Episode 114: A Three Act Play

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. On an episode of 60 Minutes that aired on September 18th, President Joe Biden told interviewer Scott Pelley that for the US, the COVID-19 pandemic is over. We still have a problem with COVID. We're still doing a lot of work on it, but the pandemic is over, Biden said. The immediate pushback on that comment and the attempts by the Biden administration to clarify the President's message speaks to the contradictory nature of the current moment. The President, according to members of his administration, was simply reflecting what many Americans are feeling as they learn to live with the virus. And if you spend any time in public, President Biden's comment doesn't seem off the mark. Most people are behaving as if the pandemic is over. But for many, the 400 plus COVID deaths occurring every day are an undeniable reminder that the pandemic is not anywhere near over. And even though BA.5 remains the dominant variant, the variant picture remains unsettled and we still don't know what the next curveball will be. These are some of the issues we'll discuss on this September 29 episode of the podcast as we assess the state of the pandemic here in the US and around the world. We'll also talk about uptake of the COVID-19 Bivalent booster, answer two COVID queries, provide the latest news on monkeypox, polio and Ebola, and share a beautiful place submission from one of our listeners. But before we get started, as always, we'll begin with Dr. Osterholm's opening comments and dedication.

Michael Osterholm: [00:02:07] Thank you, Chris. And welcome back all of you who are part of the podcast family who listen to these podcasts on a regular basis. And let me welcome those who are coming here for the first time to get a perspective on what we here at CIDRAP see is happening with the COVID pandemic, amongst other public health issues. Let me just start this podcast by making one thing very clear. All of you right now are somewhere caught between it's over, it's not, what do I do? how do I do

it? Welcome to the crowd. Even among those that think that the pandemic is over are unfortunately often reminded that it's not when loved ones, colleagues, friends, neighbors become infected with the virus, as we're still seeing substantial transmission of the virus. Today, we'll try to add some perspective to that. What should you feel? What should you do? What should you be thinking about today? And remind you that this is really like a three act play. We've had an incredible history with this virus that has been painful. It's been very sad. And for some of us, it's been devastating. And now we have the second act over somewhere in this new intermediate period we're trying to figure out, is the pandemic done or is it not? And then there is a third act. Trust me, there will be a third act. And today we'll talk about that. What will it look like? Will it be, in fact, a soft landing of the plane onto a long runway, or will it be again turbulent skies with some real challenges ahead? So in this issue of the podcast, we're going to try to address that in the way that we're hearing from you, you want to know more about. Before I go any further, though, I want to emphasize today that the dedication that we have for this podcast is really one that is for all of us. It's for everybody who's listening to this podcast. Over the course of this pandemic, there have been lifelines, there have been roadblocks. There have been some cases edge of cliffs. There have been some beautiful, beautiful horizons, all of them mixed together to form the pandemic experience. And one of the most critical aspects of all of this has been our friends. When you think about friends, there are those old friends. Now as I get older, I don't mean chronologically aged friends, but people who have been in my life for many decades. And these people are cherished, they're dear, and there are new friends. Friends we all make along the way. Something at work, something in our neighborhood, something in our social lives where we call them new friends. And then there's a third category that I've come to appreciate more than I can put into words. And that's our pandemic friends, people I would never have met, people I would never have known, people I would never have benefited from their support, their understanding, and in some cases, even their love but for the pandemic. And today I'm dedicating this podcast to those pandemic friends. One of my old friends who I consider among one of the most priceless people in my life, once wrote to me words of Saint Thomas Aquinas. Aquinas said, "There is nothing on the earth more to be prized than true friendship." And I so heartily agree with that. And in particular, I think the pandemic friendships, friendships forged out of this very, very difficult period of time are among some of the dearest friends that I have today. And one in particular I want to give a shout out today to someone who I had no way of knowing before the pandemic. We surely did not have

common paths that would normally cross. And someone who has come to mean so much to me in my life as well as her family. That's Sarah Marie. Sarah, I just hope you understand the beauty of your friendship, our friendship that with our families and what that means. And I know for many of you listening today, you've had your Sarah Maries. So today I dedicate this to all my pandemic friends, and in particular to you, Sarah Marie. We're thinking of you so much these days. Now, let me move on to my new challenge in these podcasts, and that is to give you a glass half full approach at the very beginning. And as I shared with you in the last podcast, I'm now following the sunlight in Auckland, New Zealand, one of my most favorite places in the whole world. And today, September 30th in Auckland, September 29th here in the United States yet, sunrise will be at 6:59 a.m., sunset at 7:23 p.m. for 12 hours, 24 minutes and 24 seconds of sunlight. That's an increase of almost 2 minutes and 20 seconds a day right now. And for those of you who have very appropriately pointed out, it's not just sunrise and sunset, let me just add today, civil twilight, that light when there's enough of it such that you can still maintain outdoor activities without artificial light. Civil twilight today is from 6:23 to 7:49. We so appreciate your ever increasing light picture in New Zealand. We're living on that. We know that you're sharing some of that light with us and we so, so, so appreciate what you're about to experience and we will eventually one day. I also have to give a shout out in Auckland to the Occidental Belgian Beer Huis that on Vulcan Lane, one of my favorite places in the world. So I hope you're all doing well down there today and that you are able to appreciate that increasing sunlight.

Chris Dall: [00:07:46] So Mike, let's start with the international situation. While cases and deaths continue to fall globally, there are early signs of rising COVID activity in Europe. What are you seeing internationally?

Michael Osterholm: [00:07:58] Let me start out by following up a point that I just made in the dedication. We are in a three act play. I feel like we're now in the second act. We are far from done with this play and everyone wants to be through the third act and they want it to be, we all live happily ever after. Now, someday we are going to have better control over this virus. Or at least it won't extract the toll that it has over the past several years. But in this second act, we don't really have a good understanding yet of what is ahead for us. We just don't know. And as hard as that is for people to hear, it's the truth. And we have to tell people what is the truth in a public health perspective. And you'll see later in the podcast I get taken to the woodshed pretty hard. Some of these people who

are really upset because they want the third act to be here and done, and they want me to tell them what that's going to be about. I can't. This is part of what I have to acknowledge is my inability, is my lack of clarity, is my mud-crusted crystal ball. With great humility I tell you, I can't. But this is what I can tell you. Let's just take a look at the international picture, for example. Where are we at right now in act two? You know, in some ways, Chris, it seems as if the more things change, the more they stay the same. Now, obviously, we're in a different stage of this pandemic right now compared to the previous act or previous points. So I certainly don't want to imply that everything's exactly the same. Again, in no way do I want to minimize what COVID is doing more than two and a half years into this pandemic. But the current daily death toll, which stands at just over 1,500, is a fraction of what it has been in the past. In fact, from July 2020 to March 2022, average daily deaths never once dipped below 5,000. That's the span of 618 consecutive days. And oftentimes deaths were well above 5,000. For example, there was almost 200 days where the average number of daily deaths exceeded even 10,000. For context, the total number of deaths reported this week, not day this week, was 9,000. Nevertheless, COVID is still extracting a heavy toll. Now, that being said, we've seen things cool off internationally these past couple of months. As of this Tuesday, average daily cases stood at 445,000, and deaths were at just above 1,500. Let me remind you that I put very little faith in the number of daily cases reported since we know that there is such major underreporting occurring. Deaths are more likely to be reported. And if you look exactly one month ago today, cases were at 725,000 as opposed to 445,000 and deaths were at 2,300. So there's at least some progress. However, at the same time, there are some early and in some ways all too familiar indications that this virus is still lurking. Is this act three about unfold? In fact, right now in Europe, which has documented steady declines throughout the past two and a half months, is once again seen activity bubble up. According to a recent report published by the European CDC, at least 13 countries have documented rising infections and nine have seen their weekly hospitalizations increase. What does this mean going forward? Well, if you look right now what's happening in France, they've gone from less than 18,000 cases a day two weeks ago to almost 35,000 cases a day now, almost a doubling. Austria has seen cases climb from 4,000 a day to 7,500 during that same span of time. In addition, hospitalizations are also up more than 10%, going from 900 to more than 1,000. In Denmark, cases and hospitalizations have erupted upward in recent weeks, and in England, hospitalizations have climbed from 4,500 to more than 5,100. Now, to be clear, the levels in these countries are still quite low relative to

previous points in the pandemic. However, the fact that this is happening across multiple countries in Europe at the same time is somewhat troubling, since it suggests that this isn't just some one off anomaly. And on top of that, there really doesn't seem to be a simple explanation as to why this is happening. Right now, the one thing I know that's more than capable of driving up activity is the virus itself in the form of new variants or sub-variants. We've seen versions of Omicron seem to be popping up on a daily basis, including some that might actually have some slight advantage over BA.5. The sequencing data out of Europe doesn't indicate that this latest rise is being driven by a new variant or sub-variant. So how do we explain this cause? Well, some believe it's largely due to fall's arrival and the cooler weather bringing people indoors. Others cite the absence of mitigation measures like mask mandates. And while I completely understand the desire to have a simple cause and effect explanation for things, I think it continues to ignore, or at least very best, oversimplify reality. Regardless, when you start considering all the different variables that could be playing a role like past and present variants and some variants, the timing and severity of surges, population level differences, testing programs, vaccinations, waning immunity, etc. It makes it very hard to draw firm conclusions. However, that being said, understanding why these countries in Europe are seeing increases could certainly have implications for us here in the US, since we've seen several instances throughout this pandemic where Europe has provided us with an early look at what might be coming in the weeks and months ahead. Ultimately, time will tell. One additional footnote to this international perspective, I have just returned in the last day from Belfast, Northern Ireland, where there we had the respiratory virus meetings that are held every other year. And I was struck by the fact with all these world experts there on respiratory transmitted viruses, rarely did I see anyone with any kind of respiratory protection on board. And to them, most of them, the pandemic was over also. Now, we'll talk more about this in a moment of what might be happening here. But we have to recognize right now that the virus isn't done with us as much as we're done with it. I can only hope that it's a soft landing story. But as you'll see in a moment when we talk about the issues of the sub-variants and variants and waning immunity, that guarantee just is not possible.

Chris Dall: [00:14:41] Here in the US, as we've been discussing for the last few episodes, nearly all COVID-19 markers except for deaths continue to show downward trends. Even child COVID-19 cases have been declining despite being a few weeks into the school year. Of course, that could just reflect reduced testing and unreported cases,

which we've been seeing for several months now. But either way, Mike, how would you assess where we are right now in the US, especially in light of the President's comments?

Michael Osterholm: [00:15:08] It's fair to say that uncertainty is the word of the day. There continues to be a lot of it about the situation here in the US and what will happen with this virus going forward. What I can tell you with certainty, Chris, is that this virus isn't going away. I wish I could tell you that. But I do agree with President Biden's statement last week that the pandemic is over for many, many people. And that, I think, is the sense that he was sharing. Now, unfortunately, I don't think that matches up with the reality of what could be coming. Let me just take you back to a moment in my career that surely caused me to rethink or at least consider could I possibly have misstated or misunderstood the situation. In January of 2021, when I saw the emergence of the new variants, particularly the alpha variant, recognizing that this virus, SARS-CoV-2, was very different than the flu virus in the sense of what variants could do in terms of increasing transmission, being able to evade immune protection, and even cause potentially more serious illness. And when I recognized that, I said, wow, when you look at how many people worldwide still were susceptible to this virus, the likelihood that the darkest days of the pandemic were still ahead of us. Well, you know, at that point, as many of you know, on this podcast, I got hammered pretty damn hard by many people from the likes of you know, Nate Silver to colleagues to medical journals, etc., for scaring the hell out of people. I look back on that moment in retrospect and realize that the concerns that I saw about the virus were in fact unfolding as we saw Delta and Omicron emerge. Well, now I'm not at that very same place, but I surely am somewhere with a great deal of uncertainty. Let me just be clear. What we're seeing right now in the US is not like any other time during the pandemic, and it's tough to say where we're at. Over the last couple of months, I've been describing our situation as a high plane plateau, and during our last episode we discussed that we're finally seeing numbers decline from that plateau. We've continued to see this decline and we're finally seeing hospitalization numbers that we were seeing earlier in June. Over the past week, hospitalizations have declined 6%, now around 30,000 hospitalizations a day. We've seen the number of deaths actually continue to hover somewhere between 420 and 440 deaths a day. That number has not moved much. Of note, this number is double the number of deaths we would expect to see during a bad flu season. And we're now seeing this rate day after day after day after day. So where are we at now? Well, one,

we're going to discuss in a moment the implications of the changing variants. This is not necessarily a deja vu all over moment again like I just described in January of 2021. But it surely gives us pause to understand what these variants may be doing. The next thing we have to consider is waning immunity. We're continuing to see waning immunity become a greater factor in the number of people infected. The question will be between the variants and waning immunity. What does that mean for serious illness, hospitalizations, and deaths? Maybe we'd all agree that we can accept widespread infections in our communities with COVID if in fact they didn't result in serious life-threatening infections. Maybe that's the trade off. But then we have to look at the issue also of vaccine uptake, and we're going to talk about that in just a moment where I think we are also not only over the pandemic from the standpoint of recognizing what the virus can do, but we're pretty well done with vaccine programs, too. And in particularly when we're talking about booster doses. We surely see people back at work, crowded conditions, etc.. And I find it interesting, you know, the past week I've given several talks in public settings where I wore my N95 and I was the only one in the room that had an N95 respirator on. And in one case it was somewhat uncomfortable because I actually had a participant ask, Should we all be having N95 respirators on? And I could only say, well, I've got mine on because I don't want to get COVID. Do I think based on the number of doses of vaccine I had, I'm going to become seriously ill and die? No, I don't think so. But I still am very concerned about long-COVID, and we've not clarified yet just what that means in terms of infections and long-COVID. So to me, I still want to protect myself. I'd rather not get infected than do. And finally, let me just say that closing our eyes and pretending that we're not going to have some change in the pandemic that could be challenging I think would be a big mistake. I do not want to be the person out here crying wolf. But I also want to add a sense of reality. And again, given variants, sub-variants, given waning immunity, given the fact that vaccination levels are only continuing to drop, not increase, I worry that in fact we could be challenged again in the days ahead and we will be so ill prepared, not just because we're not doing things to get prepared, but we don't even want to recognize that this is a problem. So where are we at right now? As I address several of the questions in this podcast, I think you'll see we're in that second act. And I have to tell you, I'm not sure what the third act is going to look like.

Chris Dall: [00:20:47] So, Mike, you mentioned the variants earlier and let's talk a little bit more about that. There have been a few preprints released and a lot of social media

chatter on some of the new variants popping up. You mentioned one of them, BA.2.75.2 on our last episode. Does that variant or any of the other variants out there appear ready to challenge BA.5?

Michael Osterholm: [00:21:09] Well, Chris, that is the trillion dollar question. In fact, I'd say that it's a question that is absolutely critical to understanding our road ahead. And it clearly gets into what I consider this next act of the virus and what it might look like. Let me just start by saying that at this point, I think it's very, very safe to assume that most people listening to this podcast recognize the role and impact that variants and sub-variants can and do have. If you've been listening to me, you understand how my rule book of COVID is all about the rules related to variants. Again, in my mind they represent the major wild card in all of this, since we basically know very little about what we could and should expect moving forward. So needless to say, variants are important because they have the potential to change the game. That being said, if you've kept up with the latest variant news and updates, you may feel like you're being served a daily bowl of alphabet soup that only seems to get bigger and bigger. One reason for that is the sheer abundance of Omicron sub-variants and offshoots that are emerging. In fact, as of last Thursday, the W.H.O. said it is monitoring around 200 Omicron sub-variants. Of course, some of these are less relevant than others. In reality, the vast majority might not have any impact whatsoever on activity. But at the end of the day, all it really takes is one to have a major global impact. So right now we've got what maybe is the world's biggest horse race with 200 competitors. And while the race still isn't over, there's a select group that have gained some ground and separated themselves from the others. One member of that group is BA.2.75.2. In several countries, including here in the US, there's some data that suggests it's currently gaining ground on BA.5. That being said, it's still got a ways to go since it only represents around 1% of the cases at this time. Regardless, it's earned some ongoing attention due to some recent preprints that have shown its ability to sidestep immune protection, at least in lab experiments. And this is for both natural infection immunity as well as vaccination. So that's one to keep an eye on. Otherwise, another potential frontrunner is BQ.1.1. This sub-variant is actually a descendant of BA.5 and neutralization studies in the lab have also shown it to be highly immune evasive. Nevertheless, while it's been detected in various countries, we're lacking a lot of real world data that's needed to know what it is capable of doing. Let me remind you, when we talk about something being immune evasive what it means is that the antibody or the immune response that we develop from vaccinations or from

infection may not actually provide the kind of protection to keep you from getting infected. The challenge we have, does it still, however, protect you against serious illness? And that's something that we're still trying to understand. In terms of the additional variants, there's BF.7. Again, this is another descendant of BA.5, and at least right now in some areas it seems to be capable of outcompeting the competition. Right now Europe seems to be seeing the most cases to BF.7, which makes it around 20% of the cases in Belgium and 8% of the cases in the Netherlands. Otherwise, it accounts for just over 2% of cases in the US. Alongside BF.7 is BA.4.6, which represents 12% of the cases in the US. At this point we've seen it continue to grow in numbers, but it's been relatively slow going overall. And finally, I just want to mention BA.2.3.20. Again, there's some preliminary data showing it gained some ground in certain locations. I know that probably felt like a lot. Your head's swimming. You're wondering what the heck I'm talking about. And that's okay if it went in one ear and right out the other because the race isn't over. Our job is to keep track of these, to try to understand what they mean. And at this point, I'll just tell you, there's a lot going on out there, but it's too early to call the next leg of the race. Regardless, the one thing that's definitely worth noting about this latest batch of Omicron sub-variants is that each of them have independently acquired matching mutations in several different positions. In other words, although they've taken up distinct evolutionary paths, we're seeing a number of these variants pick up some of the same select mutations. And so with this concept, which is known as convergent evolution, we have fairly real time evidence of this virus adapting to selective pressures placed on it and in relatively short order when you think about how long it's been circulating in humans. In this case, the mutations that keep popping up are largely associated with changes to immune evasion, which comes as no surprise since the heightened ability to escape protection offered by vaccines or previous infections would clearly be a major advantage to the virus at this point. And if that ability happens to be coupled with other traits that allow the virus to outpace the competition, we can absolutely see future waves. So here it is now, I'm feeling January 2021 déja vu all over again. What does that mean? Am I out there crying wolf? Am I completely out of touch with what's really happening? Well, it's not just me saying this. In fact, on Tuesday, a story published in Science magazine spoke to this exact reality. The story, which was written by Gretchen Vogel, who is a very well respected, widely recognized scientific writer, is titled "Big COVID-19 waves may be coming, new Omicron strains suggest." Quite a title. It starts out with the following, and I quote "Nearly three years into the pandemic, SARS-CoV-2 faces a formidable challenge finding new ways around

the immunity humans have built up through vaccines and countless infections. Worrisome new data show it up to the challenge. Several new and highly immune evasive strains of the virus have caught scientists' attention in recent weeks. One or more may well cause big new COVID-19 waves this fall and winter. We can say with certainty that something is coming. Probably multiple things are coming, said Cornelius Romer, who studies viral evolution at the University of Basel. Whether they will also lead to many hospitalizations and deaths is a big question." Later in reference to the recent preprints the article goes on to say this, "Researchers in China and Sweden have found that the spike protein from BA.2.75.2 can effectively evade nearly all and I want to emphasize the word all the monoclonal antibodies used for treating COVID-19, suggesting that these treatments may become useless. Both groups also found that BA.2.75.2 seems very good at evading immunity in humans. In a preprint posted on September 19th, immunologist Ben Murrell at the Karolinska Institutet and his colleagues reported that serum samples from 18 blood donors in Stockholm, where vaccination rates are high and prior infections widespread, were less than one sixth as effective at neutralizing BA.2.75.2 compared with BA.5. This is the most resistant variant we've ever evaluated, says Karolinska virologist Daniel Seward. The new variants do not seem to have lost any ability to bind tightly to the receptor on human cells that the virus uses to infect them, which means the variants infectiousness has likely not decreased. And they, the researchers from China, report some evidence that infections with the variants trigger proportionately more of the wrong types of antibodies which bind tightly to the virus but don't blunt its ability to infect cells. Finally, when asked about the results, here's what the preprint authors shared. First, from the researchers out of China, they said this scale of immune evasion has never been seen before, and the virus is still rapidly evolving. It's very bad. Now immediately after that, in the article Seward and Murrell, the authors of the preprint out of Sweden, agree we should expect lots of infections in the next few months, as happened last winter when Omicron entered the scene. But they are less pessimistic than Cao, the Chinese researcher, noting that many more people have recovered from an infection now or have received additional vaccine doses, including Omicron specific boosters whose rollout begun this month. Those will boost overall antibody levels and will likely broaden the antibody repertoire, Seward says. I don't think we're quite back to square one. He goes on to say, The choice to put BA.5 in the vaccine booster is still looking like a good one. The boosters are always going to be a step behind. But the good news is that the BA.5 booster is going to be one or two steps behind the virus evolution instead of five steps behind. Just

how brutal a comeback the coronavirus has managed will become clear once more people become infected with the new strains. The next wave may also provide better clues about what factors trigger or prevent severe disease, Murrell said. I think we're going to learn a lot this winter. So there you have it. The arms race that's happening between the virus and our immune system hasn't slowed down. And although we have yet to fully understand what our future will look like, this is not the time to assume we're in the clear. And yet many have. And let me just emphasize, while we are witnessing some of the better days of the pandemic in terms of overall case numbers and deaths, they've not gone away. And we don't know what's going to happen with these new variants. I know this is not satisfactory information for so many of us who want some definitive answers. But again, we have to stay tuned. We don't know what the third act is going to bring us.

Chris Dall: [00:31:24] So let's talk about vaccines and more importantly, vaccinations. The updated Bivalent booster shots from Moderna and Pfizer were authorized by the FDA and recommended by the CDC at the beginning of September. Do we have any numbers on uptake yet? And do you have any concerns that President Biden's comment about the pandemic being over could dissuade people from getting that booster?

Michael Osterholm: [00:31:46] Well, Chris, the booster rollout is underway, but as of last Friday, when the most recent CDC vaccine data was released, only 4.4 million Americans had received their updated booster shot. This is less than 2% of those who are eligible. Let me repeat, this is less than 2% of those who are eligible. Since the bivalent boosters became available, the average number of daily vaccine doses administered has increased significantly in the US. On September 14th, an average of 392,000 doses were being administered. Let me repeat that 392,000 doses were being administered. This is compared to 77,000 doses on September 5th, the day before the bivalent booster became widely available. But to put these numbers into perspective, this doesn't even begin to compare to the number of doses administered back in November of 2021, when many individuals were getting their first booster doses, which peaked at over 1.8 million in early December. This was also when Omicron started to pick up. So it's likely that people were more eager to get their booster doses when it was clear to the public that the pandemic was not over. This is also significantly less than the overall peak average number of daily vaccine doses administered back in April

2021 at nearly 3.5 million. Remind you again 3.5 million doses on a daily basis. In fact, the current vaccine uptake is even lower than it was in June of 2021, when many officials in the country have stated they believe the worst of the pandemic was to be behind us. We've seen with previous vaccine rollouts that uptake is usually highest immediately after a vaccine becomes available and it slows as time goes on. We saw this with those who we recommended getting a fourth booster who are 65 years of age and older. Immediately prior to the ability of the bivalent booster dose only 26% of those 65 years of age and older at the highest risk for serious illness, hospitalizations, and deaths had received a fourth booster dose. Only 26%. Look at the situation with kids under age five. Early on, it appeared that parents were eager to get their children vaccinated immediately once the vaccine was approved for those under age five. Look at all the media coverage and the clamoring that occurred in the media for these families to be able to access the vaccine for the younger children. But when you take a look of the reality, as of September 21st, only 8% of eligible children under five have received at least one dose of COVID vaccine. Now, when you look at the rates for vaccination in kids, they vary substantially from state to state. In 13 states, over 10% of the children have received at least one dose. And in 15 states, less than 5% of the children have received at least one dose. Louisiana, Mississippi and Alabama all have the lowest vaccination rates for this age group, with only 2% of eligible children under five having received at least one dose. Washington, D.C. has the highest vaccination rate for this age group, with 32% of eligible children under five, having received at least one dose. So you can see the variation that occurs here with regard to vaccination and what it means. I fully anticipate we're going to see the very same geographic and age specific issues with regard to booster doses for the older population. So to answer the second part of your question, Chris, I think that it is possible that President Biden's comments may have had a real impact on the small percentage of Americans who are on the fence about whether to or not to get this booster. But I don't think that the comment is to blame for the low booster uptake in this country as a whole. I've already pointed out booster doses in those 65 years of age and older were struggling even before the bivalent showed up or the president's comments. The problem with children already was happening long before the president's comments. But I think what it has done is it has given the public one more piece of evidence to say, why are we talking about this anymore? Let's just move on. And I think that's the problem that we have right now, is saying we want to live our lives every day. We want to have the most active, productive, enjoyable lives we can. But how do we put this all together? I'll come

back and just say the following. One, if you are over age 65 in particular, please, please get your booster doses as many as you are eligible for. If you're under 65, I still strongly recommend it, but I will be the first to acknowledge your risk of serious illness, hospitalizations, and deaths decrease. That is, unless, unless you have one of the underlying risk factors for severe disease. You, regardless of age, should also have all the booster doses that you can have on board. And then if you're in public settings or areas with people who might be infected even in your own household, wearing an effective N95 respirator can surely give you lots of protection. And I'm sitting here today, very best of my knowledge, have not yet been infected. I have been religious about using my N95 respirator, and I've already shared with this audience what we do here Fern and I do in terms of having people over for dinner about not having exposure to anyone in the previous three days known to have COVID. That we in fact anyone with any symptoms of allergies or allergy like illness, it's a no go and then everyone test negative. So we still can do things with people and minimize our risk. But do I believe that I may get infected one day? Yep, I sure do. And I will continue to do everything I can not to. And I think what this message is here is please get your boosters. We don't want to see immune invasive strains of this virus cause you to become seriously ill, hospitalized, and die. You've come this far already. Let's just do whatever we can to keep getting through without totally submarining your life and at the same time not putting you in a hospital bed somewhere.

Chris Dall: [00:38:08] Now for our COVID query segment, or rather our COVID comment segment, which this week features two emails from frustrated listeners. Our first is from an anonymous listener who wrote "How dare President Biden Say COVID is over just one week after my boosted friend died, no underlying conditions except being 82, thin, and very anxious?" And then there's this email from Patrick, who wrote, "Dear Dr. Osterholm, I always admired you for your intellectual humility. I have to admit, though, I get very frustrated now at your and other experts lack of knowledge on what's going to happen next. It's so discouraging. And I feel like just giving up. I know you don't have many answers, but perhaps you can give a word of encouragement to keep up the fight against COVID. Or even just a word of empathy or care. I'm feeling fatigued, frustrated, and discouraged so badly. Anyway, keep up the good work." So, Mike, I think these emails probably capture what many of our listeners might be feeling right now, desperately wanting the pandemic to be over, knowing that it's not and frustrated that people are acting like it is.

Michael Osterholm: [00:39:14] Well, Chris, let me just begin by offering my condolences to, unfortunately, the anonymous writer who shared with us the fact that he recently lost his boosted friend. And we all know so many people have lost friends, colleagues, family members, etc.. And so my condolences go out to you. In terms of Patrick's comments, Patrick, yes get in line, and I'm in the same line. I understand completely what you're saying, because I could have easily written this myself. The very same issue in question. And you don't know how many times I have wanted to provide you with, clear, definitive, A, B. C. D. E. F. G. like instructions to say this will handle the pandemic for you. You know, we've been at the boom and bust cycle far too long. Remember back in 2020 when we had discovered this new vaccine concept, mRNA vaccines that were going to basically tame this virus into a pussycat and that it was not going to be a challenge anymore, you're going to have long term protection. You know, you'd stop transmission, mandate vaccines, and of course, everything will basically come together and we can move on. And then guess what? That didn't happen like that. Waning immunity and sub-variants and variants changed everything. You know, how many times have we been to the well, where we thought, this is the last one we have to do and we're done? So let me just be really, really, really clear. Your frustration is not only real and important. But it is the reality for so many people, including myself. So let me just say, to say that the past few years have been difficult, Patrick and our anonymous writer, is a huge understatement. It has required sacrificing time with others and activities we enjoyed. It's impacted our jobs and finances. It's resulted in illness, disability and death of family and friends and coworkers. Of course, we all want this to be over, but just because we want it to be, or even say that it is, it doesn't just make it so. And that is not just somebody trying to be a bad news Mike. I'm reminded of the scene in the television show The Office. Many of you will remember that. Where the boss, Michael Scott, is in financial trouble and declares bankruptcy simply by announcing it to his coworkers. I declare bankruptcy. One of the accountants corrects him that just by saying those words, it doesn't fulfill the requirement of actually putting the process in motion. Michael's response is, I didn't say it. I declared it. Well, I wish I had the ability just to declare this pandemic to be over, but it would seem just as foolish as Michael Scott's comment. But I think the question and comments from listeners are really getting at two major points here. One is who gets to decide when the pandemic is over? And the second is how are we supposed to live in the meantime without completely giving up or losing hope? I'll start with discussing who decides when this

pandemic is over. In reality, it is no one person's decision. Coming to the end of a global pandemic will require consensus among a variety of biological and social science leaders looking carefully at the data. I will make it very clear right now that no one really can declare the pandemic over, likely for at least a year after it's over, because we are never quite sure, is the next shoe going to drop? Let me just share with you a story from the past week that illustrates this very point. As some of you know, John Barry, the famed historian, the chronicler of the 1918 influenza pandemic, is a dear, dear friend. John has also chronicled the issues of New Orleans and how they've worked to try to prevent the flooding that has occurred there in the past and in particular in association with hurricanes. And we were having a conversation last week, just last week, in which we talked about, well looking better and better that the gulf is going to miss any of the major hurricanes this year as we're getting closer and closer to that October 1st date, which is when the risk of hurricanes starts to drop as the waters of the Gulf cool. We were just having this discussion a week ago. And here are someone who knows a lot about hurricanes and John Barry. And yet today, look what Ian is doing in Florida. One week later. You know, and I have to say that to me, this is the kind of scenario that I so worry about with COVID. That we will find ourselves at a point where it's over. We're pretty well done. And while it may not be the same kind of pandemic wave in terms of number of cases, seriousness of illness, and deaths as earlier in the pandemic, because there is more immunity, we still don't know what the immune evasiveness of the strains, along with waning immunity, will do. So while we can continue to talk about the pandemic over or not just know that it won't matter, even if the director of the W.H.O. says it's over, we won't know for some time until we have evidence what has happened with these viruses is not likely to cause another wave. Whether or not we have evidence or consensus to support the claim, leaderships making statements about the pandemic being over does have consequences. As you heard from someone who has submitted an anonymous comment to us, it can feel incredibly dismissive to those who are grieving. If the pandemic is over, do those who continue to be infected, hospitalized, or die not matter? Statements from leadership also carry weight on the overall public narrative impacting risk taking behaviors. Risk is cumulative, so the more and more people choosing to reenter large gatherings, forego respiratory protection, or no longer stay home when ill can have exponential consequences. Now that makes a big difference. Am I likely to have a mild illness? Am I likely to have a serious illness? Remember, COVID today yet is still the number four cause of death in this country, day after day after day after day. And I've been saying that for months. That, to me

still says, you know, there are some significance to its occurrence. Finally, leadership influence is funded in policy. If the pandemic is declared to be over, you all know funds and policy efforts will dry up overnight as we're beginning to see that happen. And we lose valuable tools for public health surveillance, testing, treatment, and mitigation. I worry about the 28 million people in this country who have been covered for their health insurance during the pandemic because of the emergency declaration, and today may very well fall out of the health care plans that have been made available to them because of the pandemic. What happens to them? How do they handle their illness? To the second part of the question, how do we live in the midst of this pandemic and not grow weary? I think it takes a really healthy balance of realism, kindness and hope. Things we talk about every week in this podcast. These are not just fluffy concepts. I know people say, you know, stop talking about that kindness and hope stuff. You're a scientist. Just stick with it. You don't know what the hell you're talking about when you talk about those things. Boy, I do. I do know because they're personal to me. They're very, very personal to me. But you know what? It's really important that we, in fact, also emphasize vaccination and boosters, staying home when sick, using respiratory protection in public places, particularly if you're at increased risk of becoming seriously ill, But also remembering kindness and hope play a role, too. We need to find ways to connect with one another. As I just mentioned earlier in this podcast, my partner and I have regular dinners with other couples. We found a way to do that. I know the things I'm doing doesn't eliminate all the risk, but it helps me balance the realism with our need for community. I think the beautiful places we've been able to share each week are wonderful reminders of hope as well. Hearing about and seeing pictures of family and friends connecting, getting into nature, finding new hobbies is so encouraging. Please, please continue to share those with us. I wish I had perfect silver bullet answers to these questions. I don't. But thank you for trusting us with your fears and frustrations. Know that you're not alone in them.

Chris Dall: [00:48:01] Now onto the monkeypox outbreak. Globally and here in the US, monkeypox cases continue to decline. So the first question is, Mike, do you think we have the monkeypox outbreak under control? And secondly, the deputy coordinator of the White House Monkeypox Response team was recently quoted in the New York Times saying that the goal we're working toward is to eradicate monkeypox. Is that even possible?

Michael Osterholm: [00:48:25] There have now been over 65,000 cases of monkeypox reported in the current outbreak, over 24,000 of which have occurred in the US. As you mentioned Chris, in your question, cases are continuing to decline with an average of about 524 cases reported each day globally and 206 cases reported each day in the US. I think in general reporting is actually fairly complete, meaning that we're surely missing cases that are being misdiagnosed or not being diagnosed because they're not presenting to medical care with monkeypox and in some cases not adequately tested. But I think we've got a pretty good handle on the overall size of the iceberg, of what's under the water and what we see on top. It's notable that the current number of cases is about half of the average number of new daily cases that we were seeing at the peak of the outbreak in mid-August. That said, I still believe it would be premature to declare victory over this virus. Even though we are seeing significantly fewer daily cases than we were a month ago, it would have been unheard of even half a year ago to refer to 206 daily cases of monkeypox in the US as a situation that is hardly under control. In fact, it would have been considered a house on fire. I also hesitate to say that this outbreak is under control because of the ongoing equity issues we're seeing. Since the week of August 7th, the proportion of cases occurring in white Americans has remained relatively stable at around 27%. We've actually seen some improvements, in the disproportionate amount of cases occurring in the Hispanic American population from 36% in the week of August 7th to 23% in the week of September 11th. But the disparity in black American populations has grown since the outbreak peaked, with black Americans now accounting for 36% of cases during the week of August 7th and 47% of cases during the week of September 11th. The reality is that this outbreak may be under control for some groups in this country in some locations before it will ever be under control for others. And we need to acknowledge this when we discuss any progress that has been made in controlling this outbreak. Amidst this overall decline in new daily cases we've seen over the past month, there's been a lot of discussion about the potential endgame for this outbreak in this disease. Many of us in public health are far more optimistic about how this outbreak may be brought under control than we ever were with COVID. But I want to be very clear that we should not expect this disease to disappear, even though some experts are publicly stating otherwise. As you mention your question, Chris, the deputy coordinator of the White House's Monkeypox Response Team, stated last week the goal was to eradicate this virus. I was quoted in the New York Times piece last week voicing my concern over the use of this word. I want to remind everyone that eradication means that a disease is completely gone from

the human population. The only disease we've ever done that with has been smallpox. A critical element of the concept of eradication is that that particular infectious agent can only circulate in humans. Meaning if there's an animal reservoir, then in fact you can't get rid of those. And so therefore, you're always going to be at risk of human infection occurring when a spillover event happens. In the case with monkeypox, the natural reservoir for this virus is in animals in central Africa. So there is no possible way that you can eradicate this virus. What we're really talking about is elimination. In this case, what we've seen in the US with diseases like measles is a much better goal where we make every effort to keep it out of the US in terms of our vaccination programs and follow up and for that matter, anywhere in the world, but that occasionally spillovers will occur. Remember polio elimination, same kind of concept. Yet when we let our guard down with vaccinations, the virus ended up spreading. So at the very best, what we're going to do is end up hopefully providing for elimination of the virus out of many countries. It still is not clear to me how we're going to address the ongoing challenge in Central Africa. Until the vast majority of that population can be vaccinated against monkeypox, we will continue to see spillovers of infections from animals to humans, which then have every possibility of fueling another round of human infections around the world. So at this point, it's clear that we can bring this virus infection under control in many locations and that we ultimately need to focus on how we're going to keep it from spilling over from the wildlife reservoir in Africa.

Chris Dall: [00:53:13] And now for some updates on other infectious disease stories in the news, polio in the US and an Ebola outbreak in Uganda. Mike, what's the latest on these two stories?

Michael Osterholm: [00:53:24] Let's start by discussing where we're at with polio in the US. It's been over two weeks since the governor of New York declared a state of emergency due to the virus. The state of emergency will end on October 9th unless the governor chooses to extend it. Some have argued that this declaration of a state of emergency was an overreaction, given that there was just one case of paralytic polio reported at the time. And as of today, there have not been any other additional cases reported. But I want to shed some light on why this emergency declaration is really important and why it is not necessarily an overreaction even if we don't see a single additional case of polio at this time. First of all, remember, it has continued as a virus to be detected in the wastewater of at least four different counties in the state of New York.

And so from that perspective, we know we've got virus circulating. But as I pointed out in the previous podcast, the likelihood that someone will actually transmit the virus to someone else and they themselves develop paralytic polio may be as low as one in 2,000 to one in 2,500, so meaning that a lot of people may get infected, but then getting paralytic polio is still a rare outcome. But over time, if enough people get infected, you could still have a sizable outbreak. We don't know where we're at in that area right now. By declaring a state of emergency. It actually was a set of words that describe a policy situation where it allows for providers like pharmacists, emergency medical workers, and midwives to administer the polio vaccine, which they typically would not be able to do. It also allows doctors and nurse practitioners to issue standing orders for polio vaccines that are not patient specific. This has made it easier for New York public health workers to get as many unvaccinated children and adults vaccinated for polio in a timely manner as possible. So this really means that the declaration of a state of emergency may play a critical role in raising polio vaccination rates in New York and getting booster doses to those at highest risk of contracting the virus. If it is successful enough in doing that, it may prevent future cases of paralytic polio, which may cause vaccine skeptics to say that the declaration was unnecessary when in reality the rise in vaccination rates may very well be the reason that this one case of paralytic polio, never developed anything further. I also want to address the Ebola virus disease outbreak that's raising a lot of concerns in Uganda. As of Tuesday, 36 cases and 23 deaths have been reported in the outbreak, which started in a small village in central Uganda earlier this month and has since spread to three districts in the country. Let me be clear there are many who would say 36 cases and 23 deaths hardly means this is a public health crisis. Well, in fact, the challenge we have is much as we saw with the outbreak in 2014 to 2015 in West Africa, this could quickly morph into a much, much, much larger outbreak, particularly if it gets into urbanized populations. So don't take this situation as meaning it by itself is the full crisis. We're also looking at what may, in fact, be the potential for the future. While all the outbreaks of Ebola are concerning due to the high mortality of the disease, this outbreak is a particular concern due to the strain of virus causing the outbreak, Ebola Sudan. Ebola Sudan is one of four strains of the Ebola virus that are known to cause disease in humans. It is less common than the Ebola Zaire strain, which is what caused recent outbreaks in Central Africa. And as I mentioned earlier, a major outbreak in West Africa back in 2014 through 2015. Though both cause similar symptoms and have similar ranges of case fatality rates, an outbreak of Ebola Sudan is a lot more concerning because unlike Ebola Zaire, there is no vaccine that targets this

strain. Ring vaccination, which is the process of vaccinating contacts and sometimes contacts of contacts with Ebola patients, has been critical in controlling outbreaks caused by Ebola Zaire in central Africa in the past few years. So I'm really worried about how quickly Ebola Sudan could spread in the absence of an effective vaccine. There are some vaccines for Ebola Sudan in early stages of development, some of which have receive phase one safety data, meaning that we know that they're safe but have very little data whether or not they're effective in preventing the disease. The W.H.O. Is now currently working to determine if any of these vaccines could be evaluated during the outbreak, and it appears that there will be at least one and maybe more vaccines introduced into this situation to study their effectiveness. I really hope that some of these vaccines that are currently in development for Ebola Zaire can be used to effectively prevent transmission during this outbreak, but is right now I think it's just too soon to say that will be the case. And as always, hope is not a strategy. We'll do our best to keep you updated on the spread of this disease and the potential use of the new vaccines and treatments in the weeks ahead.

Chris Dall: [00:58:33] Mike who is this week's beautiful play submission from?

Michael Osterholm: [00:58:37] Chris, this is such a special part of the podcast for me to be able to share with you the kinds of submissions that we get from the listeners. This comes from Marie, and Marie writes, and it's a slightly edited piece because it was much longer. "Thanks for your podcast and science-based information. My wonderful place during COVID has been Zoom meetings. I know many people are tired of Zoom meetings, but for my family has been a wonderful place. In 2020, when my elderly parents couldn't get to church and see people, I brought them an iPad so they could connect. I started a weekly Sunday afternoon visiting call for my father and his siblings, all in their eighties and nineties. At first it was awkward, but two years later, the calls have become a vital part of their wellbeing. In 2020 we had a Zoom Christmas get together for 2 hours with cousins across the country and some of their families, many who would not normally be able to attend the family Christmas in Pennsylvania. I asked for photos and updates on everyone's family that I compiled into a PowerPoint along with some older photos of our grandparents and cousins. One cousin collected photos and information about all the quilts our grandmothers had given us grandchildren and put together a PowerPoint with that. The calls also helped the family through the deaths of three of the ten aunts and uncles within a six week period in early 2022. The emails

and Zoom calls were a way to connect, find out what was happening, and share pictures. Each time a death happened, we would have a Zoom memorial and sharing about that person, photographs, singing, and praying. It was all very meaningful during the tragedy. Through Zoom, my parents have also been able to go to church every week, hear violin concerts by a young woman who used to work for them, see their great grandchildren, connect with friends across the country, and continuing living well even though home. My immediate family also gets on Zoom calls weekly with my children and grandchildren. We live on both coasts and in the middle, so seeing each other is difficult with COVID. Zoom has been a wonderful place for us. I've included one photo, a Zoom birthday party. Thanks for all you do to educate the public. Marie." Marie, thank you for helping to find that gold nugget somewhere buried against all the debris of life. And this, I think, is an example of what can be done. The creativity. Yes, Zoom can just be a process of a work-related communication, or it can bring families together when it otherwise would not be possible. So thank you for sharing this. This is a beautiful place, and I can tell you that in my own family Zooms have become very, very important as we too have relatives and close contacts around the country. And so this has been a wonderful example of how to basically take that gold nugget, find it, and keep it near and dear to your heart.

Chris Dall: [01:01:39] And just to reiterate what Mike said, we love your beautiful places. And if you want to tell us about the beautiful place that has helped get you through the pandemic or share a celebration of life for a loved one friend, neighbor, or coworker who died during the pandemic, please email us at osterholmupdate@umn.edu Keep those beautiful places coming. Mike, what are you take home messages for today?

Michael Osterholm: [01:02:02] You know, sometimes I almost want to turn it around and say to the listeners, what did I say today that made any sense to you? You tell me. But I'll I'll give it the old college try here. First of all, you got to continue to expect the unexpected. Even though we don't want to. Even though it's not comfortable, even though we want some kind of conclusion to be reached with this pandemic, we can't. We still don't understand what the collision course between variants and sub-variants waning immunity and the reduced vaccine uptake will mean. What will immune evasion mean? What will it take for immune protection? How will we come about deciding that the pandemic is over because it's only killing so many people? Or will that be the

criteria? I don't know. The second point is we all know the world, including ourselves, is pretty much done with COVID. And we need to acknowledge that in such a way that we don't blame, that we don't find people at fault. This is part of, in a sense, almost a pandemic grieving process. And I've tried very hard to understand people and where they're at and what they're feeling. And then to take the reality of what we know about this virus and share it with them. And I think Patrick's comments today to me were right on the mark. He was fair in saying, I wish I'd give him something useful. We have to acknowledge that. We have to acknowledge we're there. And rather than become angry or rather than reject what we think is information that we don't want to hear, we figure out how to process that, how to move on, how to live our lives. How do people who are in constant crisis live their lives? You know, I find myself sometimes living a life in this country that I forget that there are people who literally every day exist just to survive for that day. And I think to myself, how do they get things done? How do they live life? You know, what do they do? Well, ours isn't quite that bad at all. But COVID surely has thrown in some real monkey wrenches. So I think that at this point right now, we have to figure out how to live with this, how do we deal with it, and what does that mean? And then finally, friends. Never forget what they represent to us. Yes, family is critical. Colleagues are critical. But you know what? Invest in friends. Be kind to your friends today. Reach out to a friend today, even if it's someone who is not necessarily high on your list of priorities today, do it. Just reach out to a friend. You'll find that they may be surprised and pleasantly surprised, and you may find yourself pleasantly surprised how wonderful it was you reached out. So I think today, clearly one of the underappreciated aspects of this pandemic has been the ability to find, nurture and appreciate friends. And that's why I can say to you, Sarah Marie, I appreciate your dearly. So to me, Chris, I still welcome the audience writing in and telling me the three points of today's podcast that I should have known and didn't and didn't share with you, and just know that I find myself the older I get, the more vulnerable I am to learning. It's a wonderful phenomena, so I always welcome the feedback and how you can help me learn a bit more.

Chris Dall: [01:05:30] And do you have any closing songs or poems for us today, Mike?

Michael Osterholm: [01:05:35] Thank you. Of course. How would I end this without such? Right? Well, the one I'm choosing today is in keeping with a theme I've already discussed. And it's also one that actually some of you may think that I'm losing the ability to be creative. This is a song, the lyrics for which I've used five previous times on

this podcast, but it means so much to me that I have to use them again in particularly in light of the dedication we had today. I've used this song on the May 6th, 2021 podcast Episode 54 on Vaccines and Taking Care of Friends. I used it on August 19th, 2021, in Episode 65, An Ongoing Tug of War. I used it in December 9th, 2021, in Episode 81, The Early Data on Omicron. And then again on March 31st, 2022, in episode 97, The Virus isn't Done with Us. And then finally, I used it on July 8th of 2022, in episode 108, Living with COVID. And I use it again here today in keeping with the theme that I've already shared. The lyrics I'm share with you today are to the song "Friends." Music written by Elton John, verse by Bernie Taupin. This was the third US hit and the second to reach the top 40 after his breakthrough success of "Your Song." This song was released on March 10th, 1971, having been recorded in September 1970. So here it is, "Friends." Lyrics by Bernie Taupin and music by Elton John. "I hope the day will be a lighter highway for friends who are found in every road. Can you ever think of any better way for the lost and weary travelers to go? Making friends for the world to see that the people know you got what you need. With a friend at hand, you will see the light. If your friends are there, everything's all right. It seems to me a crime that we should age. These fragile times should never slip us by. A time you never can or shall erase. As friends together, watch their childhood fly. Making friends for the world to see. But the people know you got what you need. With a friend in hand. You will see the light. If your friends are there, then everything's all right. Making friends for the world to see. But the people know you got what you need. With the friend in hand. You will see the light. If your friends are there, then everything's all right." Elton John and Bernie Taupin. Thank you again for joining us this week. I hope that you were able to get some information that can at least help your guidance system understand where we're at in this pandemic. And I hope it nudged you a bit in thinking about your friends, what they mean, how you can reach out, and in this time of uncertainty, develop a new appreciation for friends. Yep, the virus is going to continue to do what it does. The variants and sub-variants are going to continue to emerge. I hope that we don't see increased major activity in the fall and winter as was suggested in the Science piece. But I at this point don't put anything past this virus. I know we want some conclusion. But it ain't over till it's over. And we'll stick with you through this. In the meantime, there's a lot we can do to live our lives in such a way we don't let the virus control us. I'll be damned if I'm going to get infected with this virus, but at the same time, I'm going to live my life. And I think that's what we're all looking for. So thank you again. I want to thank the podcast team. I work with the most incredible people in the world at CIDRAP,

just simply incredible. I also want to just emphasize to all of you that we welcome your comments, your feedback. And I also want to just remember that today, again, we used a bunch of numbers. And our anonymous writer reminded us that those numbers are not just numbers. They're real people. They're our moms and dads, our grandpa and our grandmas, our sons and daughters, our friends who have become seriously ill and died from COVID. 420 to 440 people a day are dying from COVID in this country. Those are not just numbers. Those are people. We can't ever forget that. So until the next podcast, be safe, be kind, reach out. Thank you so much for listening and for being with us. We appreciate this podcast family very, very, very much. Thank you. Thank you.

Chris Dall: [01:10:31] 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. The Osterholm Update is produced by Cory Anderson, Meredith Arpey, Elise Holmes, Sydney Redepenning, and Angela Ulrich.