nucleic acid test. It's looking for viral debris and trying to pick up some of the nucleic acid from the actual virus. This is by far the most reliable of the tests, and it's one that, however, also requires much more comprehensive and expert laboratory capability to do. The other test that's most often talked about and used is the antigen test, often referred to as a lateral flow or rapid test. This is one where we're trying to look for a protein from a nucleocapsid part of the virus. Unlike PCR testing, which actually goes through a process of called amplification, which it can say that with a very, very low level of virus over the course of the analysis, that material is amplified in the test so it can be picked up initially as something a very low level. With the antigen testing, it basically picks up what's there. You don't amplify it, so if you have a very little of it, you might miss it. If you have a little bit more, you might find it. If you have a lot more, you probably have a better chance of finding it. It's really a plus minus. But again, it has been used. I think in a way that at this point, the science does not keep up with what has been some of the public policy promotion by some of my colleagues. What do I mean by that? Well, let's just take PCR testing right now and just tease that out. As we talked about before, it basically only tells you if you're infected. There are what we call cycle thresholds, the cycles it goes through to amplify the material that is being looked for in the sample and by the number of times it has to be amplified. Basically, it gives you a sense of how much was there to start with. And so we talk about CT and cycle thresholds. You know, if it's above 20 or if it has to be amplified 30 times, that means it's much less material there, etc.. And we've tried to ascribe some sense of just what that means. We've already determined, however, that with PCR testing with viral debris, meaning that full virus, but just what's left over after an infection, you may pick up a positive with PCR weeks after you've actually been infected and are likely no longer infectious. And so we've never been able to use that from a standpoint of are you infectious or not? Well, others have tried to use a lateral flow test to say well, but because it's not amplified if it's a negative, yeah, you could be positive. And others have said if it's positive, you really are positive. And I agree where such a commonly occurring situation right now, where yes, if it's positive, it's likely positive. But the question is, what does it mean if you're negative? So what's going on right now? Why are we having such controversy? First is availability. Let me make it really clear the whole world is experiencing a surge situation for testing and even countries like the United Kingdom and Israel, which had the most touted and well recognized testing programs in the world, these are countries that were heralded for the work that they were doing in terms of availability of testing to those in the community. Lots of home tests available. They, too, now are having challenges getting people tested because the surge has outstripped production capacity. So expect that here in the United States and we're seeing that. So availability is a challenge right now and over the next three to six weeks, I don't care if you're talking about PCR testing or you're talking about antigen testing, know that testing is going to be greatly reduced. On top of that, we're also seeing right now the challenge of individuals who work in these testing centers getting infected and not being able to work. How many places around the country have recently had to shut down actual testing sites because there weren't enough people to work at them? And then you get to the laboratory itself for PCR testing and you have a problem, how do you go ahead and do testing when you have so many people out sick with COVID? And so the challenge has been availability is not just a function of, yes, we make so many tests a month. It's the surge has outstripped almost any reasonable expectation of what most people thought should or could be available. Yes, we could have been better prepared for this. As you know, I've been saying for a long time, I thought some of the darkest days could still be ahead of us, and we should have been preparing more for what could be an event like this. But we didn't. We're here. So with the current situation, let's just assume PCR tests are going to be available at some level, but likely greatly reduced. And then we have to figure out who should get tested, who should be priority for those. And I'm going to comment on that more when we talk about school setting, because I think that by itself is a huge challenge of how we're using these tests. In terms of the antigen testing, I think that we have seen a situation where their utility has been unfortunately overstated by some scientists who have a point of view as opposed to a book of data. And I'm wide open, I'm agnostic, I just want the data. And for people to say that antigen tests are highly correlated with high virus levels and effectiveness, as some people have said, there is some truth to that, but we don't understand how correlated. How many times have I seen in the last two to four weeks individuals three and four days into their infections, where in fact they were negative by repeated lateral flow tests and then found to be positive on the same day by PCR testing? Clearly, the sensitivity is a challenge, and we know that challenge is real. As the FDA itself has said that, and I'll cover that in a minute. Well, maybe it's helpful, though, when you're at the height of your infection, maybe at three to five or seven days. Are you infectious? And I just want to come back to this point, this is where I think some of my academic based colleagues in particular and I'm an academic based guy, so I'm looking in the mirror here, OK? Have this idealistic view of the world where if we just had more data, everything would be OK. No, it doesn't work that way. When you're in a crisis like this, and as I referred to in previous podcast from a former secretary of defense, you know, you don't get to go to war with what you want. You've got to go to war with what you got. And we're having a problem right now trying to understand this testing from the standpoint of what its availability. And if I'm going to make recommendations that people can or can't be in quarantine or isolation don't need to be, if I'm basing that on testing and testing is not available, what good is that recommendation? And yet the crisis nature of this, of having people working in our health care systems. I talked to a physician yesterday in Rhode Island who their hospital now is in a crisis standard of care, where they are allowing and hoping that health care workers who have very mild illnesses in the last three or four days that are documented to be COVID will wear their N95 respirator and be in the bedside. Otherwise, these patients risk having no one there to take care of them. I'm going to tell you from a greater good standpoint as a public health person, forget all that academic data. What are we doing to get through? What are we doing to help people get through? And so I think that one of the challenges we have right now is everybody wants these tests to do more than they can. And you know, they're blaming the CDC. And I don't think the CDC has done a great job communicating this whole issue of how to determine who should be quarantined and isolated by what given days on these tests. I all along said, I think the testing can give you some information, but not much, I surely wouldn't use it if the test is negative on day five. Should I believe it? Well I didn't believe it in those first three or four days, why do I believe in day five? How often should I believe it? If it's positive, does it mean someone really is infectious? I don't know, I think it's truly a likelihood it's possible, but how infectious? Are you willing to take your risk on somebody using an N95 respirator to be by the bedside when otherwise wouldn't happen with someone who might be antigen positive? And so to me, I understand if you can get tested and you're antigen positive, you know, try to stay away. But if you're desperately needed, you should be. Now let me just really quickly summarize these lateral flow tests because I think this has been one of the most misunderstood issues by the public is what they mean. Remember, these are the same tests that we told people in the holiday season, if you want to protect grandpa and grandma, get tested an hour or two before you go over to their house for Christmas or whatever you're going to do. And yet at the same time, do we have any real data how often that test is negative is really negative in terms of being infected and infectious? No, we don't. This is what we do have. Let's take a look at the lateral flow test. And what I think is the most key issue is the false negative test. They surely are going to vary with symptom status and viral load, and that the sensitivity or the ability of the test to be positive if an individual is truly infected is going to be substantially lower than likely the ability to say someone's not infected. Ok, so that in fact, what we're saying is, is that if you're really not infected, you probably are not going to come up with a positive. But if you really are infected, you may still come up with a negative and not a positive. A study from the CDC actually found among people who were truly positive but asymptomatic about two thirds had a false negative result on the rapid test, meaning two thirds of the time you were told you weren't positive, but in fact you were infected. Now, I agree. I don't know how infectious you were, but you were definitely infected. This only compared to one third of those who are symptomatic, had a false negative test. So even if you are symptomatic a third of the time, the tests said nah that's not what you got. Don't worry about it. That's a challenge. Another study shows that the antigen test results only agree with PCR results about half the time. 54% for the Binax, 56% for the Quidal Sofia and 50% for the BD test. Clearly, the more virus you have, the more likely you are to be test positive. But these are not slam dunk, yes, they are going to tell you exactly if you're infected or not. So if you look at cases where the viral load was high corresponding to what I would call low CT, remember that cycle threshold value, we do know that these tests performed much better. But how often does that occur? When does it occur and how does it occur? So I just want to leave you with the fact that at this point, we have had very, very poor direction on what to do with these tests and how to use them. What's largely happened is that we've seen debates back and forth in the media between talking heads, I put myself in that category, about what a test can mean and should they be available, how to use them. Right now, the FDA, I think, has done us a major disservice in this country. Major disservice. They have looked recently at Omicron and tried to understand what is the sensitivity with Omicron. How often do you pick it up when it's really there? And all they've come forward with and said is there's decreased sensitivity. Well, you know, what does that mean? How do I, as a citizen internalize that and how do I act on it? I think that's irresponsible. We owe the public. We owe our colleagues data on how well do these tests actually detect Omicron on any one given hour, any one given day of the infection and then therefore help us understand it? If I only got a 50/50 chance of finding a true positive or infected person when I do these tests, why in the hell didn't I just flip a coin? You know, it's probably better. If somebody is symptomatic, I don't care what their test result is. Don't be there, don't work. If you can help it, don't go to a family event at all. I don't need a test to tell me that. I wouldn't trust a negative test right now if I had symptoms even. So I think that this has been a challenge and you're going to hear more of it. The media keeps hammering home. They they've now basically drawn blood. CDC supposedly has screwed up their messaging and they're not clarifying it. And they're saying, if you've got to test, use it. But if you don't, you still have to go ahead. And I think that's right. If we're in a crisis standards of care, we're going to take whoever. If we can't open our pharmacies and dispense lifesaving medications that I will take a pharmacist back on the job six or seven days after they were found infected with mild symptoms fully recovered. But they have their N95 on. I would take that. That will save lives. We're going to run out of food soon, we're seeing grocery stores shelves getting more and more depleted. We have to worry about can we make oxygen in our oxygen manufacturing facilities to make sure hospitals have oxygen? I will take somebody working in one of those plants day five, day six or day seven after they've been found to be positive, if they have mild symptoms and are wearing an N95. More lives are going to be saved and I don't hear that discussion. I don't hear any of that. I just hear this academic back and forth well, on day six this is how infectious you are. On day five, this is how infectious you are, and I'm telling you in each one of theseou can also argue about how many angels can dance on the head of a pin, but it doesn't mean it makes things better. So to me, this is where we're at right now and and I think the one message I have to CDC, I think you got it right on the testing. I think communication of why that decision was made was poor and you absolutely have a dead, dead, dead wrong on masking. Again, to my dear colleagues and friends at the CDC you know, I don't understand it, but the fact that you can still have all this misinformation about masking, how well they work, what's on your website as currently as this past week, recommendations don't use N95s because health care workers need it, something that has been outdated now for 18 months. That's a challenge. So if someone is in fact, day five, day six, day seven, been well have had a COVID infection critically needed at work to save lives wear your N95 fitted as tightly as you can and save lives do that. That's what we ought to do and get these academic types off of TV, myself included and doing this kind of back and forth about how effective these tests are at picking up the virus. We're not going to know. We aren't going to know. And at this point, I think we're doing a disservice by this kind of discussion back and forth, and I hope the media takes note of that because right now the media itself is contributing to this confusion.

**Chris Dall:** [00:55:42] All right, so one additional question on testing, then, Mike. Many school districts around the country are relying on both rapid antigen tests and PCR tests to keep schools open during the Omicron wave. Is that a sound policy?

**Michael Osterholm:** [00:55:56] Well, Chris, let me just be really clear. Many schools are now using this one time testing strategy as their approach to remain open during the Omicron surge, meaning they'll require their students and staff to test negative for COVID before returning from their holiday breaks or vacation. Let me just be really clear. This one time testing approach is a seriously flawed strategy for several reasons. There are four main issues that need to be considered when understanding the ineffectiveness of this one time testing policy. To understand this from a practical life standpoint, let me just start out by saying, imagine you buy a brand new house beautiful house. But the smoke alarms only work for the first day you live there and then they're done after that. I mean, what does that do to protect you? Surely on the first day gave you some sense of early detection and protection, but after that is done. Testing, unless done repeatedly, repeatedly, repeatedly, repeatedly, is not going to give you any benefit. First of all, it's just the performance of the test, the first part. This can only be as good as the test itself, and I just covered the lateral flow issues with you about how you pick up infections or not, particularly if you're asymptomatic. If you're sick, you shouldn't be coming to school. But if you're asymptomatic, the likelihood of picking up something on a lateral flow test is remarkably low. Very low. Issue number two. Let's just talk about the availability of testing. Testing demand has increased rapidly in the last few months, with the current seven day moving average of 1.7 million tests per day in the U.S., the highest since January of 2021. And that's even without taking into account all the rapid at-home tests that are not even being reported. The current demand for testing far exceeds the testing resources that are available. Again, if you want to be certain that you have a higher likelihood of detecting an infection, you're going to use PCR versus lateral flow, particularly in an asymptomatic population. The Center for COVID Control, a group that provides COVID tests at many locations across the U.S., reported that their average number of PCR tests administered per day rose from 8,000 to over 85,000 in just the past week. They are now seeing major delays in test results being reported back because of the surge. There's a similar shortage of rapid antigen tests across the country. Indiana's state health department has now limited eligibility for rapid antigen testing at their state testing sites to those under 18, regardless of symptoms and over the age of 50 and symptomatic just due to the decreased demand and reduced supply of tests. Normally, Indiana uses about 50,000 rapid antigen tests per week. This past week, they were only guaranteed 11,000. So the shortage in testing right there means that the idea of repeated testing in schools, it's just not practical. It's just not going to happen. Then with this major surge we're seeing, the results are not available quickly. Issue three, so what happens if it takes five or six days to get a result back? That's the smoke alarm that doesn't go off until 24 hours after the house is burnt down. What good is that? Yet that's at the very foundational issue of school testing. Keep these people out. Has anybody asked them a common sense question? You're educators, think about it. If you get the result back for five or six days, what good is it going to do? And then just this issue of the incubation of COVID and what it means from the time you get tested, if I have a negative test today doesn't mean that tonight I don't get infected and that in two days now I'm going to be transmitting the virus just as I get my test result back saying I'm negative. As I've shared in this audience before, some of them will be listeners who will recognize themselves here, I have had six colleagues or friends who have all had college students come home with winter break who were tested on their college campuses by PCR, all of them negative, but they were tested three to five days before they came home. They got home, became ill within a day of arriving home, were infected with COVID, and transmitted it to their family members. That screening tests at school did nothing to really help them. So let's be realistic. So for all those who are hanging their reopening of school on a single one test before you get back in school, it is a tremendous waste of resources, a tremendous waste. You're not going to accomplish what you think you are. You'll pick up some people, but you're not going to pick up the next day or the next day or the next day or the next day or the next day. And any one of those next days could be the match that starts the human coronavirus forest fire that wipes through your school. And let me be really clear, we are definitely seeing substantial transmission in schools. Absolutely. No doubt about it. I've been involved with some of these situations, and I can tell you transmission is rampant in schools right now. So what's my bottom line message? I want my grandkids in school. I know the benefit that they are able to have from being in school, but we got to live in the reality of the COVID world. The next three to four weeks, what should determine whether the kids go to school? One, do we have teachers, staff, support staff, bus drivers? I know of many school districts right now where there are hundreds of school teachers out and they're really sick. They really are infected. This whole thing, it goes back to the CDC position and you know who should be able to work when? Number two, is even if you have all the staff, what can you do if you start to see major transmission in your school? Most of the schools today do not have adequate ventilation. Masking is a major challenge. And what we're trying to do is get through, as I've said before, I think the case numbers are going to come down precipitously in the next three to four weeks. These are going to be bumpy three to four weeks. Expect that. This is not the whole next semester. This is not the rest of the year. But when I see a politician saying schools are the safest place for kids, we're not going to close it, might as well just say a hurricane is coming, it's a category five, but school is the safest place for our kids to be in right now. Ok? That's crazy. That's crazy. That's not a scientifically sound position to take. You can't guarantee safety right now with Omicron. But at the same time, we want our kids in school and it's going to be a function of each school basically deciding on the number of cases that are occurring. Do they have staff? And what does it mean for the next three to four weeks? So I know this is not a satisfactory answer for many, but it's the reality.

**Chris Dall:** [01:02:35] Now to our COVID query, this one comes from Karen, who asks "Since animals are also getting COVID, will humans and animals create a continuous ping pong of new variants and a constant threat of new and worse variants?" And Mike, this is a very pertinent question, given some recent findings of coronavirus in Ohio's deer population. So how worried should we be about this?

**Michael Osterholm:** [01:02:58] Well, as I started this podcast with a quote from Sir Winston Churchill, "Now this is not the end, it's not even the beginning of the end, but it's perhaps the end of the beginning." And what that really means relative to this very important question is well didn't really worry about animals before, did we? We really didn't. It was a virus that basically once it jumped from an animal species to a human, we just assumed it would maintain itself in humans and that humans would be the important new reservoir for variants. Immunocompromised individuals may be more of a risk of having variant development when they remain chronically infected with with one of the SARS-CoV2 viruses. Well, the white tailed deer data that you cited, which has been very impressive and data that I've talked about before on this podcast, along with data from a number of other animal species showing they can get infected, raises a whole new specter. Is this going to be a ping pong motion kind of situation where we get infected, we infect animals, animals get infected, remain infected, new variants develop and then it jumps back to humans and we don't know. So I think that what where we're at right now is the end of the beginning. We're now going to be living with COVID in a way that as this particular wave goes through, more people are going to develop immunity of some kind for how long, we don't know, and we're going to be at the mercy of new variants. And I just come back and reinforce my belief that 10 months ago that with the new variants of alpha, beta and gamma that we still had a long ways to go with this pandemic ahead of us. Even when everybody else thought it was done and over. Well, I think we're still there. I don't know if another variant is going to develop that will jump into humans that now may evade immune protection from what we currently have for vaccines or even naturally acquired immunity from an infection with Delta or Omicron. Could there be some other mechanism by which one of these viruses could in fact develop mutations that would compromise that immune protection? That's going to be something we won't have to live with for some time. This is why I have urged the research community to prioritize the study of pan-coronavirus vaccines. The idea that like we're talking about universal influenza vaccines, ones that may actually be able to hit parts of the virus that are not likely to mutate as much. And so whichever virus spins out of a human or an animal population and potentially could do what Omicron has done, we'll be able to slow that down. It's also why we have to not focus so much as we have on the prevention of infection only. I think the vaccine approach has been very important. I never for a moment want to diminish it, but we need a concurrent treatment model too, where we can actually treat people quickly and early in their infection in a way that if they do have a breakthrough, they are at risk, we do see immune evasion, we can also treat people so that they don't go on to develop severe illness, much like an antibiotic might be used for a bacterial infection. And so I think it's going to be the combination of those two. So, Karen, your question is a really good one. It's very important and it's one that we're not going to be able to answer right now. We'll have to see what happens with variants over time, but we now have an absolute need to monitor these viruses in animal populations as we learn about them and that we try to understand, is there a harbinger of things to come moment where we can say, Wow, look, what's happening in this animal population with this SARS-CoV-2 virus? It may come back to bite us because it now has properties that in fact support a new mechanism of immune evasion or it's more infectious, and that's going to be really important.

**Chris Dall:** [01:06:59] So, Mike, we've covered a lot of territory today, but what are your take home messages and closing thoughts?

**Michael Osterholm:** [01:07:06] Well, Chris, this was a lot to digest today, and for all the audience, I'm sorry that it was so dense and at the same time, yet with so many speculative answers or surely answers that lack the clarity that I know that we all would like to have. But this is reality. This is this is the real world we're living in right now. I have to start out by just saying that we are living in a viral blizzard. I can't say it any more clearly than that. That's what I said four to five weeks ago, and I think it's exactly where we're at. We know we shut down in blizzards. We know that all services are compromised when we have a blizzard. And what we're trying to do is get through this one. So just think of this in the next three to four weeks. We're not asking people to deal with this kind of situation for the next four months, five months, six months. I don't think that's going to be the case. Covid will be here. We'll still have a COVID pandemic of some kind, but it won't be Omicron-like as it is now. So that's number one. We're in a viral blizzard. Let's get through it. The second thing is we have to understand what's going to happen over the next 14 to 21 days where we have a substantial loss of critical workers in the workforce, whether they be health care, whether they be other forms of infrastructure. I mean, I can go through the laundry list with food supplies, the drug supplies, safe water, electricity, all the things that are going to be so critical. How do we keep them in place when we have so many people out sick? Remember, we have a Just-In-Time economy and we know workforce issues have been a challenge already just with the pandemic. But now they're accentuated. So we are going to have to address this and it won't be business as usual. We're going to have to accept potentially real compromises in care just as a number of hospitals around this country and for that matter, around the world have had to live by crisis standards of care throughout the entire COVID pandemic. This is going to be a new ad-on this wrinkle of of what happens with so many people out sick. And I think the third thing for me and I've alluded to this, but you know the media's challenged right now, there are so many people out there talking about this as experts. You know, I know for myself, you know, I think all the time when I'm doing media or public speaking that, you know, what does this really mean to the public? What are the data I have to support it? And why would I say it if I don't have the data to support it? We have a challenge here trying to get through these next two to three weeks, and the issue with the media is going to become more important than ever, trying to frame the issues as they are not making a more political or less political, understanding that the world is in the soup at the same time. You know, we think we got problems here in this country. Look at many other parts of the world are in the same area. So we got to hang together. As Ben Franklin once said, you know, we must all hang together, or we shall hang separately. And I just wish we could hang together on this one. As far as my closing today, I thought long and hard about where I'm at, and you know, I do by nature want to be cheery and positive and, you know, as a cheerleader for all of us. But so what I've decided to do is kind of compromise a little bit, just kind of a pep talk as opposed to just rah rah rah rah. I had a number of people suggest the lyrics to a specific song that I think is really very timely and very helpful. The first one to do so is Michelle, and thank you, Michelle. Today, I'm going to share with you a song from the Dave Matthews Band. This was one of the singles on his studio album "Come Tomorrow," which was released in 2018, and it was one that was highly successful. It received very, very high scores ratings, and it ultimately ended up number one on the U.S. Top Rock albums, the US Billboard 200, a number of accolades for it. This is a song that was written by Dave Matthews and his colleague Mark Batson. The title of it is "When I'm Weary," "When I'm weary, when I'm tired. You remind me to keep on trying. There'll be dark, dark days, more coming. Just as sure as this sweet earth beneath my feet. It don't matter. Come tomorrow. Together, we must face what lies ahead. When we're weary, when we're tired. Please remember to keep on going." What a wonderful way to say what we must do. So thank you to the Dave Matthews Band. And thank you to all of you for spending another day with us. I know these podcasts are long. They're tough and I wish I could do more for you to help you find a peaceful place in your life with this COVID pandemic. I just want to thank you all of you from the holiday perspective for all the kindness, all the wonderful things you shared with us. We received a tremendous amount of mail, emails, even gifts and the entire podcast staff thanks you very much for that. So please just get through the next couple of weeks. Now is the time to hunker down if ever. If you're someone who's immune compromised, if you haven't had your full vaccination, including the third dose, be careful. Be careful out there. This thing is highly, highly infectious, and we want you to be around to celebrate the last day of this podcast whenever that should happen, when we don't no longer need it. So in the meantime, thank you so much. Thank you. Keep remembering all the numbers are people. They're our loved ones. Be safe. Thank you.

**Chris Dall:** [01:13:12] 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 Maya Peters, Cory Anderson, Angela Ulrich, Meredith Arpey, and Sydney Redepenning.