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**Chris Dall** [00:00:05] Hello and welcome to The Osterholm Update COVID-19, a weekly 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.

**Chris Dall** [00:00:42] It's October 1st and as colder, weather starts settling in and parts of the country and the holiday months inch closer, people are starting to think about travel plans and family get togethers and how they may be different this year because of the coronavirus pandemic. How safe should we feel getting on an airplane from an infection perspective? Should people be considering smaller holiday gatherings to limit potential spread of the coronavirus? These are some of the questions Dr. Osterholm will be addressing later in this episode of The Osterholm Update. But first, we're gonna take a look at the current state of the pandemic here in the United States and the rest of the world. We'll also discuss how the epidemiology of the virus is shifting, what serology testing is telling us about the number of people who have been infected and why approval of the COVID-19 vaccine won't bring an immediate end to the pandemic. But before we get to all that, we'll start with Dr. Osterholm's welcome and dedication.

**Michael Osterholm** [00:01:28] Well, thank you, Chris, and welcome to all of you listening today. I appreciate you being with us. As we say each week and said with sincerity, we appreciate so much the fact you take time to be with us to get this information on where we're at with the COVID pandemic. You know, I've thought a lot about these dedications and, you know, what they mean. And clearly, they're very personal. And this week's was probably one of the most personal ones, because this actually is an event that happened in my life with someone who I care about very much. And the fact that they were asked by their mother to take them to a doctor's appointment. This is an elderly woman who clearly needs to be seen in the clinic. And this individual who happened to be a daughter was actually somewhat reticent and and was concerned and felt like I you know, I truly want to take care of my mother and support her in any way possible. But at the same time, I'm concerned going into a doctor's office with the other people there who have been infected and, you know, what's the risk for my mother? What's the risk for me? And, you know, I think we don't give nearly enough credit to all the caregivers out there for the elderly and the disabled who are not part of a long term care facility or some type of organized professional services for individuals who need this kind of support. God bless you. You are very critical to what we do. But it's all the family members. It's all the people who are worried about will I take this virus to my mother or father or my grandfather or grandmother? Will I take it to Uncle Joe or Aunt Betty? What risk does it put me in if I, in fact, become infected? And, you know, it's not just as simple as, quote unquote, providing care, or bubbling these individuals who may be at increased risk of severe disease. I hear that all the time. If we just bubble the elderly, you know, we could just go on with life. And, you know, it is just not that simple. And so this dedication is really to all of you who struggle with the very best you can to help support those who clearly need our support, who they themselves are struggling. And so when you have to make a hard choice or you have to think about what does this mean? You know, again, this is the kindness and the outreach I think we all need to have. And if there was ever a time that those who are elderly or who have disabilities that need the kind of support that many of us can provide, even though sometimes that may be a difficult moment to do just out of our own fears, this is dedicated to you.

**Chris Dall** [00:04:16] Mike, COVID-19 cases are on the rise again across the country, and you recently told Fox News that this fall is going to be the biggest spike of all. Is that just due to the combination of kids being back in school, colder weather, a nationwide coronavirus fatigue, or are there additional factors?

**Michael Osterholm** [00:04:33] Well, we all recognize we're on a journey. We've been talking about that from the very first podcast. And unfortunately, this journey has been challenging, as we all know, where we've been from March, April to now. And, you know, I only see this journey getting more difficult. And we just have to understand that, because as we're in this long term marathon, it doesn't help to try to address it as a sprint. And in that regard, what we're really talking about is like I just want to remind people that, you know, we went through that period in early April when it was a house on fire, you know, thirty two thousand cases a day. And we thought it couldn't get any worse. And then with the lockdown, as it was called, and with the attention paid to distancing and how important that was, we drove cases down to twenty two thousand cases a day. And I use that term drove down with a little bit of sarcasm because we really didn't do a hard lockdown to get cases down as other countries around the world did. And then after we hit the twenty two thousand cases at the Memorial Day weekend, you know, we basically had pandemic fatigue set in. And I'll come back to that in a moment. That, to me, is just tired of being locked up. We also saw with the various protests the idea that being out was now the norm again. And with that, we saw what happened. We opened up the economy, as it was called. Electoral officials decide to remove restrictions. And lo and behold, we suddenly found ourselves at almost sixty seven thousand cases a day in mid to late July. Now, at that point, remember, we thought it couldn't get any worse after thirty two thousand cases a day. And then, of course, the same kind of effort came into play. The media was covered with stories about how bad things were. The intensive care units and some of the states like Florida, Texas, Arizona, they were overrun and we saw distancing take place again. We saw people responding with that type of concern that did lessen the risk of transmission. And lo and behold, cases then went from the sixty seven thousand a day down to just before Labor Day of about thirty two thousand. And we recall back in July and this very podcast we talked about why the fall was going to be the big problem in that Labor Day would end up being, in a sense, another Memorial Day. And sure enough, that's exactly what's happening. Right now we have a combination of factors coming together. And I just have to be honest and say the worst is ahead of us. I'm convinced the numbers we're going to see are going to climb substantially. And why, Chris, you asked which of the factors come to play here? Surely there are a number of them that are actually overlapping each other and causing us to have this enhanced transmission situation. One, of course, is the colleges and universities coming back and the number of young adults who are socializing in the exact ways that enhance the transmission of this virus. Big crowds, some indoors, socializing, close face to face contact. The challenge we have and we'll talk about that in a moment, is that they don't just contain the virus within their own group. They then spread it through the community. And we've surely seen examples of that. And I'll talk about that in a moment. Then in addition, we've gone through another stage of pandemic fatigue. Now we're at a point where it's the fact that, you know, it hasn't happened to me yet. And I've been doing these things each week, as we've talked about in the past, in terms of behavior, if I just fudge a little bit more this week, nothing bad happened. That becomes the norm. The next week, I fudge a little bit more. That becomes the norm. And pretty soon, you know, I'm pretty much back to where I was in everyday life before the pandemic hit. And then we're hitting a whole new category. I just made this term up in the past week. We're hitting pandemic anger and this is in part roughly a third of the population, it's been estimated, that believes that this is just a hoax. This entire situation, it's just a political issue and it's people who are actually angry about what's happened in their lives because of this pandemic. And some of them are incredibly legitimate concerns. People have had major economic losses. People who have basically seen their lives turned topsy turvy. There are those that just believe that public health people like me and others. And this is why so many of us receive the kinds of very difficult communications from these people believe we just are doing something so negative to society for no basis or reason. And we still today are sitting on top of a situation where racial inequities put so many people at high risk for this virus in terms of the transmission of it. And so if you put this all together and mix it in one big cauldron, it is a toxic, toxic brew. The transmission is going to be enhanced substantially over the course of the next weeks to months. Then you add in finally, the one last ingredient of indoor air as we're getting closer to the fall. And, you know, I'm convinced that we could sure surpass the numbers of cases that we saw in the peak that we had in July. And this is going to be something that's going to cover more than just a few states in terms of very high numbers of cases. If you look at just what's happened, just in the last month, and going into this now late September time period into early October, just look at the top 10 states right now in terms of the number of cases they have per hundred thousand for a seven day rolling average. So if you add it up, all their cases for seven days, divided by seven per hundred thousand. You've got North Dakota right now at fifty five cases per hundred thousand. South Dakota, 46. Wisconsin at 40. Utah, 33. Iowa, 30. Montana, 28. Arkansas, 28. You know, this is not just, you know, the classic blue states, large metropolitan areas. And if I go down the list, there's actually a total of twenty seven states that are at 20 cases per seven day moving average per hundred thousand population. And a number of these states have incredibly high rates of positivity every day on their samples that are being tested. South Dakota twenty five. Wisconsin 18.7. Utah, 13. Iowa, 17. Idaho, twenty one. You know, Wyoming, 13.5. You can go down this list here. And you can see that it's not a function of just more testing. It's testing that is finding more infected people because the percentage positive are staying so high. Well, you know this, if you look at across the country, this looks to me very much like what it looked like in early July. And it may not be the same regions, although I think you're going to see as we are looking carefully at states like Texas, which are coming back pretty substantially, that, in fact, we are going to see big increases. And in large part, it's all about that toxic mix of pandemic fatigue, pandemic anger and people not doing what they should do. And what do I mean by doing what they should do? They need to think all the time about crowds, where they're at, who they're with. If you look at the epidemiology of what's happening right now, it's bars and restaurants. It's family reunions. It's funerals. It's weddings. It's those kind of gatherings you get together. It's, you know, putting 8 young men into a van with a father who then drives them two hours to a sporting event. It's those kinds of things that continue to happen over and over again with greater frequency. And, you know, that just is a sense that, you know, this is not a real problem anymore, even masking. You know, I have encouraged masking, knowing that it is only one layer of protection. But when you outright don't wear a mask and in some parts of the country, it's the majority of people who don't, even want there are mandates. It's like, you know, forget it. We know better. Now, the problem with all this is it's not about I'm right, or they're wrong, or any of us on this podcast are right or wrong. You know, this is the whole point that we've been talking about from the beginning. This will not be a pandemic that will be remembered ultimately for blue states or red states or blue counties or red counties. This is going to be remembered as COVID colored states, COVID colored counties, more and more people who even those who don't believe in this pandemic will come to recognize when their loved ones die. And they will. And they will. And I just hope that we don't have to get to that point. But I fear we might. You know, I've said this before on this podcast, but just repeat it one more time, you know, we're all human. We all have those frailties of making good choices. And sometimes when we're feeling lonely and feeling unsettled, you know, we don't know necessarily always make all the right choices. At least I don't. But, you know, when I'm driving down the freeway, I'm late for an important meeting or a talk, I got to get on this podcast, I can't miss talking to all of you, and I'm going 10 miles an hour too fast, and I came upon an accident where they're trying to extricate somebody from a car. I see it. I go, oh, my God, this is terrible. Slow down. This is stupid. You don't need to drive this fast. And you know what? For the next two or three days I don't drive fast. I slow down. But then I'm back at it a week later. But it's very different. And I have personal experience of knowing families that have been through this. It's that two a.m. call in the morning when one of your loved ones has been killed by a drunk driver. You never forget that. Ever. Never, never, never forget that. And you work the rest of your life to try to address that issue. How do we today get that disenfranchized group that doesn't believe this pandemic's real, doesn't believe it infects them, to understand that it will. And as we'll talk later, we're not going to get saved by a vaccine suddenly. A vaccine could be a critical and hopefully a very critical tool in what we're gonna be talking about. But it in itself will not save us. So, you know, I worry a lot, Chris, about the fact that we look at where we're at today, and I just don't think we get it.

**Chris Dall** [00:15:48] So, Mike, do you see these same factors playing out in Europe right now as well?

[00:15:53] Yes, Europe, and for that matter, much of the rest of the world, are in a sense a microcosm of some of the issues we're dealing with here in the United States. As I said in previous podcasts, you know, we should have learned some of the lessons that the Europeans and Asian countries taught us about how they could drive down the number of cases and bring it under relative control. On the other hand, I think the European and Asian countries, to some degree, then learned our bad lessons of what we taught them about what happens if you let up too quickly. And I'm not suggesting that this is easy. As we'll talk about in a moment, New York is surely a challenging example in the United States of what can be done or can't be done with keeping case numbers down. But if we look at what happened in Europe, you can see that they did drive cases down well past our May time period. We did well into August. But then they started letting the the brake pedal up and in some cases relatively quickly, with the idea that it had been gone for awhile. And this is one of those viruses, it never goes. It kind of reminds me of the tune by the Eagles Hotel California, you can check out, but you can never leave. You know, this virus never leaves. And so I think what happens here is that we get too confident and that's what happened in Europe. If you look today, the European Center for Disease Prevention Control ACDC just added four more countries to this red list on the coronavirus map, meaning these nations have now crossed the threshold of one hundred and twenty infections per hundred thousand people in the last two weeks. Now, that's much lower than ours of, you know, looking at 50 infections per day, not two weeks, per day. So they're still much lower. But, you know, on Tuesday, the Netherlands, Iceland, Denmark and Hungary were added to those. We've now seen Spain, Czech Republic, France, Luxembourg, Belgium, the Netherlands, Iceland, Denmark and Hungary are all added. And I might add that the two countries, ironically, that are at the top of the list right now, Spain at three hundred and twenty cases per hundred thousand people and Czech Republic at 267, are the two most on fire countries in Europe. And they also happen to be the two countries who have had the highest level of community based masking of any countries in Europe. And so, you know, again, masking is important, keep doing it. But it just points out, unlike what has been said by some, that if you just mask, you can drive this thing into the ground. That's not happening in Spain, in Czech Republic. So I think that we just want to be aware of the fact that they still have a much better chance in Europe to drive down cases to that level they were before they quickly left the brake pedal up. And so I just want to be encouraging of this. But I also at the same time want to be realistic. One country I hadn't mentioned yet is Sweden. We're beginning to see activity pick up in Sweden. So for all those who said, you know, well, we just have to do what the Swedes do, just be careful. I think that the Swedes will experience over the course of the next month or two a substantial increase in new cases we see there. I also want to add that, you know, these countries in Europe are really right on the brink of where they might go. For example, England right now, which has about four times lower rates than we have here in Minnesota, but they're now seeing that with new restrictions put in place, the populations are pushing back. And, you know, it'll be interesting to see what happens there. There's a recent discussion in the last day that the head of the National Council, the orders of doctors in France have said if they don't turn the tide soon, the French health care system again risks being overwhelmed. German Chancellor Angela Merkel warned on Monday that that nation could see more than nineteen thousand two hundred new cases a day if the current surge is not stemmed. Last week they were averaging two thousand cases a day. So again, how they go will be very interesting. And I want to even point out that it's not just, you know, Europe, right here in North America Canada has seen a huge challenge. Quebec has now had a red alert issued for three of its regions. They were averaging about 120 to 150 cases in late August, early September. Today, they are reporting over 750 new cases. Montreal being at the center of that one. We look at Asia, we're seeing many of the same things. India continues to be, in a sense, a house on fire. They actually are at risk of overtaking us as the country with the most number of cases and deaths. It was interesting to note, however, in light of what's going on in India, they just issued yesterday a new seroprevalence study. We'll talk more about seroprevalence in general, but I just want to make a note here that they're estimating only seven percent of the Indian population has been infected based on those data. So here they are in the middle of, you know, what's considered a major catastrophe with COVID, and yet it's only impacted about seven percent of the population to date. Imagine what it could be if it gets to 25 or 30 percent. So the whole world right now is in a, what I would call, a very critical time period for is this going to go up or go down. And again, as we talk about vaccine, we're not going to be saved by it in the short term. And what we experience over the next four to six months is in our hands. And, you know, I'm optimistic that we can do things. We've had places like New York show us that. Doesn't mean it'll be perfect. But I also see the other side of this issue where we just throw up our arms and say we're done. And that will be a guarantee for more caskets this country has ever wanted to see.

**Chris Dall** [00:21:57] So, Mike, you just mentioned New York, which we've discussed often on the podcast and how well they've done in keeping their infection rate around one percent after getting hammered in the spring. Now, city health officials are reporting the infection rate is climbing above three percent, fueled by outbreak clusters in certain neighborhoods. Mike, what's your take on this?

**Michael Osterholm** [00:22:14] I have held out from the beginning of these podcasts my admiration or respect for the subsequent response by the New York State Department of Health and what they've done to deal with this in New York. We all know that they were a house on fire in April. There were choices made that some of you who are listeners here will regret mightily because you lost loved ones in long term care. I get that. I know that's true and I'm sorry, but if you look at what they've done since May, no other place in the United States and for that matter, almost around the world, have done what they did. They were able to drive the case numbers down to the point of less than one percent positivity. They had days with no deaths and they were all over this every day. If there was a slight uptick in case numbers or in the percentage of positives. And now even New York, as it is reopening under very careful conditions, are beginning to see increasing cases just in the last 10 days to two weeks. They're now investigating 20 of the state's zip codes where COVID hot spots have developed and they appear to be growing. The percentage of total tests returning positive, or the positivity rate, in some of these zip codes have reached 10 percent- far beyond the roughly one percent infection rate in New York, there's been reported for weeks. The cluster of cases that they're seeing in some of these areas are very different than in different parts of the state. For example, they have clusters in Brooklyn as well as Orange and Rockland counties. Some of these zip codes have five times the number of cases that just adjoining areas in New York City have. A lot of these have been associate with large Orthodox Jewish communities, challenged there to help bring us together. And of course, it occurs at a time where Yom Kippur and Rosh Hashana have occurred and we're worried about what that means. And so it even points out that, yes, this is not going to be simple and easy to control this. I will look very carefully at how New York State handles this, along with New York City over the course of the next several weeks to a month. And if there is any hope that we can really keep this contained, they're the ones that are going to do it. If they have a major challenge, then I think it does bode even more poorly for what we might expect for the entire fall, in terms what we could possibly do. So I'm watching carefully what New York does. I'm hopeful that they can help bring this under control and come down in this, and at the same time continue to open up parts of New York as they have. They may end up having to issue new restrictions, which I know how painful and hard that will be. But, you know, our hope that there is a model that works is New York and we're all waiting to learn from them, how they are able or not able to do that.

**Chris Dall** [00:25:06] On another point you mentioned earlier, Mike, the CDC came out with new data last week showing that from June to August, COVID-19 incidence was highest among 20 to 29 year olds, but also that increasing infections among younger adults preceded increasing infections in older adults by four to 15 days. So what does that tell you?

**Michael Osterholm** [00:25:25] Well, let me first comment on the report that came out of the CDC and the weekly Morbidity Mortality Weekly Report entitled Changing Age Distribution of the COVID-19 Pandemic- United States May-August 2020. You know, last week I surely shared with the audience my concerns about the leadership at the CDC and expressing why it was so important that CDC really serve as a kind of that light on the hill, you might say, of public health for the world, and that how much we've missed its expertise and the many, many people at CDC who are highly competent, very well-trained- some of the best minds in public health in the world. They were missing in action. This report is a reminder to all of us why the CDC is so important. It was an outstanding piece of work. It really took a lot of effort to pull it together. And my hat's off to the CDC professional staff that carried this out. And what they found was during the June through August time period, COVID-19 incidence was highest in persons twenty to twenty nine years of age and accounted for 20 percent of almost all the confirmed cases. Particularly in the southern United States in June of 2020, increase in the percentage of positive SARS-CoV-2 test results among adults age 20 to thirty nine years of age preceded increases among those age greater than 60 years of age by four to 15 days. And that this was really evidence that the younger population would serve and did serve as a source of transmission to those who were over 60 years of age. And it just reminds us why, when we see these trends right now of increasing number of cases in our college campuses and universities, we have to understand that the implications are both for the individual young adults who are infected, and remember, we talked just recently about long haulers disease and why I was so concerned about what would happen with them, but also then it is this carryover that occurs and the fact that we are beginning to see the pandemic in the United States play out more and more in the younger age populations. It was notable that in May of 2020, of the six hundred and four thousand plus cases, twenty seven point five percent of them were in those 60 years of age and older. So twenty seven point five. For June for the seven hundred forty three thousand cases, twenty one percent or age 60 or over. So down from the twenty seven point five. Then when you get to July of 2020 there, the one million thirty three thousand cases you actually saw about sixteen point one percent in those 60 years of age and older. And in August 2020, of the nine hundred thousand cases there, eighteen point three percent of the cases were actually among those six years of age and older. And I think as we head into September, October, you're going to see because of the big increase in cases in students at colleges and universities, that percentage is going to go up again in the younger age, down of the older age. But I think as we get in further into the fall, you're going to see this coming back. And where there is a higher percentage of older cases, we're going to see much more morbidity and mortality. And so I think this is a real challenge. So in short, what this study really I think pointed out, is that there is a relationship between who gets infected in this country first and how that drives transmission to others in the days subsequent to that initial infection.

**Chris Dall** [00:29:13] Another study came out last week in The Lancet showing less than 10 percent of a nationally representative sample of dialysis patients had antibodies against COVID-19. Mike, did these results surprise you at all?

**Michael Osterholm** [00:29:25] Well, anyone who's been listening to this podcast and who keeps asking me what inning are we in- and, you know, I've been saying I think we're in the fourth inning now -won't be surprised by these results. And these are not the only results that are coming out to support this information. This study, which actually looked at dialysis patients across the United States and took samples from them, found again, just slightly less than 10 percent of the sample had antibody to COVID-19. And in that regard, I think it's a good estimate of what's out there. Now, some will say, and I agree actually with this, that this is a little bit like having the freezer feeder in the oven and average your temperatures just right. I say that because those who are undergoing renal dialysis also are people who realize they're at high risk for a serious outcome with this infection. So they've probably everyday life doing more to bubble themselves, to protect themselves than the average. Not as likely to be out at the bar scene or, you know, even eating out at restaurants. At the same time, they are probably more likely to get infected just by being three times a week potentially in the public area around hospitals, dialysis treatment facilities, etcetera. And so the chance of getting infected there is slightly higher. So in the end, I think the to kind of cancel each other out and I would say that this is a pretty good sample. It also is so, because there is a study coming out from the CDC and soon, I hope, that has looked at samples from blood banks and find that blood donors, in looking at their positivity, fits into the same 10 percent range. Now, this is important because it's what, as you know if you've been listening to this podcast, I've been saying. I just changed literally about three weeks ago from eight to 10 percent, from 10 to 12 percent of the people, I think, in this country have been infected with this virus. And I keep saying over and over again to the point where I'm sure you're numb I'm hearing this, but, you know, think of all the pain, suffering, death and economic disruption we've experienced to achieve 10, maybe 12 percent of the population being infected. Clearly, in some areas of the country, such as some of these zip codes in New York, it's much higher. It's in the high 20s potentially at that point. But nowhere in the United States have we gotten close to the 50 to 70 percent of the population that I still maintain would have become infected and develop some durable immunity, or be vaccinated and develop durable immunity, to actually see herd immunity develop. Again, remember what herd immunity is. It just means that you have enough rods and that virus reaction of immune people that slows down transmission. It doesn't stop it. It just slows it down. So I think you could still have a population where you could easily have 70 to 80 percent of the population infected. It just may slow down as it gets towards that 50 to 70 percent. So if you look at this, the data from several studies in Europe that are looking at this have found roughly the same thing. We've also I just mentioned earlier in the podcast about the seven point one percent positive rate in India. This really reinforces that all these studies are really coming up with the same answer, that no matter how much the house has been on fire, it still has only consumed a very small part of the human wood out there to burn. And we have to understand that. I will talk more about this when we get to the discussion about vaccines. But this is the contribution we've had right now. Vaccines never showed up. We have a long, long ways to go to get to that 50 to 70 percent. And I hope, again, the public understands that when they say, I don't know anybody who's had this or nobody I know has been severely ill, wait till I get to 25 or 30 or 40 percent. If it's going to happen through natural infection, you will know someone. You will know someone. And, you know, that's a hard thing to say right now, because the last thing you want to do is have it come true. I know as surely as every day I've ever gone to work, that that will happen if, in fact, we don't do more to protect ourselves from becoming infected with this virus.

**Chris Dall** [00:33:45] We received an interesting email this week from a health director at a U.S. Army Base who had a question regarding a COVID-19 vaccine and what the end of the pandemic will look like. How should we in public health be talking about the end of the pandemic? With increasing vaccine hesitancy and immunity data suggesting partial and potentially short lived immunity, will we see less of a clean end of the ball game scenario and more of a slow rolling, getting better over a long timeframe scenario?

**Michael Osterholm** [00:34:12] Well, at this point, the scenario is still has a substantial number of unknowns, which will have a big impact on how it ultimatly plays out. Not just for the next year, but literally for many years to come. Let me just give you several different scenarios of which any of them could play out in the future. And we're going to have to see which ones they are. We should prepare for all of them. The first one is one that I've already mentioned in this podcast and one that is now taken on much more significance in the events that have happened over the course of the past several weeks, and that is that there is a decision made by the administration to bring forward a vaccine before the first week in November using the secretary of Health Human Services Authority to issue an Emergency Use Authorization even without the company's desire to do so, or the FDA has approval from the scientific overview. There could be a claim made that some people have reviewed these data and said that there's sufficient to call for that authorization. The president has the authority under the Defense Production Act to require that particular pharmaceutical manufacturing company to go ahead and make the vaccine. They couldn't stop from doing that necessarily. Now, we all know that that would be a crazy situation, likely involving lots of litigation. I think it would send a very dangerous message to the public because I believe that most public health professionals who are involved with this work would stand up and say, no, this vaccine is not ready for prime time. We do not have adequate information about either its safety or its effectiveness, which would then cause the public to even have more concern than the 50 to 60 percent now that say they're thinking about not taking the vaccine. That would be, I think, a major injury to our ability to deliver a safe and effective vaccine, even weeks to months later, when such evidence may be apparent that we do have safe and effective vaccines. So that's one scenario that if in fact that happens, I think vaccine uptake in the first year could be extremely limited in this country because of the confusion at that situation would create public health, say no and then saying yes with the same vaccine separated by weeks to months apart. The second scenario is even if that doesn't happen, and we do have vaccine that is approved sometime later in the year, it will take a substantial amount of time to ramp up all the production that we can for that vaccine, or multiple vaccines that have been approved, and deliver those to the American public. Again, starting with what we believe will be the highest priority will be health care workers. But even that has not yet been decided at the state and local level. I do believe that we're well into the third quarter before we can get most people vaccinated that would want to be vaccinated. Which then leads me to the second point. Who wants to get vaccinated? If we see this persistence of concern about vaccine safety, also, I have to say, I have now seen some of the adverse effects of Bob Redfield's comments to the Senate hearing recently where he said, 'if I just wear my surgical mask, that maybe, you know, more protection that I get from a vaccine', I'm hearing people say now, and I'm getting a lot of e-mails about this, that, you know, 'I'm not going to get vaccinated. I don't need to just wear my mask and I'll be fine. I don't have to worry about the safety issue.' So if there's a series of these kinds of things that detract from people's willingness to get vaccinated, you know, it would be a stretch maybe to get 50 percent of the population vaccinated. Well, if you have a vaccine that is 50 to 70 percent effective at most and you have only 50 percent of the population gets vaccinated, that means only 25 to 35 percent of the population will be protected from that vaccine. And that even combined with what we've seen for number of cases to date, still falls far short of what we would need basically for a really a solid herd immunity. And so you can see this dragging on for the next year and we're still having a lot of activity. On top of that, we're going to see a number of the middle and low income countries that are not going to have access to this vaccine potentially for several years. You know, I'm part of a group that's been looking at the availability of vaccine by country and manufacturing capacity, and if you take every bit of manufacturing capacity we have right now and you allocate it to this vaccine production, depending on which type of vaccine is ultimately going to be approved, and you don't cannibalize other critical vaccines like childhood immunizations that need to be done, you're still talking potentially 2023 to 2024 before you'd have enough vaccine for the world. So the pandemic is going to keep raging on in many countries of the world. And as we all know, if there's a virus somewhere in the world tomorrow, it can be anywhere in the world. So even just protecting ourselves with the idea that the world is going to need to get vaccinated so that we don't see it continue to spill in other countries will be a long time. So I don't know where this is going to fall out. In the ideal world, we'd have an 80 percent, 90 percent effective vaccine, 90 percent of the population would take it. And waloo, we're gonna be in pretty good shape. I don't think that's going to happen at all. Then the final piece that comes back to this issue, and you asked about this short term immunity, we're still waiting to see what happens in terms of reinfection and the durability of this immunity. Let me just say right now that, you know, we're hearing about more and more cases or two more announced today from India of confirmed reinfections, where a first virus, a second virus with the second illness were available. This happens so rarely that anybody would have even one virus available for analysis, let alone two for two consecutive illnesses. And so I think that we're going to see more and more potential breakthroughs. We don't know how much. We don't know what it will be like at four or five months versus eight to 12 versus 16 to 24. We just don't know for either disease or for vaccination. So this surely is another challenge. The bottom line message is we have to be prepared to be in the long haul with this thing. You know, I know that's not what you want to hear. I know that that's complicated. But our lives are going to have to adjust. We can not accept the fact that by next year, at this time, everything will be hunky dory. I hope it would be, but I don't think it's going to be. It's hopefully going to be better. But the bottom line is this is going to impact us for a long time to come. And, you know, we're just gonna have to keep planning for that and plan for it in a way that is not just about addressing the virus, but about addressing society. Mental health wise, I can't even tell you what I think about what this could be like a year from now if we don't have some relief in terms of the pressures and the anger and the concern and the confusion and the fright. So this is part of that whole scenario. So thank you for asking a great question. I'm not sure how well I answered it other than to say I just don't see the final answer yet. These are all possible scenarios that could play out that any of them will still be a challenge.

**Chris Dall** [00:41:53] All right. So now to the questions about travel and the upcoming holidays. I'll start with another listener e-mail. This one from Lisa who writes, 'My question is about air travel. How safe is it? My mother, who's ninety one, lives alone in Florida. So far, I've not traveled down to her. There may come a time before this pandemic is over, based on your 12 to 14 month projection that I will need to go down to her. It's a three hour ride. Is there a way to protect myself? Would I need an N95 mask? Would it be better to drive down? If I drive, are public bathroom is safe?' So Mike, what do we know about coronavirus transmission with travel in the weeks to months ahead?

**Michael Osterholm** [00:42:30] This is a very difficult one because the information is quite incomplete. And let me just tell you that I wrestle with this from a very personal perspective. You know, prior to this pandemic, I was almost a two hundred thousand mile a year flier. I spent a lot of days, not just hours, days on airplanes. I've not been on a plane since March. And I don't have any interest in getting into plane right now. Now, I'll try to be very measured in my comments because I understand the implications they may have for the travel industry. I surely don't want to create, you know, some kind of controversy about this, but I think that there's still a lot of unknowns and uncertainties about let's just cover air travel first. I actually have had experience with infectious disease and air travelers, having worked up several outbreaks when I was at the state of Minnesota, or at least potential outbreaks where airplanes were involved. One of the most notable cases was an individual who flew from Europe to Minneapolis, then on to the Mayo Clinic with a highly drug resistant TB and HIV. And it turned out that on his sputum when he was seen at the Mayo Clinic, it was a four plus. In other words, it lit up like a Christmas tree. And so we had grave concerns about the potential transmission there. I've worked on measles situations, etcetera. So I will just tell you one thing that planes today, the air quality is much, much superior to what it was several decades ago. And people were even allowed to smoke because the filters in the planes actually clogged up quickly with the tar in nicotine made the filters largely inoperable at that time. So what happens in a plane? Let's just take where you're seated, what's going on. This is actually a good news situation. The planes do have a ventilation system that actually meets requirements for even COVID patients in isolation rooms. They have anywhere from 10 to 12 air changes per hour. The air actually comes out of the top. And this is why that air coming outside of your vent can be important. And then its basically driven to the floor and then it goes into the side of the body of the plane and into the filters recycled back. Depending on how the plane is being run, and what I mean by that is there's what we call bleed air, it bleeds off the engine, which actually takes more energy to have more air recirculation, but it delivers about 50 percent air from the engine, 50 percent recirculated air, with that recirculated air going through that HEPA filter. And so from that perspective, actually, this is a pretty good situation. If I had to be seated next to somebody it'd be a lot safer than being seated next to, for example, in a theater. But it's not a guarantee. If you're sitting next to someone who is infected, you don't know who they are and you both are masked, you still have a real possibility of becoming infected, given that the low dose likely of infection for SARS-CoV-2, could very well happen there even before the virus was driven into those next filters. So at this point, I would say the airline industry has done about as much as it can in terms of the planes themselves. But clearly, we can't say no. We can say it truly is a much safer event than, say, riding on a bus or something like that. So the challenge we have then is what does this all mean? Well, don't forget, the travel is much more than just sitting an airplane, even with a mask on. It's getting to the airport if you take a cab. It's in the airport terminal itself. It's what I often jokingly say is the cattle car at the gate. It's getting in close contact with the people coming down the gate down to the jetway. It is waiting for your bags at the baggage claim. It's all of those things that also add to this. And then when you are somewhere else, the question is, are you actually in a private residence or in a public area? Are you eating out at restaurants, etcetera, etcetera? That's been one of the challenges of trying to understand what the risk of transmission has been. There have been several studies now done of what appeared to be isolated, and I want to emphasize isolated outbreaks on planes of one or two people sitting next to someone who was infected, but today, you can't know who is infected on these planes. You just don't know who that person is sitting next to you for three hours. And if you have your face cloth covering on, you know, again, you're going to be afforded potentially some protection if they have one on, but as I said, I don't believe that's going to be nearly enough necessarily to prevent you from becoming infected. So what do we need to know? Well, first of all, we really have very, very poor data on who's flying and who's getting infected and what the potential risk exposure might be. Health departments are strapped to look at this issue. We've looked at health department collected data, a very outstanding story in The Washington Post, did a similar kind of analysis. And the bottom line is it's really incomplete because first off, I'm flying and I've become positive three days after my flight and I become clinically ill, five days, whatever. Was it the flight that did it? Was it at the airport? Was it in the cab? Was it some other part of that experience that got me exposed? And we just don't know. In addition to that, if you look at just how many people have been exposed to someone on a flight, this is where the CDC basically in this September 19th article by Ian Duncan in The Washington Post, really laid out the fact that there had been at least 11000 people who had been exposed to coronavirus on flights for which we have very poor information about who they are. Did they fall ill with this infection? What are their testing, etc.? So my bottom line message on a plane right now for those in the airline industry, I surely don't want to make life difficult for you, but I will avoid flying for as long as I can at this point until we have hopefully a vaccine that is going to be much more protective and reduce the number of infected people. Do I think that the airlines industry is doing what it can to reduce transmission? I think so. I think the do not fly list for people who won't wear a mask is fair. I support that issue. I would love to see right now more studies done, particularly seroprevalence studies done in flight attendants. Let's see if they are, in a sense, the canary in the coal mine, unfortunately, I hate to say that its not meant with disrespect, but if they're showing up with an increased percentage of people positive, that gives us some evidence that, in fact, airline flight is a challenge. We don't have those data. Those data should be collected and should be part of an ongoing assessment, as critical as this is. So from that part of travel, I have a challenge. Now, let me take it to the road trip up travel. That's where you're in your vehicle, you're traveling. And I think actually that can be done much more safely. You know, if you're going from point A to point B, even several nights long, I think that you surely can pump gasoline safely. The one challenge will be using the bathrooms. I understand that. And, you know, that's in and out, clearly wearing the mask in and out. But it's also one where, you know, again, unless there is someone who is in there just prior to you and ventilation is very poor, the idea of the very limited time period of using the bathroom is such that I believe that the risk of a infectious dose exposure is quite low. Staying in hotels, you know, if someone hasn't been in the room and the ventilation system has been working, I don't worry about the surface contamination, as we've talked about before. Part of hygiene theater, I worry about the air and I find those rooms not likely to have enough virus, even if the housekeeping people were in there several hours before to be any kind of a challenge in terms of transmission. So I think you can stay at a hotel, you know, check in quickly, mask. Don't wait around. And so if I were going to travel right now, that's how I'd do it. I would see the world in a car or an RV or whatever you want to do. And so to answer your question about, you know, should you go see your mother or not? Lisa, I would say please go see your mother. Don't wait. Go do it now. You know, do it twice. Do it three times. And if I were you, I would get in a car and travel. And that to me would make me feel most comfortable. You know, take time right now you say, well, it's a lot easier to do a three hour flight to Florida than it is to drive there taking two or three days. You know, this is COVID time. Use it. And so I would say that's the one thing I would do. And at this point, I will know when I personally feel whatever this intangible is that I have between my professional knowledge and my personal feelings is when I can go back into an orchestra hall and feel confident when I listen to the music or watch the play that I'm comfortable being there. And that when I get back in an airplane. And when that happens, you know, then I'll know I'm there and I'll share that with you.

**Chris Dall** [00:52:11] And then, Mike, how should people be thinking about the holidays this year? Should we consider smaller gatherings, and will this all depend on what case numbers look like in November and December?

**Michael Osterholm** [00:52:21] Well, it will depend in part on what the case numbers look like, but I'm telling you right now they're going to be a problem. OK? It's not going to suddenly be magically different, if anything. I'm not sure it'll be worse. It surely could be worse by then than even now. Again, depending on what happens with that peak that I think will occur in October, early November. Plan now, this is the time to plan. Families are already under enough stress. And this is a time when we all revel in getting together, whether it be Thanksgiving or Christmas or any of the other religious holidays. And, you know, the last thing you want to do is on the Monday before Thanksgiving, have a big debate about are we all going to get together at grandma's house? You know who's bringing what? Whatever. I don't feel comfortable, confident. I don't think this is not going to be easy. Some people will find any kind of restriction on what was normal holidays as being irresponsible and without a basis. Others will wonder, how could you say that? You know why would you expose grandma or grandpa to this virus potentially? Don't tell me when you bring in the three kids who are in junior high and high school or you yourself, who is in a work setting, aren't infected. We've already seen way too many of those experiences. This picture show has shown too many times already. So I would say plan on your COVID holidays, meaning that in any way you possibly can, again, supporting particularly those who have been sheltering in place who don't have the ability to be out and about do what you can to interact with them, knowing that it's going to be cold. You know, if you can even get together on the back porch outside, you know, count on that. But to be very careful and have these discussions now. I don't have a magical number because I, in my own family, we're working through this issue. Of what would we do? How would we do it? Who has contact with who? But by starting it now and realizing that it's going to be soon when we're going to be finalizing Thanksgiving plans, you know, it's less than two months away. You know, people are going to travel on an airplane. Well, you know, what risk does that pose? And I just got done saying that. Well, you know, my sister Suzanne and her husband Bob are flying here from Atlanta. They'll be here for a week. You know, do I feel comfortable being with them after they've been on the plane and through everything without even know anything else? And then they're going to be staying at mom and dad's house? You know, I think these are going to be challenges. And so start the discussion now. Think about it. Try to be understanding. Try to be tolerant. But don't be too accepting. Don't bend just because people are trying to push you into an uncomfortable situation. I think this is one where you can feel every bit of confidence to say, you know, this is the right thing to do for this year. This is our COVID year. OK. We're gonna just do it different this year and we're not going to be one of those households that are going to later on ask ourselves, oh, my God, why did we do that? You know, here's dad in intensive care unit. You know, that's not what we want to do.

**Chris Dall** [00:55:37] Closing thoughts this week, Mike?

**Michael Osterholm** [00:55:40] Yeah. Again, thank you very much for being with us. We appreciate it so much. Thank you for all the very, very kind e-mails, cards, notes. The staff, as I've shared with you, find a great deal of comfort in the words you share with us. You make me believe that this world is more good than not. When I see the kinds of things that are shared and what you're doing. A couple of things to note is that number one is that we would like all of you, if you will, to think about sending us a brief couple of paragraphs if you've had someone in your life who you've loved and cared about, who died from COVID. We won't use, you know, any identifiers beyond first names. We would like to highlight every week someone who is special to you, who died from COVID. You know, make this a more human story. You know, I get in here and talk about all these crazy facts and numbers and so forth. You know, let's humanize this, if we can, a bit more. And, you know, for those people who have lost loved ones, colleagues, that's one way to do it. So, please, if you would consider sending to The Osterholm Update website or the e-mail that kind of, you know, several paragraph, just tell us why they were so special and the circumstances. And we would love to hear that. The next thing I just want to say again, also, you know, you hear me say this over and over again, but if there's ever a time where we need to be kind and patient, it's now. You know, try to find the good in even those that you have had in the past, a challenge finding good in. And, you know, just do what we can to make this a better place. This country's only going to get more tense as the next few weeks go on, as case numbers start to increase even more. So it's going to be more and more challenging. And so I just, now is the time for us to, you know, as I would say right now is, you know, spark that pandemic of kindness. Thank you. And it's also one of just perspective of where we're at and who we want to be. And this week's poem I'd like to use is actually from Trish. Thank you very much, Trish. Trish is actually from Melbourne, Australia, and she sent this to us, and she actually closed her email to us, is that I think in of itself is priceless. She said, 'Stay safe. Be brave. Life is joyous.' And the poem she suggested this week is from Rudyard Kipling. You may know him as English journalist, a short story writer, poet, novelist. He was gifted with words in many different venues. He was born in India back in 1865. He died in London in 1936. He wrote some very famous novels as well as short stories, The Jungle Book, The Man Who Would Be King. He wrote one poem that has meant a great deal to me that Trish shared entitled 'If'. It's kind of the ultimate inspiration poem, it's about how to deal with different situations in life. So 'If' by Rudyard Kipling. You can keep your head when all about you are losing theirs and blaming it on you. If you can trust yourself when all men doubt you but make allowances for their doubting, too. If you can wait and not be tired by waiting. Or being lied about don't deal in lies or being hated, don't give way to hating. And you don't look too good nor talk too wise. If you can dream and not make dreams your master. If you can think and not make thoughts your aim. If you can meet with triumph and disaster and treat these two impostors just the same. If you can bear to hear the truth you've spoken twisted by knaves to make a trap for fools or watched the things you gave your life to broken and stoop and build them up again with worn out tools. If you can make one heap of all your winnings and risk it on one turn of pitch and toss and lose and start again at your beginnings and never breathe a word about your loss. If you can force your heart and nerve and sinew to serve your turn long after they are gone and to hold on where there is nothing in you except the will which says to them. Hold on. Or if you can talk with crowds and keep your virtue. Or walk with kings nor lose the common touch. If neither foes nor loving friends can hurt you. If all men count with you, but none too much, if you can fill the unforgiving minute with 60 seconds worth of distance run. Yours is the earth and everything that is in it. And which is more, you'll be a man, my son and a woman, my daughter. Rudyard Kipling. Thanks again. Be safe, be kind, be tolerant. Just think about all this we have going on right now. We need you. We need you. So stay strong. Thank you.

**Chris Dall** [01:01:16] Thanks for listening to this week's episode of The Osterholm Update. If you're enjoying the podcast, please subscribe, write and review and be sure to keep up with the latest COVID-19 news by visiting our website, CIDRAP.umn.edu. The Osterholm Update is produced by Maya Peters, Corey Anderson and Angela Ulrich.