

## Episode 77: A Booster Dose of Humility

**Chris Dall:** [00:00:00] This month, CIDRAP is commemorating its 20th anniversary. Since we first opened our doors, our team has created what is now a globally renowned center tackling the world's toughest challenges in infectious disease and public policy. In celebration of this milestone anniversary, a generous CIDRAP supporter has offered a transformational matching gift to support our efforts and ensure we're able to continue our important work into the future. For a limited time, your gift will be matched to 50%, helping to build a solid endowment to support CIDRAP's work. Please visit [cidrap.umn.edu/donate](http://cidrap.umn.edu/donate). 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. It's November 11th, and once again, it feels like we're in no man's land in this pandemic, both from an epidemiologic and a psychological perspective. In the U.S. and other parts of the world, we've seen significant declines in COVID-19 cases, hospitalizations and deaths over the last two months, but those declines have hit a plateau and a rather high one at that. Other parts of the world, meanwhile, are seeing dramatic surges. Psychologically, with vaccines widely available for ages five and up and oral antiviral treatments on the way, the light at the end of the tunnel appears to be getting a little brighter. But as winter looms and we see the surges occurring in other countries, it also feels like we could be on the precipice of another dark period. If it feels like I've made similar comments in past monologues, it's probably because I have. This is just another dip in the roller coaster ride we've been on for 20 months. This week on the Osterholm update, we're going to discuss this uncertain moment we're in as we take a look at the international situation and what's going on here in the United States. We'll also examine what the pandemic being over might look like and how we'll know when it is, review some new data on COVID-19 vaccines and the latest news on antiviral medications, answer a COVID query about Thanksgiving, and tell you about the latest beautiful place submission from one of our listeners. But first, we'll begin with Dr. Osterholm's opening comments and dedication.

**Michael Osterholm:** [00:02:41] Thank you, Chris, and welcome to all of you. Back to another episode of the update. As Chris indicated in his introduction, if it seems like we've been here before, we have been. Of note, it was one year ago this week that the Pfizer company released its first data on the effectiveness of the vaccines, and there was a general sense of almost euphoria that we had finally conquered this virus with this new tool. Today, we're sitting here looking at still a very challenging situation one year later. Today, I will try to share with you a sense of where we're going based on a lot of uncertainty and based on a sense that now if there was ever a time to have humility with regard to how we respond to this virus, it is now. Anyone who has listened to this podcast since its earliest days understand how important I believe humility is in the sense of understanding where we're at and what we can explain and can't explain. Today, unfortunately, we're going to need a big dose of humility again. Today, let me share with you a dual dedication to this podcast episode. The first one of the two dedications is to the COVID conscious. I can't tell you how many emails and letters and even phone calls to our office that I've received over the past two weeks, almost as if somehow there is an intersection between the increasing case numbers we're seeing in many parts of the country and the upcoming holidays. So many families struggling. What do I do for Thanksgiving? We were prepared to have Thanksgiving this year. We were going to finally recover from the loss of last year's Thanksgiving that never took place. The same thing is true, even looking at the Christmas holidays and the idea that we're planning a major family events, but now I'm not so sure. We all are struggling with that. I'm in the same boat you are. And today I'll talk more about that, what I'm trying to do to personally work through this as someone who probably has a leg up on understanding some of the risk issues around this virus than many of you. And yet I am still confused and concerned. So I'll share with you at least what my journey looks like, and hopefully it may be helpful to you. But in the second dedication, I also want to give a dose of what I believe is optimism and even light-hearted humor. And that is that Big Bird this week received their COVID shot. Unfortunately, this past week there was actually some backlash that occurred because of this episode, trying to encourage kids to understand the importance of these vaccines, as if somehow the children were being co-opted by this inappropriate or for a lack of a better term, politically incorrect activity. I just want to congratulate Sesame Street for taking this on and for, in fact, helping to promote life saving healthy behaviors in our kids today. So for those who are COVID conscious, stick with us. Hopefully we can add context for those who have children,

now's the time to get them vaccinated and just know their hero Big Bird is right on board with them.

**Chris Dall:** [00:06:06] Mike, internationally, we've been discussing the situation in Europe the last few weeks, and it appears to be getting significantly worse. Last week, the head of the WHO's European Regional Office called the rise in cases on the continent a grave concern and said the region could see an additional 500,000 deaths by February. Is there something new going on in Europe?

**Michael Osterholm:** [00:06:27] Well, Chris, clearly Europe is the world's epicenter for COVID activity right now. And if you look at what's playing out there, it warrants real concern. This is the point that we've been raising in the last several podcasts, our concern for how this virus may raise its ugly head in eastern and now western Europe. According to the WHO's COVID dashboard, in the past week alone, the European region reported around 1.95 million cases almost two million cases, its second highest number of weekly cases since the start of the pandemic. Let me repeat that the second highest number of weekly cases since the start of the pandemic and the only week that has that documented higher case totals, which was more than a year ago during the week of November 2nd, was one of 1.98 million cases, almost identical numbers. So that we're not far off from setting new record highs, and I am quite convinced by next week in fact, that will be the case. And while Europe's cases haven't risen quite as rapidly as they did during the surge last fall, their journey since the summer has been notable. For example, cases there are now more than five and a half times higher than they were in June, and they're nearly doubled over the past two months. Of course, their surge in cases is also resulting in more deaths, with the continent now reporting nearly 27,000 COVID deaths over the past week, meaning that more than one out of every two COVID deaths reported worldwide last week occurred in Europe. Most of these deaths are still happening in Europe's eastern half, where once again all 12 of the world's countries with the highest per capita death rates over the past week are located. Of these countries, nine have yet to fully vaccinate half of their populations, with seven reporting rates below 35%. But as I covered last week, the surge isn't just isolated to Eastern Europe. My prediction that we would see more activity in Western Europe is surely playing out. The concept of viral lava that I've used before to describe this theme of rolling hotspots appears to be playing out in Western Europe is now being impacted. For example, in Germany, where two out of every three residents are now fully

vaccinated, Covid cases almost tripled in the past month, and they've now reached their highest level since the start of the pandemic. 40,000 cases alone were reported on Tuesday of this week, and while hospitalizations in Germany are currently three times lower than they were during the previous peaks, those numbers are climbing and placing strain on the country's health care system, which has also been dealing with staffing shortages. As a result, some officials are now considering canceling all elective procedures in large parts of Germany, and a growing number of German states are imposing rules that restrict access to certain venues like restaurants, bars and clubs, unless individual has proof showing that they've been vaccinated or have recovered from COVID. In addition, Germany is now expanding access to booster doses across the population. The Netherlands is facing a similar situation with cases there growing five fold over the past month, despite a 68% population vaccination rate. Last week, the prime minister of the Netherlands reinstated mask mandates and widened the use of vaccine passports. Still, a group of five hospitals in the country's southern region, which is currently seeing the highest incidence, published a letter urging the government to add even more measures, saying that they don't have the space or staff to take care of any more COVID patients. They also said the following, "We are heading straight for a health care disaster and the whole system is becoming jammed. We're convinced that the rest of the Netherlands will be following us shortly." And let me just remind you again that the Netherlands are at a 68% vaccination rate, more than 10% higher than we are here in the United States. Just two months ago, with average daily cases sitting around 300 and three out of every four residents fully vaccinated, Denmark decided to lift all the remaining COVID restrictions. I can't tell you how many times I've been approached by individuals who are claiming that Denmark had found the sweet spot. They knew how much they had to accomplish in terms of vaccination, with previous infections to move on in a post-pandemic world. And again, you've heard me say on this podcast my suspicion that that was a premature declaration. Well, here we are. Since the time of just two months ago, cases in the country have grown more than six fold, prompting government officials there to propose the return of COVID passports and to consider reimplementing mask mandates. And these are just a few examples I could go through many more countries in the region dealing with surges, all of which have fully vaccinated a significant higher percentage of their population than the U.S., where we still stand at 58%. They include Austria, 64% are fully vaccinated, yet cases now are at an all time high. Belgium 75% of the population is fully vaccinated. They've seen cases quadruple in the past month, reaching their highest levels in more than a year. Iceland

77% of the population fully vaccinated nearing record high cases. Ireland 76% of the population fully vaccinated. Cases have tripled in the past month, and Norway 70% fully vaccinated. Yet cases there have also tripled in the past month and approaching all time highs. Even in countries like Portugal, where 87% of the entire population is fully vaccinated and Spain, which has fully vaccinated 79% of its population, are showing some early evidence of potentially significant upticks. Despite the growing surge in Western Europe, I would be remiss to not try and put this into context. There is no doubt that these countries are faring much better than their neighbors to the East, thanks to their higher vaccination rates. For example, while Germany is experiencing their highest case rate since the start of the pandemic, the current number of per capita deaths there is seven times lower than it was during the country's peak this past winter. In Denmark, per capita deaths are more than nine fold lower than they were last winter. So while we understand that there will be lagging indicator increases, meaning that hospitalization and deaths will increase in those countries as this rapid onslaught of cases occur. They still are doing far better than they were before vaccines. So how do these rates compare, though, with what we're seeing in countries in Eastern Europe? Well, the difference is pretty remarkable. Take Bulgaria and Romania as examples. In Bulgaria, less than one in four residents are fully vaccinated. Per capita deaths there have hit an all time high during the surge. Remember, this is deaths. In fact, they're at a level that is 15 times higher than Germany's death rate as of today and 34 times higher than Denmark's death rate. Romania, which has fully vaccinated just over one third of its population, has also reached a new record high death rate during this surge. At its peak, per capita deaths in Romania were nearly 16 times higher than the current rates in Germany and 36 times higher than the rates in Denmark. Of course, one could argue that Germany and Denmark are in the early stages of this most recent surge. And as I just noted, deaths in these countries likely haven't come close to peaking, making any comparison of their current death rates to countries in Eastern Europe, which have been neck deep in this surge for weeks to months, still somewhat problematic. And that's a valid argument. So I also want to use the United Kingdom as an example. They've been facing their delta surge just as long, if not longer than countries in Eastern Europe. And with 69% of the UK's population fully vaccinated again compared to our 58%, their rates are fairly comparable to other countries in Western Europe, including Germany and Denmark. Although the number of cases in the UK during the height of the Delta Surge didn't quite reach the record high levels reported this past January. They were relatively close. However, the death rate from their delta surge was almost seven and a half times

lower than it was during that January peak. In addition, per capita deaths at the peak of the Delta surge in the UK, were more than nine fold lower than the levels currently being reported in both Bulgaria and Romania. I know that's a lot of numbers and I apologize for that. But in summary, there is no doubt that SARS-CoV-2 and COVID-19 can still wreak havoc in countries with even moderately high levels of vaccination. And there's also no doubt, however, that the vaccines are helping to prevent the levels of severe disease and death we saw before their arrival. So what does all this mean? Well, based on sequencing data from these countries, this is still being driven almost entirely by the Delta variant, which we know is more transmissible than previous variants. But it's not necessarily anything new. Instead, for reasons that elude me, this virus is making its presence known and burning through gaps in protection wherever it can take advantage of those gaps. Many of these gaps have been there since the virus first emerged. So why are we seeing a surge now? Of course, the increase in infectivity of Delta certainly helps, but I'm not sure what exactly triggers these surges. As I have said many, many times before, anyone who gives you the exact answer, be careful they probably have a bridge to sell you. People have offered explanations in the form of relaxing mitigation measures, colder weather driving people indoors and waning immunity, all which could play some role. Anytime you get people together, especially in conditions ripe for transmission, an increased risk is surely there. However, I don't think these are the things that are exclusive to the European continent. That's exactly why what's happening in Europe doesn't just have me concerned for the region alone. Instead, I see their latest surge as a grave concern for the rest of the world. As I've said before, you can't run out the game clock on this virus. Sooner or later, it will find you. If you are not immunologically protected through vaccines or previously having been infected, so I am still relieved by the downward trends in most regions of the world. I view it as only temporary. There is no reason we shouldn't expect future surges in places like Africa, where less than 6% of the residents are fully vaccinated or Latin America, where activity has been declining for months. I look at Asia, which is home to India, where we first saw what Delta was capable of doing. Just one quarter of India's population is fully vaccinated. Let me repeat that just one quarter of India's population is fully vaccinated. Yet activity there has steadily declined since their record high peak in May. Meanwhile, an article published in The New York Times on Tuesday stated that most of the country appears to have returned to normal life with children back in schools for the first time since last March, and scenes of crowded streets and shopping malls occurring throughout all of India. The smoldering activity we've seen in these places is

still more than capable of developing into a real raging COVID forest fire, and in order to limit this foreseeable damage, we have to keep vaccinating. Until we achieve much higher vaccination rates, we will undoubtedly see continued transmission in instances of major flare ups, which will place more pressure on the backs of health care systems that are already working hard to keep up with all the critical work that they do on a daily basis.

**Chris Dall:** [00:18:42] Here in the United States, we seem to be stuck on that plateau of around 75,000 cases a day. The cases have actually increased over the last week, but deaths and hospitalizations continue their slow decline. However, over these next two months with holiday get togethers, increasing travel, the overall mood of people being done with the pandemic and as you noted, only 58% of the American public fully vaccinated. It feels like another national surge in infections is inevitable. Is it just a question of how big it's going to be?

**Michael Osterholm:** [00:19:17] Well, first of all, Chris, you undoubtedly know my thoughts on predicting the course of this pandemic more than just about anyone at this point. I'm only half joking when I say that this virus has probably provided me with enough lessons in humility to earn another PhD and then some beyond that. Regardless, I've learned that I can't state with absolutely certainty exactly when and where this virus will take off or why it will recede. We don't know. We have to acknowledge that. Look at what I just shared with you with regard to the international picture. Explain to me, while in countries like Japan, countries in Asia or South America, where in fact immunization levels are substantially lower than we're seeing in Europe, that we should suddenly see Europe take off. That doesn't make biologic sense in a way that says that this is just going to be like a flu season and spread around the world then it's done. That's not the case. Now, factor in what we're seeing in the U.S., and I don't think I've ever been more unsure of where we're going to date. After two months of steady case declines, we're seeing this plateau, which still sits at levels more than six times higher than we were actually reporting before Delta arrived. And if you look at trends over the past two weeks, we're actually seeing average daily cases grow by 5 to 6%, reaching almost 74,000 new cases a day. By the way, this does not include what I believe is a growing number of individuals who are actually using over the counter testing procedures to actually learn of their COVID status, and those are not getting reported. We have numerous examples of people where that's happening, including

some who are tested at the pharmacy, go home, don't report to anyone until they need emergency services at a hospital because of their very rapidly deteriorating condition. Even though their case was documented via their rapid test, they never reported it. So I think these numbers are clearly an underestimate compared to where they might have been assessed a year ago. If you look today, hospitalizations have fallen below 45,000 for the first time since late July, and average daily deaths, which stand at about 1,200, are at their lowest point since late August. But remember, as lagging indicators, I think we can expect these declines in these categories to start slowing and to even begin to increase in the coming days. Logically, as you mentioned your question, with the upcoming arrival of holidays and get togethers, growing pandemic fatigue and increased travel, I think we can expect plenty of opportunities for this virus to keep transmitting. In fact, although the number of people going through TSA checkpoints still isn't quite at pre-pandemic levels, it's growing closer. In a given day, it is consistently two to three times higher than it was just last year. So in that sense, one could make a pretty convincing argument that activity at least has the potential for moving up. On the other hand, we've seen examples where this virus has seemingly defied human logic. For example, in the days leading up to Thanksgiving last year, the country was experiencing a rapid rise in cases. Some of the states contributing to that surge included Iowa, Michigan, our own home state of Minnesota, Colorado and Oregon. Yet even with all that virus circulating in these places come Thanksgiving, we didn't necessarily see a dramatic surge result from the holiday in any of those states. And in fact, cases peaked in Colorado, Iowa and Minnesota right around Thanksgiving and actually declined after that. Now, at the same time, I think it's important to mention other places, including California, Massachusetts, Pennsylvania and Texas did see cases spike shortly after Thanksgiving. So I'm certainly not saying that Thanksgiving gatherings are risk free. However, it just shows us that our expectations don't automatically align with reality. Oh my, I wish I could understand why. That being said, I go back to our discussion about Europe and the surges that are occurring there, even in countries with vaccination rates that are 10 or even 20 percentage points higher than us. I'm not convinced that the U.S. or any state within the U.S. has nearly enough protection at the population level to avoid future surges. As a matter of fact, I think a number of places in this country will face major challenges to their health care systems when a surge does arrive. Let me just give some sense of perspective to what's happening in the U.S.. Right now, I might argue that one of the safest places in this country to be from a population based risk standpoint for developing COVID infection is in the deep south. If you look at their



numbers of cases in the community, it's almost at all time lows. Remember, just three months ago, they were on fire. On the other hand, I'm following right now 17 states, because I believe that they represent potentially combined or in some cases, different yet relevant issues regarding transmission. All of these defy the classic predictions that some have made using statistical models. For example, what is happening right now in the Four Corners area? Those four states of Arizona, New Mexico, Colorado and Utah are seeing major surges in activity. Arizona right now is at 43 cases per 100,000, where the national average is 23. 73% increase in cases in Arizona in the last two weeks. New Mexico 59 per 100,000. Again, remember, the national average right now is 23. They've had a 52% increase in cases in the last two weeks. Colorado, which we're all hearing about right now because of the major stress that COVID is putting on their entire health care system, is at 61 cases per 100,000, they've had a 36% increase in the last two weeks. And Utah, at 53 cases per 100,000, have had an 11% increase. These four states have something very unique going on. If you look within the Navajo Nation, which is an increased population in those areas, a population which has done an amazing job of getting their members vaccinated with well over 74 to 76% of the population is vaccinated and this is happening. Another area that is of grave concern right now in terms of what is happening is right here in my own backyard, the Upper Midwest. There are eight states here in this Upper Midwest group that are beginning to see major surge activity. Minnesota, unfortunately, is leading the way with 54 cases per 100,000 population, almost twice the number of the national average, a 35% increase in the last two weeks in cases. Let me just quickly go down the increases we're seeing. Nebraska 33% increase in the last two weeks. Michigan 29% increase, Iowa 25% increase, Wisconsin 25% increase, Illinois 24% increase, South Dakota 19% increase. And while North Dakota has only had a 7% increase, its overall incidence of 67 cases per 100,000 is one of the highest in the entire country. What's going on here? Why all of a sudden, we have many of these states that are in the 60 plus percent rate of vaccination. Look to Europe, we understand. We even look in the upper northeast part of the United States. There, New Hampshire and Vermont are looking at 62 and 55% increases in cases, respectively. Here are states with some of the very highest levels of vaccination in the country. What's going on? We don't know. I look at two other states right now as bellwether states, which actually aren't showing high numbers of cases per hundred thousand, but the potential is there. I've been talking about that in this podcast through the duration. California is at 16 cases per 100,000 below the national average, but they've had almost a 10% increase in cases in the last two weeks. New York state of

New York, and particularly New York City, 23 cases per 100,000 right at the national average, but they've had almost a 20 percent increase in the last two weeks. What will happen there? I don't know. Now, the one good news piece that I can share with you. The northern Rocky Mountain states, which were so hard hit Montana, Wyoming, Idaho, which still have high numbers, but the case numbers are coming down. Will they be like the states in the deep south where they hit these incredibly high numbers and then came down and appear to be staying there? We just don't know. So when I look at what's happening right now, I look at the four corners or I look at the Upper Midwest, I look at the Upper Northeast and there are 17 states I'm following carefully and we'll see what happens in these areas. And of course, if California and New York lights up, which I have every reason to believe they're going to eventually because we'd have large pockets of under-vaccinated or people who are not vaccinated at all in those states. And when that happens, that again could fundamentally change our surge numbers. So when I look at this right now, I just have to say I think we're at a tipping point. The national picture will largely depend on what transpires in many of these states I just talked about in the coming weeks. There's a lot of virus still out there and a lot of people it can reach. And although we haven't vaccinated enough people to really stamp out transmission at the population level again, it's still our best defense against infection, serious illness and death. As I pointed out with Europe, and let me just reiterate this again of what the vaccines are doing in the U.S., although the latest numbers are from a couple of months ago, data from the CDC shows that the unvaccinated individuals are six times more likely to become infected and 12 times more likely to die from COVID compared to fully vaccinated individuals. This was supported by data released by this Texas Department of Health this past Monday, showing that unvaccinated Texans were 13 times more likely to become infected and 20 times more likely to die from COVID compared to fully vaccinated individuals. So if there's one thing I can say with 100% certainty, it's get vaccinated.

**Chris Dall:** [00:29:52] So speaking of vaccines, Mike, last week we discussed the recent data on vaccines, waning immunity, breakthrough infections, and booster shots. Do you have any updates this week on those issues and was there something you felt like you didn't emphasize enough last week in our discussion?

**Michael Osterholm:** [00:30:08] Yes, in fact, last week we provided in the podcast data from a recent study that showed that people who are vaccinated but infected were just

about as likely to transmit to household contacts as unvaccinated people. So some were asking this past week why get vaccinated with people who are vaccinated are just as likely to transmit to others? But what was missed, and I didn't do a very good job of emphasizing and I should have is if you don't get infected in the very first instance because of the vaccine, you can't transmit. It's only when you are those rare cases that do get infected and have breakthrough cases where vaccinated that that concern about your ability to transmit is real. But don't forget the fact that if you look at what happens in vaccinated individuals that are becoming infected, that is really important. For example, if you look at recent data from the CDC, they actually show that the rate of COVID cases per 100,000 population in the unvaccinated group was 665.7. So again, 665.7 per 100,000 people were unvaccinated, whereas in vaccinated people it was only 113.7 per 100,000. The difference between unvaccinated and vaccinated was even greater in the youngest age group to 12 to 17 year olds, where 767 cases per hundred thousand in the unvaccinated, compared to only 81 in the vaccinated. So you can see that that really does reduce the likelihood of ever getting infected, which then in turn means you don't transmit the virus nearly as much. So don't misinterpret what happens if you are a breakthrough case and how you might transmit to compare it to the fact that you just don't get it at all. Also, we know that vaccination reduces the number of severe cases, even if you do have a breakthrough case reducing the strain on our health care system. This health care system, including ICU, that we worry about breaking in different geographic locations as opposed to just even bending. We know, for example, again, data from the CDC vaccines reduce severe illness and deaths. If you look at recent data there, deaths from COVID-19 per 100,000 population was 9.17 among unvaccinated and only 0.7 among vaccinated. And so we see that people who are vaccinated even when they have a breakthrough infection aren't needing the same level of intensive care that those who are unvaccinated. And finally, the data clearly are supporting the fact that people who are vaccinated are less likely to develop long COVID, even if they do have a breakthrough infection. A study published in Lancet recently found that fully vaccinated people who got a breakthrough infection were about 50% less likely to develop long COVID than unvaccinated people with COVID-19. In the vaccinated group, 5% of the people developed long COVID, compared to 11.5% in the unvaccinated group. So that is really also another reason why to get vaccinated. And finally, booster doses look like they may make it less likely to transmit to others. An article in Nature Medicine recently reported that the vaccine could reduce viral loads in breakthrough infections, and that is restored at least temporarily, with a third booster dose. The

authors conclude that booster doses may decrease the infectiousness of breakthrough infections even with the Delta variant. So all of these data strongly support the fact that we should be vaccinating as a means of actually reducing transmission in our communities. The final piece I just want to note here is the issue of booster doses and the global recommendation for boosters. We have been incredibly sensitive to the issue of getting the vaccine to the rest of the world and how important that is, and some people viewing booster doses as being luxury doses kind of, you might say, a dessert dose that it is reducing some mild illness, but generally speaking, the lifesaving doses should be heading to the low and middle income countries. Well, what we're seeing now is that in fact, countries across the world are recognizing the importance of boosters in terms of reducing actual morbidity and including mortality, and that as time goes on, we're seeing the further you get from that second dose of mRNA vaccine or first dose of adeno platform vaccine, that the incidence of breakthroughs and the severity is increasing. Now we're seeing on a global level the extent to which countries are recommending additional doses. The New York Times global vaccine tracker shows now that 47 countries are administering additional doses. And the data do not account for all the countries that now have recommended. Boosters, as we know, Israel tops that list, having given 44% of their population an additional dose. But Uruguay is a 37%, Chile is at 33%, the United Arab Emirates is at 29%. The U.S. is actually lagging behind as 14th on the list of the percentage of the population has received an additional dose at 7.5%. The 13 countries in front of the U.S. have all given additional doses to at least 12% of their population. So I think it's very important that we understand that these booster doses are not being seen as a luxury by many countries and that we do have to resolve getting vaccine to the rest of the world. Right now, we have at least 25 countries that have recommended boosters for people 65 years of age and older or immunocompromised. We're now realizing that these countries are beginning to expand that to additional ages. And just to conclude, at least 15 countries are now administering boosters to the general public. So what does this mean about getting vaccines to the rest of the world? Well, we're seeing a big increase in the number of doses of vaccine that will be available for the world in the next three to six months. The Global Commission for Post-pandemic Policy reports the total monthly production for October 2021 was about 1.4 billion doses. Total production since vaccine rollout began in November 2020 is at about 8.57 billion doses. The accumulated total production by the end of this year remains likely to exceed 11.5 billion doses. We expect this number to ramp up substantially over the course of the next three to six months for the entire

world. So in this regard, we should be able to meet the world's demand for vaccine over the course of the upcoming months. The challenge we are going to have is what if we have to give booster doses? What happens if in fact we find out that you're going to need an additional dose every six to eight months? Well, we don't have an experience doing that, particularly for the world's population. The only experience we have with rolling out vaccines every year, as in a sense, a booster dose approach is with influenza vaccine. The global production of seasonal influenza vaccines in 2019 was estimated to be about 1.5 billion doses during that year, far, far short of what would be necessary if we had to roll out booster doses once to twice a year for the entire world. So we don't have a model for that. So we're going to have to look at this whole vaccine availability from the perspective if we don't need booster doses, meaning beyond the third one for mRNA vaccine or beyond a second one for the Adeno platform vaccines. Can we reach that goal in a relatively short period of time? I think the answer is yes. But if we have to do booster doses, this is going to be a whole new ballgame. And at this point, we just don't know which way that is going to go.

**Chris Dall:** [00:38:15] Last weekend, former Food and Drug Administration commissioner Scott Gottlieb said with young children now eligible to get vaccinated and potentially two oral antiviral treatments coming down the pike, he believes the pandemic phase of the COVID-19 crisis might be nearing an end, even though we may see infections pick up again over the coming weeks. So Mike, what do you make of that prediction? And then just beyond that, when people talk about the pandemic being over and the coronavirus becoming endemic, have we really defined what that means? What is that going to look like and how will we know when we're there?

**Michael Osterholm:** [00:38:51] Well, I count Dr. Gottlieb as a friend and a colleague, and so from that perspective, I always listen to what he has to say. But for those who have followed the prediction world with COVID-19 realize that Scott and I have always not been on the same page and I surely don't find myself in the same page here now. We already have painted the picture of what can happen when vaccines are readily available and yet not used. I mean, look at vaccines we have today for those who are 12 years of age and older. Even before the approval for the five to 11 year olds and we see these huge pockets of under vaccinated or non-vaccinated populations. This is what's fueling the surge right now in Europe. It will fuel the surge around the world. And of course, it is front and center what's happening here right now in the United States. I

find it somewhat difficult then to say just because of vaccines available means that that is going to change the course of the pandemic. What we have to do is convert vaccines into vaccinations, and that's been our challenge. As I talked about in last week's podcast, my concern for kids remains that if you look at even the 12 to 17 year olds, just a little over 50% of these kids are vaccinated, even though the vaccine has been available for months for this group. Based on the Kaiser Family Foundation survey data, we know that for five to 11 year olds, parents who have been surveyed of these kids, said a third, I can't wait to get the vaccine. I'm the one calling seven clinics this week to try to find an open date for my child to get vaccinated. A third have said, You know, I'm not against getting vaccinated, but I'm going to wait. I want to find out just how these vaccines actually operate. What do they do to the kids? Are there safety concerns? And then a third of the parents say, under no condition will my kids get vaccinated. As I said last week, I could easily see us getting to the holiday season and having less than 40% of kids in the five to 11 year old age group vaccinated. Well, that's sure the more than enough opportunity for this virus to continue on and continue to cause the problems. In addition, the issue of breakthrough with vaccines is still going to be a challenge. We don't understand what it's going to look like in six months after these booster doses. So until we have a sense of that too, that adds a complexity in addition to the absence of being vaccinated. Now, the question is if you are vaccinated, what do we have to do to maintain that level of protection that is enjoyed in those first weeks to months after being vaccinated? I hope, I hope that in fact, we will see long, durable protection. But as I've said many times in this podcast, hope is not a strategy. So we're going to have to wait and see what that means. The one thing that I think can provide a potential game changing impact on the future of the pandemic is the new what we call small molecule drugs, the oral drugs that we're now realizing are coming to market soon. This includes both the Merck drug and the Pfizer drug. If in fact these become available and people have access to them in the earliest days of their infection, whether it's someone who has never been vaccinated or someone who is a breakthrough infection. This surely can reduce the serious illness and hospitalization requirements and of course, the deaths. But we still have to figure out how we're going to get those drugs out there. How will we have a system so that people know that they've been infected, i.e. who is going to get tested? Where do they get tested? What kind of test results are necessary to then allow them to be given the medication? We have to work all that out and not just in the United States, but around the world. So I think at this point to say that by early winter, we're going to see this basically fade away into a picture that's very different than we're in

now. I just don't think is the case. You know, if I had a nickel for every time somebody said to me, Well, you know, we're done with this now. We've hit herd immunity, dating back to a year ago you know, we could I could take everybody on this podcast out for a heck of a dinner. And I think that now we have to be again honest with ourselves and say, we're making inroads, we're making inroads. And the vaccines are surely reducing the amount of serious illness, hospitalizations and deaths and infections in many people. But you can still see what's happening in Europe, in the United States and what's going to happen again in Africa, in South America and Asia. We're going to see these surges keep coming back. India is going to be hot again. It's just simply is. And so no, we're not at the end of this pandemic by any stretch of the imagination. And I think it's unfortunate when we say that, you know, I had a number of people, for example, who contributed to the mindset of last May. I keep talking about May, as anyone who's listened to this podcast knows, I was very concerned in May about the Alpha variant and then with the emergence of the Delta variant, what that may do to change the future course of this pandemic. And while people were all predicting we'd have a mild summer, few cases and maybe a flare up a bit in the winter. You saw what happened. But you know what that thinking in May is what in part turned our country into a blind's eye as to what this virus could still do and caused part of the major reaction that people had and said, Wait a minute, you told me this was done. I don't know who told you. A bunch of people may have said that, but who told you? I don't know. And I think at this point, this is a really major point of the population psychology. I'm not here to try to scare people or, you know, bad news, Mike. But you have to understand that what's happened in the Upper Midwest, what's happened in the four corners, what's happened in the far Northeast is real. And that we have to be prepared to respond again and again, so we're not done. As far as the endgame, we don't have a good endgame. What is this going to look like? How will we know if in fact, the pandemic is over? And where does it have to be over with to call it over? Is it only in the high income countries? Is it in all the world? Remember, we're concerned about variants developing wherever they may. The variants that we are concerned about today all basically arose outside the United States. So from that perspective, I think we still have a lot of work to do in terms of understanding if in fact, we get to a point where COVID-19 is like a bad influenza year where we don't shut down businesses, we don't stop people from having everyday recreational activities, schools stay open, etc. Will we in fact then adopt those same kind of approaches? When will we know that that's where we've gotten to? How will we know? And then, of course, as I pointed out earlier, remember, we don't vaccinate the

world against influenza in any way shape or means. We vaccinate a very small percentage of the world against influenza seasonally. Well, what will be the requirements with this virus before we say the pandemic is over? So I'm part of a group right now that's putting together a major publication on what the endgame looks like. We hope to have it out shortly. And I promise you, on an upcoming podcast, I'll go through in detail what we think need to be the essential elements of addressing, responding to, and being impacted by this pandemic that will allow us to say we've now moved on. The pandemic is over as we know it. The virus is still going to be here. It will still cause us harm, but we now can live with it within the context of how frequently that harm occurs. And so all I can say is at this point, stay tuned.

**Chris Dall:** [00:47:11] Now to this week's COVID query, this one is from Sally, who posted the question on our Facebook page. It's a question that many of our listeners have. Sally wrote, "With current cases alarmingly and stubbornly higher here in Minnesota, many of us are increasingly reluctant to attend large Thanksgiving family gatherings. My behaviors follow those of Dr. Osterholm. What is he doing for Thanksgiving?" Sally went on to note that she is 72, fully vaccinated, and has received a booster dose.

**Michael Osterholm:** [00:47:42] Well, my first reaction, Sally, to your very thoughtful question is congratulations. Number one, you've done everything you can to protect yourself with your vaccines. And number two, you're thinking about the whole approach to how you're living your life with COVID in exactly the right way. You're one of those people I dedicated this podcast to, from the standpoint of a COVID conscious individual. What am I going to do? Well, first of all, I'm talking to a lot of my colleagues who are in the same position that I'm in. I'm trying to actualize what we do from a professional standpoint into a personal life decision. And I'm going to tell you right now, it's not easy. Why is it not easier for me? Well I, like you, am fully vaccinated. I have my booster dose. I've been very careful about how I expose myself, potentially in the public venue. You know, in terms of who I have contact with, only those who are fully vaccinated with booster doses in a private setting. And I do have a challenge coming up with Thanksgiving. We will be getting together as a family. My two kids and the five grandchildren. And at this point, both my partner, Fern and I are both vaccinated, as I mentioned, and we will have at least one of the kids who is younger than five, not at all vaccinated and the other ones in the various stages of being vaccinated. Or at least, I



hope so. And at this point, I'm willing to accept my risk on that particular day because of what it represents in terms of the family event, having missed so much for so many months. And I feel confident that with my booster dose that I'm otherwise in good shape, I'm not at increased risk for a serious health outcome. And at this point, I feel confident that I can be with them, but I would sure feel a lot better if they were also all vaccinated, fully vaccinated, and so we'll be together. I would not go into a public venue. I don't go to restaurants. I don't go to concerts. I've turned down some pretty amazing tickets that I've already purchased some months in advance and even longer when concerts have been canceled and rescheduled. I do not participate in social events of large numbers of people indoors. When I say large, it's more than three people for me. And so I think that I've tried to live all of that as I see risk, but in the Thanksgiving piece, I'm willing to say that for those kids, this is what I'm willing to accept. So I hope that all of you think about this. I've talked to numerous people who have deeply divided family situations right now, where they have adults who would not be vaccinated. All of my adult kids, my partner and I are all vaccinated. So, you know, we feel confident in that. But I know people who have just canceled Thanksgiving this year because they were not going to get into the fight with other family members who are hell, no, I won't be vaccinated versus those who demand that they be. I'm aware of one individual, for example, that has a family member that is at very high risk of potentially a bad outcome if they were to get infected and because of their condition, they may not at all have the same level of protection from the vaccines that you and I might enjoy. And yet they still had family members who demanded if they're going to come to this, they're not going to be vaccinated or tested. So there's no one easy answer. There's not Sally. But all I can say to you is you're thinking about it the right way, and I'm going to enjoy Thanksgiving, and I'm going to obviously count on my vaccination and my booster dose and that of all the adults in that room is protecting us from yet the incomplete coverage from our kids.

**Chris Dall:** [00:51:46] Mike, one additional item here, since the start of the pandemic, we've seen occasional reports about animals becoming infected with the SARS-CoV-2 virus. The most recent report that's received quite a bit of attention suggests that white tailed deer are susceptible. What are your thoughts in this news and what are the implications?

**Michael Osterholm:** [00:52:03] Well, to begin with, Chris, this news serves as another reminder of just how much we have yet to learn about this virus. On the one hand, these

reports describing the infections in white tailed deer aren't completely unexpected. We've seen previous reports of SARS-CoV-2 virus infecting other animal species, including dogs and cats, mink lions, tigers and even gorillas. In each of these instances, close interaction with a human host, which typically served as a pet owner, a zookeeper or a farmer has been noted. And although some of the deer that tested positive were also captive, meaning they had human contact inside of fenced areas, most were free ranging. So this really represents the first clear and compelling evidence showing widespread transmission in a wild animal population. The studies, one of which looked at deer in Iowa, while the other are more recent study sampled deer in Ohio really built off of previous evidence, including documented infection of white tailed deer following experimental exposure and serological surveys by the U.S. Department of Agriculture suggesting that a fairly high percentage of deer were being exposed to the virus. Of course, now we know that these exposures can actually lead to infections in these deer populations, which really raises a litany of questions. When you dig into these studies, you can see some pretty interesting and frankly puzzling and even potentially frightening results. For example, the study out of Iowa conducted PCR testing on nearly 300 lymph node samples from white tailed deer between April 2020 and January 2021. This is largely before the Delta surge really took off. Overall, they reported that one out of every three samples tested positive for the virus. However, the incidence appeared to increase over time. Basically overlapping with the surge in Iowa's human population. Between November 23rd and January 10th, a period of time when I was deer hunting season is underway, the researchers tested 97 samples and found that more than 80 percent were positive. Now, one might be concerned that they could have false positive test results or something about the way they did their testing. Well, they sequenced the viruses and found that they matched the same strains circulating in humans. However, the fact that they identified more than one strain of the virus in these deer surely lends support to the notion that they were likely multiple occasions in which human to deer transmission occurred. The study out of Ohio, which involved PCR testing and nasal swabs from 360 free range white tailed deer between January and March of 2021 showed similar results. And once the virus entered the deer population, it appears readily capable of transmitting widely between these animals. Now what all this means to me remains unclear. Neither of these studies were designed to look at the clinical impact of the infection in deer. In other words, we don't know if the deer infected with the virus show clinical symptoms of the disease or suffer negative health effects. And for me, a very major issue is we don't know how exactly these deer are being exposed.

A number of theories have been posed, ranging from human assisted feeding to sewage discharge sites. The study out of Ohio did find higher prevalence of infection among deer located in urban areas, which makes sense since these settings would provide more opportunities for interactions to occur, but no clear links have been made. And finally, what would it mean if deer can act as a reservoir? As of right now, there's no evidence showing that deer can transmit the virus to humans, but it certainly can't be ruled out. So for any listeners of this podcast who are hunters, I recommend following general precautions like wearing gloves while field dressing an animal and avoiding handling and consuming an animal that looks sick, or is acting in a strange manner. Regardless, active infections and deer inherently means the virus has yet another abundant population to replicate in. The latest estimate suggests that there are more than 25 million deer living in the U.S. alone, and last year, hunters harvested over six million of these deer, meaning they had close, intimate contact with the deer itself. And as we know, continued replication always comes with the risk of mutations and potential variants. Would a population like this serve as another source for a Delta variant to come forward that we only previously thought about occurring as a result of human infection? I don't know, and I can't find anybody who can answer that question for me. So overall, I think this news adds yet just another wrinkle to the pandemic. As of right now, I'm not sure what the implications are, but I think it reminds us that this virus seems to have no shortage of tricks up its sleeve, and this animal reservoir issue is just one more.

**Chris Dall:** [00:57:20] Mike, what can you tell the listeners about our latest Beautiful Place submission?

**Michael Osterholm:** [00:57:25] Well, this particular beautiful place submission really touched my heart. We all know that beautiful places can take on many different meanings. Is it some location someplace in the world? Is it a place where your head goes? Your heart goes? What what does it mean to be a beautiful place? Well, this one comes to us from Evin, and she wrote to us, "Dear Chris, Dr Osterholm and the team, this is my first grandchild, born in October of 2020. I retired early from my teaching career so I could help my son and daughter in law as they began raising their new son in isolation, all during a pandemic. We all wanted a safety. Being a child development specialist, I knew what to do. Like the rest of the world, we were confused, fearful at times, frustrated, angry, joyful. You know, all the feelings. Our bubble did, all the things

many on our planet did. We baked bread, decluttered our homes, tidied up our yards to enjoy that beauty. But for me, the healing began when Arthur arrived. He became my pandemic partner as his parents worked from home and we played in the living room. We got to know each other really well and developed a love language that to this day, is still healing. I taught him to play the piano and the drums. We recited every nursery rhyme and nauseum and hugged all the trees around the house. This is my beautiful place, Evin." Thank you, Evin, for this very, very beautiful place story. When you see Arthur's picture, you can understand the beauty that he brings, not just from his smile, but from the sense he brings to a room. So we all need these kind of beautiful places. Thank you so very, very much for sharing this with us.

**Chris Dall:** [00:59:20] And to our listeners, if you found a special place of comfort or solace during this pandemic and want to share it with us, please email us at [osterholmupdate@umn.edu](mailto:osterholmupdate@umn.edu). We love hearing about and seeing the places that have helped get you through this difficult time. So Mike, what are your take home messages and closing thoughts for today?

**Michael Osterholm:** [00:59:40] Well, I do have three messages, but before I discuss those. I just want to share with everyone again that sense that is such an important part of this podcast that again, I used lots of numbers. I talked about a lot of abstract issues and ideas. But every one of these numbers is in the first instance, a mom or a dad or an aunt and uncle or a grandpa and grandma or a son or a daughter. And we all are struggling as we work through now another curveball in this pandemic. For some in this country, living in geographic areas that are now getting hit hard by COVID, it just creates again more confusion, more concern. More lack of clarity about what and how can I do what I want to do? So I just want to share again with our podcast audience that sense that we must never forget what these podcasts are all about, what COVID is doing to us as a world and why it matters that we care. And as far as my three take home messages from today's podcast, number one, we are still in a pandemic throughout the world and no matter how much we don't want to be, we are. This is a reality check time. Now is the time that we're going to continue to see the anger voiced about what we in public health have recommended must be done in order to avoid additional cases. The challenge that more health care workers are going to experience one more time again in terms of the surges and the case numbers, the case loads, the challenges of trying to maintain a health care system that bends and doesn't break. The

pandemic is still here, and it will be for a while yet. We just have to understand that. The second point is the vaccines are remarkable, but they're not perfect. Remember that. They're remarkable, but they're not perfect, I hopefully have given you enough data today to convince anyone why they want to get vaccinated. But at the same time, I'm fully aware of the implications or at least the potential implications of breakthrough infections and waning immunity. This is that issue of evolving science. We're going to continue to study this issue. We're going to keep coming back to you with more and more information. Never was it a wrong conclusion to say these vaccines work well. A year ago today, we were celebrating those early results from the Pfizer studies and came to a conclusion, unfortunately, that the thing was over with and done. These vaccines were going to completely change the pandemic. Well, they have changed the pandemic, but the pandemic is not done. So we have to just continue to remember we'll we will be learning more and more about these vaccines, not about safety. Safety, we've got down, but just how they work and how to best use them. And finally, my third point relates to the question and answer about white tailed deer. The animal reservoir that the white tailed deer represents is, in a sense, a black hole moment. And what we can anticipate with the evolution of SARS-CoV-2 in the future. What will happen with these viruses in animals? In fact, could variants that might develop in these animal reservoirs become challenges for us with regard to protection from our vaccines or even the issue of transmission? We don't know. This is another humbling moment, a stay tuned moment that we're all going to have to live through. And I promise you, we will keep you updated on this, but I remain amazed at what this virus can and continues to do.

**Chris Dall:** [01:03:38] And any closing songs or poems today, Mike.

**Michael Osterholm:** [01:03:43] Well, of course, I I have to add that little seasoning flavor at the end, it's clear that this podcast was not very satisfactory. It didn't provide you with clear cut and compelling answers. I wish it did. I wish I had those. I don't. And again, as I said, time and time again, to those that do have them clear and compelling answers as to exactly what will happen, be careful because they also have a bridge to sell you. So today I actually have gone back to a goodies, but oldie. And this is a song that I use the lyrics to from Episode 53: Two Doses of Vaccine and ironically, One Dose of Humility. This was on April 29th. We dedicated that episode to the immunosuppressed individuals seeking answers on protection with vaccination, which

ironically, here we are now in November, still challenged by what we can share in terms of what we know and don't know about that. This was a song from Fleetwood Mac from their band's hit album Rumors in 1977. It was the first single song to hit the charts from that album. It hit the number three spot on the U.S.. Billboard Hot 100 in October of 1977 is written by Christine McVey, sung by McVey and guitarist Lindsey Buckingham, entitled "Don't Stop." "If you don't wake up and don't want to smile, if it takes just a little while, open your eyes and look at the day, you'll see things in a different way. Don't stop thinking about tomorrow. Don't stop, it'll soon be here. It'll be better than before. Yesterday's gone. Yesterday's gone. Why not think about times to come and not about the things that you've done? If your life was bad to you, just think of what tomorrow will do. Don't stop thinking about tomorrow. Don't stop. It'll soon be here. It'll be here better than before. Yesterday's gone. Yesterday's gone. All I want is to see your smile. If it takes just a little while, I know you don't believe that it's true. I never meant any harm to you. Don't stop thinking about tomorrow. Don't stop. It'll soon be here. It'll be here better than before. Yesterday's gone. Yesterday's gone. But don't stop thinking about tomorrow. Don't stop. It will soon be here. It'll be here better than before yesterday's gone. Yesterday's gone. Don't look back. Don't look back. Don't look back. Don't look back." For all of us, we are now living for our tomorrows. And we want to do everything we can to make those tomorrows as wonderful as they can possibly be. That also even means living with enjoying, appreciating some cases, I would say, even tolerating family, friends that made it through this pandemic. We want to do everything we can to ensure that that's the case. So don't stop. Thank you for the listeners. For those of you who sent us the letters, the emails, as I've said time and time again, we read them all. Thank you so very much. And just to remember, it's going to get tough in a number of locations in the United States and around the world in the days ahead as we see these new surges. Just remember, be kind, be careful, be kind and have a wonderful holiday season as we start to plan for that. But don't be afraid to protect yourself within that holiday season because I'd rather have you around for many, many more holiday seasons to come. So thank you. Be kind. Thank you.

**Chris Dall:** [01:07:50] 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](http://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](http://CIDRAP.umn.edu/donate-now). The Osterholm update is produced by

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