

# Retrospective Contact Tracing: How States Can Investigate Covid-19 Clusters

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Dr. Margaret Bourdeaux: Welcome everyone. I am thrilled to go ahead and start. So welcome, everyone, to the seminar on retrospective contact tracing, co-hosted by the Berkman Klein Center for Internet & Society, Harvard Medical School's Program and Global Public Policy, the National Governors Association and Partners in Health.

I'm Dr. Margaret Bourdeaux, and the research director of the program and global public policy at Harvard Medical School. And I co-chair the Berkman Klein Center Digital Pandemic Response. I am thrilled to welcome all of you to our first seminar and what I hope will be a series that focuses on practitioners and implementers of the COVID response.

I'd like to welcome today Dr Hitoshi Oshitani who's a member of Japan's novel coronavirus disease control subcommittee. His pioneering work has helped to develop the retrospective tracing methodology, he will present today on this methodology, how it was developed, and how it is being implemented in Japan. I think that before I turn it over to him, I should note that we are really happy to have him here because, as I think many listeners know we are in a very difficult position here in the United States when it comes to the COVID epidemic.

We yesterday had more cases reported in the country, I think overall, if not at least since its first peak in April and we are at a moment where we really need to think about what we're going to do over the next couple of months. So, I've always maintained, and I know Berkman Klein Center and Harvard Medical School has always maintained that we are not helpless before this epidemic that there are things that we can do and public health strategies that we can develop and implement and that will leave us in a much, much better place.

And so many of you have heard me talk about sort of the three-legged stool approach to the public health response. With one leg being these environmental modifications that we can make, ventilation, air filtration in our buildings to make transmission less likely. The other leg being the public health population-based strategies of asking people to adopt behaviors that will protect them, like mask wearing or wearing PPE in appropriate contexts. And then the third leg of contact tracing, which is where you try to interrupt individual chains of transmission to decrease forward transmission.

But the thing we haven't talked about so much is the seat of that stool, of that three-legged stool, which is really health intelligence and how you understand the epidemic, where it is spreading, how it is spreading so that you can refine each of those three legs of the stool.

And in some sense retrospective contact tracing is one approach to helping build more robust health intelligence during the epidemic and not only helping you with your basic contact tracing approach as well. So, without further ado, I'll turn it over to Dr. Oshitani.

Dr. Hitoshi Oshitani: Thank you, Margaret for the kind introduction. It's my great pleasure to be at this seminar to share our experience in Japan. I'm going to share my slide. I hope you can see my slide, right. So I'm going to talk about the cluster based approach in Japan, focusing on retrospective contract tracing.

So, these are the early findings of COVID-19 in Japan. Among close contacts we had a very low positive rate, 1.3% in early cases, early--the close contacts. Similar findings were obtained in China and also the chain of transmission patterns were analyzed in the very early clusters, in February in Japan, which showed that one individual infected many others, and many other infected individuals did not pass the virus to anybody else. These are the early findings.

Also, Doctor Nishiura, Hiroshi Nishiura had some preliminary data which suggested that the majority of infected individuals did not pass the virus to anybody else. And the small proportion of the infected persons, infected many others. And this over-dispersion characteristics of COVID-19 was also shown in other countries, other places like Hong Kong.

So that was the basis of our cluster-based approach. And if there is no cluster or super spreading event, the no--there is no sustained outbreak. But the only when the chain of clusters is established, that's the time, that's the situation where we can, we have sustained outbreak of COVID-19.

And the prospective contact tracing are done like this and if you find confirmed cases that you identify the contacts, and among contacts, you are trying to identify the cases, COVID-19 positive cases but as I mentioned the positive rate is quite low.

Dr. Hitoshi Oshitani: And probably one or two contacts may be identified by the prospective contact tracing, but the cluster that can be found by identifying that ten or so confirmed cases, you need to find many more confirmed cases to identify the clusters.

And also, another tricky part of this virus, COVID-19, is the invisible nature of this virus. Before SARS, the majority of infected individual developed very severe pneumonia, viral pneumonia. That's why we could identify almost all chains of transmissions, and we managed to interrupt all chains of transmission.

But for COVID-19, there are many mild cases or even asymptomatic cases, which makes this virus more difficult to identify. And this invisible nature is another challenge for COVID-19. And also, there is a significant difference between COVID-19 and SARS in terms of infectivity. For SARS, only when the patient developed very severe symptoms – that's when they had infectivity. But for COVID-19, the peak of infectivity is believed to be before the onset of the illness. So this also makes this virus more difficult to control.

And in retrospective contact tracing, when we find the one confirmed cases, we try to identify the source of infection. As I mentioned, if there is no cluster or super spreading event there is no sustained chain of transmission. So there must be the cluster somewhere around each case. So we try to identify the source of infection. Which in many cases, is a cluster or associated with a cluster. So this is Retrospective Contact Tracing.

So in Japan. We are also doing prospective contract racing, but we are mostly focusing retrospective contact tracing, which identifies the common source of infection. And the contact tracing in Japan is mainly done by the public health centers. There are the over the 460 public health centers all over Japan.

And there are more than 28,000 officers stationed in these public health centers. Including more than 8,000 public health nurses. And these public health nurses are mainly in charge of the contract tracing, and the retrospective contact racing has been done as their routine work, for investigation of particularly the tuberculosis cases, as you probably know, we are still having many TB cases in Japan. With TB, identifying the source of infection is very important. So that's why they are used to the retrospective contact tracing. And actually from the beginning the public health nurses have been doing the retrospective contact tracing.

And then this is a diagram for our contract tracing. In addition to identifying the secondary cases from the confirmed cases, we try to identify the source of infection by asking their activities in the past 14 days.

And probably 14 days is too long, and in most cases we identify the source within five or seven days before the onset. But in some cases we identify the source nine or 11 days

before the onset, but for many cases we identified the source three to five days before the onset.

And then by doing this approach, one objective of this approach is to interrupt the chain of clusters. And it is usually when we identify the super spreading event. There are some secondary transmissions from the cluster, but we still can interrupt the chain of transmission from the cluster.

And we also try to identify common characteristics of clusters. We have identified many clusters in Japan. And so these are the most important common characteristics, of all of the clusters. Closed spaces, crowded places and the close contact settings. And so these are now known as [Japanese] in Japanese and the “Three Cs” in English and even the primary school kids know about this concept, and the public was asked to avoid these risky environments to reduce the number of clusters.

Dr. Hitoshi Oshitani: And the further analysis of clusters identifies some additional risk factors such as exercise, talking in loud voices, singing and also night-life settings. And also we identified those who were likely to transmit the virus to others. So these are the characteristics of the primary cases of the cluster. The primary cases tend to be young, in their 20s and 30s, although the average age of the total cases were much older, so they are probably more infectious because they are more active. And the majority of primary cases, more than 40% of the primary cases, were in their pre-symptomatic phases.

And we are analyzing more cases in Japan. And over 17,000 cases have been analyzed and the pattern is still exactly the same. With over three quarters of the cases, the virus did not pass the virus to anybody else. But a small proportion of infected individuals infected many others. Sometimes more than 10 people.

So the secondary cases are generated by relatively older people, and from the children, the percentage of the cases that are generating secondary transmissions was quite low.

And this is the epidemic curve of Japan as of November 10, and we had a first outbreak, the first wave of outbreak from February to May. And the second one started at the beginning of June and this wave is still continuing. And now we are seeing some increasing trends. And so we are analyzing the clusters and many clusters have been analyzed and the setting where the clusters are occurring is changing.

So it is important to monitor the clusters, so that we can implement the specific measures for the specific setting. And especially in June and July, we had many clusters in large nightlife entertainment districts in major cities, especially in Tokyo. And from there, we had many community transmissions, including households, schools restaurants and parties and at the end, the virus reached nursing homes and hospitals, where the majority of severe cases occurred. So, it's important to interrupt the transmission somewhere, before the virus reaches hospitals and nursing homes.

These are the transmission patterns in the community. And if there are medium to large sized clusters, we may see there are some household clusters and clusters in the workplaces, and eventually in the hospitals. But if there is only small clusters there might be some household clusters, but there is no further transmission and many of the transmission chains are interrupted in the community.

So now we are discussing the prioritization of cluster investigations, including the retrospective contact tracing partly because we are seeing the increasing trend of cases and the public health nurses and the public health centers are overwhelmed now and in such settings, high priority should be given to the hospitals and long term care facilities, including in a nursing homes.

And the nightlife entertainment is also risky setting, because from these settings, community transmission can be starting and also large social gatherings, like parties, and the theater, live music events and so on. But schools, universities/colleges, and the workplaces - these are the settings from where community transmission is less likely to occur. Unlike in the US. we haven't seen very large clusters in the universities.

And so for further information we set up our website, and you can see some of the information about our approach, including English guidance for the epidemiological investigation, including the retrospective contact tracing. And, so this site was actually established by our colleagues, including Dr. Gindai and Mia Kokikchi ??? and ??? and so, I appreciate their effort to set up this website, and thank you very much for your attention.

Dr. Margaret Bourdeaux: Fantastic, thank you so much for going through that with us. You know I think we can all start to see how this approach can really change how we think about super spreading events being not necessarily about an individual, but where that individual goes, and how they're relating to others, and which environments.

So just to say I'm going to turn it over to Dr. Seung and then afterwards, I see some questions coming in. We'll have plenty of time for questions after Dr. Seung's remarks so keep them coming.

So to introduce my colleague Dr KJ Seung is a total honor. He is the chief of strategy and policy at Partners in Health in Massachusetts's COVID-19 response. He's also an associate physician at the division of global health equity at Brigham and Women's Hospital. And an assistant professor at the Department of global health and social medicine at Harvard Medical School and he's going to focus on sort of, okay, yes, this is a cool amazing technique, but how do you do it, how do it, how do you execute on it. So KJ, I'll go ahead and turn it over to you.

Dr. KJ Seung: Morning everybody. I think for a lot of you, it's the first time you've heard Professor Oshitani. For us, it was actually, I think it was back in July, when we heard, you know, Professor Oshitani was very gracious to get on a quick zoom call with our project and it was really a different way of doing things. And so we want to explain exactly how we restructured our project to incorporate a lot of these techniques.

And just a little background on our project here in Massachusetts. This is a state of 7 million people. The project, this is the community tracing collaborative and you can see up there on the left there are 351 local boards of health in the state, in the Commonwealth of Massachusetts. So each one of those has jurisdiction over its town has its own public health department.

And so the collaborative is really meant to incorporate all of these. So it's really the those local health departments that are doing a lot of the contact tracing and there is another surge workforce of contact tracers that is meant to backstop those in case those public health nurses really who are very closely aligned with what's happening in the field start to get overly high case-loads and so a lot of these concepts and strategies we have incorporated into this surge workforce, which tends to, you know, which can really float across the state and is not restricted to work in any one jurisdiction.

So it's really set up as a large call center and a lot of other states have done this as well. And it's a unified force. It's a, it's got a single database. There might be a few things in Massachusetts that are different from other states. For us, the CTC contact tracing units have case investigators and contact tracers. The case investigators do the initial case investigation.

The contact tracers are then making calls to close contacts in reality, those two roles are very, very similar. And in fact, those people really do both things, depending on the

need. We also have a third cadre called the care resource coordinators and we know that people need support, they need nutritional support, they need medicines, they need transportation, they need all of these things to stay in isolation and quarantine so there's a third cadre, a smaller cadre that is also floating throughout the contact tracing units for those cases and contacts that are flagged, the CRCs will be able to provide that support.

So the first problem. You know, I think as you listen to Dr. Oshitani, you probably had the same reaction I did, which was that what he is really explaining with respect to retrospective contact tracing is different. It is not actually what we are doing. It is not part of the WHO protocols or CDC protocols.

There is, you know, our protocols are meant to do prospective contact tracing and that means from 48 hours prior to symptom onset, that is anybody, you're really looking for the people who that case could have infected. It is, but to go back retrospectively is, you know, there are in all of these protocols, there is some data collection about possible exposures, but really I think if you listen to the professor. You can see that it's actually much more involved.

And so what we have done is, if you really think about as level one and level two instead of really pushing out that level two which is a retrospective component into the entire contact tracing workforce of over 1000 people we chose to develop a smaller unit. So really a unit within the overall contact tracing team.

And we called it the Epidemic Intelligence Unit, the EIU and it's really less than 20 people at this point. But you can see here, though, that if you're going to take this approach. The larger contact tracing workforce. So, level one clearly has to involve some aspects of level two. So in some sense, level one is the first, the first contact, the first communication with the case, that initial first call.

And so if the person, the case investigator is not really sensitized not really thinking about where the case was infected, then that hint, or that tip about a possible cluster at a workplace, at a restaurant, at a yoga studio or hockey team, that cannot be given to the EIU, then level two can't start so level one definitely here. I think it's, it's, you know, I think it shows the different roles and the differences between the level one and level two, but really that level one, even if you do have an EIU, a smaller unit that can really handle the retrospective component. You can't completely. You know, there's still a lot of training that has to be done to your larger contact tracing workforce.

So really, in our case it's over 1000 people. So that's one issue here is that is that have you expand your protocols and how do you expand your workflows to get around the first problem, which is that it's not really what Professor Oshitani is describing is not contained in current contact tracing protocols for Covid.

So the other problem is, is this one. It's just that. The cluster, and I think that in the previous presentation there was some discussion of this, is that clusters are not obvious. The cluster analysis and investigation is fragmented and so you really, you know, I know that Professor Oshitani has talked a lot about the danger of the isolated case. So when you're seeing a lot of isolated cases so cases to say, you know,

I don't know where I got infected. I don't know who I could have infected because I'm living maybe with my household. I don't know where I got infected. That's an isolated case. It's not connected to a cluster. That's dangerous.

And you know the other thing, I would expand on that, is that it's really the isolated household right so we know the easiest part of this is, the household transmission. I'm not saying that it's easy to prevent but it's certainly easy to find. Everybody is living with people, their close contacts, they are high risk for infection.

So you, what you see is isolated households, you have households. There are household clusters are all over the place, but they don't seem to be connected to any any cluster. So when you start to do this retrospective analysis. What you find is that, you know, each household and, you know, in Massachusetts is that we consolidate those household key contacts and those cases into one contact tracer.

So really, those follow up calls can be made in a much more efficient manner, but you know as your retrospective contact tracing continues, you may find that this household is actually connected to a larger cluster. So suppose actually three households actually went to a playdate at one of the addresses. So now you know. Now these aren't actually isolated houses. This is a small cluster, but the way that we set up our contact tracing program is that there is one contact tracer. So there are actually three contact tracers who are following this relatively small cluster, because there are three households that are involved.

If you continue to do your retrospective contact tracing and hypothetically, you find actually, this is part of a larger, not a gigantic cluster, but still a larger cluster, because one of the children went to a pool party where there were some teenagers involved who had actually gone to a Halloween party.

Well, again, this is really not a gigantic cluster, but you can see here that there are seven different contact tracers involved because there are seven different households. So it's very difficult in fact, to see for each of these contact tracers. They may, part of the training in that phase is that phase one is you at least get a hint is to really ask further than the 48 hours so they get an idea of how, where the exposure happened, whether those are playdates or Halloween parties.

But really it's impossible for all of them. And it's not efficient for them to try to figure out the extent of this cluster and to trace back even for this relatively small size cluster to the Halloween party. So the EIU has to be, it's really a problem of communication. So, you have fragmentation, because you know people aren't getting tested, you cannot test 100% of the people in the community every day. You may only pick up certain cases in the cluster, but then those cases are followed by different people and you really have to have a central unit, and we for us, That's the EIU and there has to be just free communication with the entire contact tracing workforce.

So, you know, this cannot be done with a database, you know, there's no way to do this. There's, there's no way to do this from the outside the EIU has to be able to communicate with the people who are directly interviewing the cases and contacts, because what you find. And, you know, this is one of my pet peeves is that when people are talking about why contact tracing is not being effective.

And when people are not listening or people are not complying with contact tracing, what I usually say, and I tell them, is that it is because in fact you're not listening to what they're saying. And in fact, in our experience, for example, retrospect contact tracing cases are extremely interested in how they got infected, they want to talk about it for hours. And what we've in fact trained our contact tracers to do is to ignore that information that the cases want to tell them.

So it's really a systems failure, rather than an individual failure, failure of the community to comply quote unquote with contact tracing.

So, just the last slide here, you know, because there's this other question that's and that's the third problem is that is really what one of my colleagues calls the "so what" problem. What are you going to do with this information? So we have here a case we have a case investigator, we have the follow up support, there is a resource coordination. So this case can stay in isolation but actually this case, let's say, is connected to a cluster. This is not an isolated case this is perhaps it's a yoga instructor that was, it was a Yoga Retreat that was held at, a weekend retreat that was held at a

hotel or it's a it's a hockey team with a coach, that's part of a league or it's a business, a large.

It's a large meat processing plant with a manager and multiple shifts. So there is a larger social background behind this cluster that this case is in, you know the the case investigator, you know, that's phase one can get it can get a tip and can provide a tip to the EIU, but it's really the EIU that's responsible for looking at and really delineating the boundaries.

The size of, where this cluster took place, this particular cluster took place. We have a lot of tools for that. You know that I've shown in previous slides for example those cluster maps, but the end the end of the question is really "so what?" So how does this actually prevent future clusters. And that's really with, you know, in our case, with our local health departments. Right, so that they have really jurisdiction. They have responsibility.

Those public health nurses are able to talk to coaches to talk to leagues to talk to hotels to talk to businesses. And to have very much more in depth discussions about how they're trying to defend against covid to prevent outbreaks in their, in their settings and can even, you know, as a blunt instrument implement more other sorts of restrictions on hours or operations that will cross out you know that will encompass an entire sector.

So the EIU here is, you know, the idea is that it's supposed to provide actionable intelligence, so you're collecting information from all of these cases investigating these thousands of contact tracers you're trying to put them into a format that's useful, not a bunch of names and numbers and dates but to put them into a cluster map.

And we've developed some of those tools that I showed you previously, but those can be taken by local health departments can be used to understand, you know, very specific small or large clusters can be used to discuss with business owners with places of worship, with restaurant owners and even you know with mayor's, with city councils, can can be used to to change policy surrounding Covid in those jurisdictions.

Thank you very much. If you know, the US Public Health Accompaniment Unit is available to help states and, you know, I hope that we'll be able to talk more in the future.

Dr. Margaret Bourdeaux: Fantastic. Right. So a lot of learning has happened here at the contact tracing program in Massachusetts. And thanks to Dr. Oshitani for coaching us through it.

Dr. Margaret Bourdeaux: I want to quickly give the first, the right of first question to Dr. Tufekci, who is a techno-sociologist who has written about specifically retrospective contact tracing and the nature of COVID as something that spreads in these clusters. And so I know that ever since your article in *The Atlantic*, you've also been getting lots of questions, Dr. Tufekci, about, about this. So I'll turn first to you and then we'll go to our Q&A, in the Q&A panel.

Zeynep Tufekci: Thank you. I do want to start by thanking especially Dr. Oshitani, both for the presentation and how willing he has been throughout the process to share from Japan all these important key points and as you've noted, I have written about some aspects of pandemic, including potential for airborne transmission and its relationship to clusters and this backward cluster tracing that from, as we learned from Dr Oshitani's example.

So the first question I have is, What percent of the cases you're finding are coming from this retrospective cluster busting, or are, or are you not doing like the traditional prospective tracing? Because as we heard from, from the United States, that is not at all in our protocol. We just sort of mostly, in most places do forward tracing, and one question I got a lot since writing this has been, Well if we do do this backward tracing, what do we expect? Do we have some numbers, some--I mean, the theory is easy to explain, and a lot of people are convinced, but it's kind of hard to get the practical side moving. And so people would like to hear, What's the payoff? Do you have some percentages? Do you know like how--what percent of your cases are found, you know, maybe first backward then forward or, if you could enlighten us a little bit more, that would be very interesting, I think to many States that are considering these protocols.

Dr. Hitoshi Oshitani: Okay. Can I answer this question?

Dr. Margaret Bourdeaux: Please.

Dr. Hitoshi Oshitani: The--I don't have exact numbers, but the--it also depends on the situation, that when we define the cluster by doing the retrospective contact tracing, we usually can find the number of cases, sometimes, so the cluster is more than 50, or even more than 100. So, by identifying the many clusters, we can find more cases and the--I don't have an exact number, but the probably the nearly half of our cases were found by identifying the clusters.

And also, we also identify many *unlinked* cases, the cases without any epidemiological links, and--but many of these cases are--many of these isolated cases--probably, do not

generate any secondary cases or very few secondary cases. It's more important to identify the cluster than identifying the many isolated cases. And that's our concept. And that's why we are putting more effort to identifying--to identify the clusters.

Dr. Margaret Bourdeaux: Fantastic. KJ, do you want to follow up on that, how--and maybe you can include a little bit of, so okay so you think that the cluster was at a yoga class or a Halloween party, then what do you do? Do you go and test everybody that was at the Halloween party or at the, at the yoga class, or how does that practically work?

KJ Seung, MD: Yeah, I think that we're really getting to that, that question, which is the so what? So what are you going to do--what will you do with this information, and it really depends on the type of cluster. So I think that what we're seeing now in Massachusetts anyway, are--we're not seeing--well, I can't really say, that we're not seeing *any* very large clusters. Certainly, we do see some of them. But what we're, what we see more of are lots of little clusters. And whether this is happening in the in the workplace, which is relatively controlled, or schools or, or, social gatherings, which, you know, I don't think we're having the same sorts of large social gatherings that we did in the spring when we were really taken aware.

But these are these are harder to do. And I think that certainly, in certain cases, you can, you can, you can increase, you can target your testing. So if you have an idea that there's an outbreak at a church or workplace, it's quite common in fact for business owners to say, 'Well, now I'm going to test the entire, I'm going to test the entire workforce.' So that, you know, at that point, you're not trying to characterize the cluster, you're actually trying to stop transmission there.

Social clusters, you know, this is the very, very difficult. These are not huge gatherings. These are gatherings of 15 people, maybe four households, maybe 6 people but with attack rates of 60, 70%, you know, pretty much everybody with it at an indoor gathering, at an indoor dinner party getting infected.

And there are, you know, it's really about, you can--it can certainly inform your, your community education but also just community advisories and restrictions of the size of social gatherings, it can inform those those things as well. So I don't think that it is--I think, really, for every type of cluster there is, there are certain actions that can be taken on, on a, on a local level.

And I, you know, I would also agree with the professor that, that it *is* a clustering disease. So when you find these, if, you know, we certainly are not able to find 100% of

the clusters. We may not be able to connect 100% or even 80% of all cases to clusters. But I don't think that's necessary. You know, this is--if you have characterized well and certainly when you're having a huge caseload, it's really impractical, you cannot, you cannot do retrospective contact tracing on every single person. But I don't think that's the point. The idea is to get a sense of where the transmission is taking place, what sorts of social gatherings, you know, is it happening in colleges and universities, is it happening in churches? We know overall there's quite good evidence of, of, outbreaks at all of those places, but this will give you on a local level, where it's tending to happen in, in your area. And it doesn't say you don't need to, to find 100% of the clusters, you just have to get a sense of where they are happening by essentially doing a sampling and, and then you can take action.

Dr. Margaret Bourdeaux: Fantastic. Yeah, so I just to underscore those points: retrospective contact tracing helps you both identify cases so that you can do prospective, well, prospective contact tracing and help isolate or stop onward transmission. But maybe more importantly is you sort of learn about the environment in which transmission is happening so that you can modify that environment and so that the transmission doesn't occur there anymore.

I, so the, just to humor, humor you with a little bit of an example of this. KJ has watched as my family, which is a very strong hockey playing family--I have four daughters, they all play hockey, my husband coaches for hockey teams, and hockey, was, it was discovered that it was, had led to a couple of clusters, maybe more than a couple in Massachusetts. And much to the heartbreak of my whole family, hockey in Massachusetts was stopped, youth hockey was stopped. But really what, what was able to happen was they started looking at, Well, why was that happening at hockey games? You know, why were they finding this? And they were able to at least try to modify the practices of the youth hockey teams, such that, such that they could re-, restart youth hockey.

And you know that's the kind of battle rhythm that we all need, to need to get into here, if we're going to figure out how to both drive down the transmission and get ahold of the epidemic, but also, you know, keep living, keep living life. And so I think there's a number of questions around that in the Q&A, really about the issues around the, well I'll pick a few.

Why are universities in Japan and schools less--why are you having fewer clusters there than in the United States, do you think? Is it something about how you changed your school, something about the age of the students, or something about the nature of the epidemic there?

Dr. Hitoshi Oshitani: Thank you for the question. Actually we are also seeing some clusters in university but the, most of the clusters in university are, have been occurring in dormitory settings, and--or the outside of the, the lecture, the drinking party after the lecture and some other activities. And particularly, we do not have many dormitories in Japan and compared to the, the university in US. And so the dormitory is the probably the most important setting and, they, they, for the sports clubs, they are living in the, in a dormitory. And we've been seeing the many clusters, large clusters in such settings. But the usual student not many--most of the usual students and not staying in the dormitory. That make--And also that we are still doing online, online lectures in most of the universities. But the--probably, the dormitory is the most important factor.

Dr. Margaret Bourdeaux: Interesting. So, so that's interesting in terms of how you sort of think about, about clusters. I think that, you know, another sort of bulk of, cluster of questions in our, in our Q&A has to do with really the US context. And you know, we, we've been struggling with testing and had very sort of big limitations in our testing capability and also we are, you know, seeing this surge in cases. So some questions, Dr. Seung, maybe you can answer. Does this work, in a low, where you have low testing capability, and, you know, what about, in, with rising case loads, is it kind of worth it worth the effort?

Dr. KJ Seung: I do think it's worth it. I think that if you, you know, with the rising case loads, you know, you cannot, you cannot contact your trace, contact trace yourself out of an epidemic, not a COVID epidemic. But the, the retrospective contact tracing and the prospective contact tracing is not going to catch every case and catch every cluster. It's not. But I think that for retrospective contact tracing, that's not the goal. The goal is not to is not to find everything. The goal is to understand better where the transmission is happening and also to guide your efforts, so, so targeted testing, targeted outbreak response.

But just going back to the first one, you know, there's another question there about really this rigid definition of a 'close contact,' and I think this is really a great example of how it changes--you know, doing retrospective content tracing changes your understanding. This is really a--you know the definition of 'close contact' that's meant to facilitate content tracing, but it has been so driven into the minds of the community that they think that is actually protective.

And, you know, we've seen many, many--you know, as you do, as you talk to the churches as you talk to businesses, we can see, you know, and it's obvious, right, if you have 8, you know, if you have 12% of your workforce in a large warehouse that is

infected with COVID, documented infection, you know, these--and none of them actually fit the definition of 'close contact,' okay? So what you realize is that in certain situations, in the three C's, for instance, you know, there is infection that can happen actually quite easily, even for non-close contacts. And no, it's not difficult to figure out that there is an outbreak going on, that all of these are linked. You know, if 12% of your workforce is infected with covert, is PCR positive, and is symptomatic, obviously they are linked in some way, these are not, these are not independent infections.

So this is, you know, even on the, on the, you know, even on the very basic understanding of how COVID is transmitted within a place that fits the three C's, and for broadening your perspective and, and, and, and giving you the impetus to go a little bit beyond these very, very rigid protocols that we're using, I think retrospective contact tracing is extremely valuable.

Dr. Margaret Bourdeaux: Fantastic. You mentioned sort of the idea of six feet being kind of drilled, you know, just like the mantra now is like this protective warp, invisible warp shield, as long as you're staying six feet away from someone. And we, you know, we just know that that is just not the case, in, in tight spaces with, with bad ventilation and you're there for a period of time, you're going to get it, whether you're six feet apart from other people or not.

And Natalie Dean asked a nice question here about how do we communicate the need for retrospective contact tracing with the public? How do we handle some of the sensitivities that might come up? You know, I know you said people like to talk a lot about where they got infected, which is, definitely chimes with my experience of patients as well, you know. So for some that's not going to be an issue, but for others, you know, they're not going to want to reveal, you know, that it was their hair styling business, you know, or, you know, there's a lot of, a lot of difficulties there. So how do we explain this to the public, and how do we address some of the sensitivities around doing this kind of investigation?

Dr. KJ Seung: Well I, you know, I will say that I think that in the United States we, we are really behind in this aspect. I think that people, you know, I and I and I'll say what I--again I'll repeat: I don't think the problem is with the community. People are quite happy to talk about these things, they are not worried about talking about this. They, you know, and like I said, you know--obviously, is there some reluctance sometimes to give up names and phone numbers? Of course. But, you know, in some sense, in, in, in, in, in retrospective contact tracing, that's not even necessary, right, because you can certainly, you know, if somebody says, I went to a Halloween party--if they're, if they're, if Halloween parties are coming up again and again and again 10 days after Halloween,

you don't have to know exactly who went there. You don't have to know [the] exact guest list of every single one of those parties to know that this is a major, major problem going along--popping up. And that in Thanksgiving and Christmas is going to happen again.

So I think that, you know, we do have information here that we can gather. We have to be--we have to figure out how to convey that to the public in terms of community education. But, you know, even more broadly, like, I think that because we haven't figured out how, to how to explain COVID outbreaks to the American public, there is a lot of, of both stigma and discrimination, which I think is ridiculous for, for what is relatively, you know, which really by now, you know, well into the epidemic should be routine. There should not be any shame, there should not be any discrimination about being, about exposing your church or your business while you, you know, while you were not symptomatic which, which is really the most common situation.

And people shouldn't be scared about getting emails saying 'You've been exposed, you need to go get tested,' out of quote, unquote, 'an abundance of caution.' We have not been able to, you know, we haven't done very good communication on this. We have, we have a lot of media that jumps on, on clusters and likes to make a huge media event out of it. And I think it perpetuates the problem. But I definitely would like to hear from Professor Oshitani how Japan has dealt with this problem.

Dr. Hitoshi Oshitani: So thank you. In Japan, we also have some issues regarding discrimination and so on. And sometimes people do not want to talk, especially we have this problem with the cluster being the [inaudible], that kind of the nighttime, nightlife entertainment settings, and the people do not want to talk to where they were, and both customers and the people working in these settings. And that was the one of the reasons, the--probably the main reason, why these clusters were difficult to control in June, July. And we also seeing some increasing of the clusters, in the foreigners community.

And so, so the communication is quite difficult. And the people do not usually go to the clinics for testing. So we are now trying to find a better way to communicate with them. And--but usually the people that are willing to cooperate with the local authorities there, particularly with the public health nurses. But in certain settings, it's more difficult to investigate.

Dr. Margaret Bourdeaux: All around the world, people are people. And have certain things they like to keep private. Dr. Tufekci, do you want to wrap up with any other, any

other question, and then we'll, and then we'll have to continue our conversation in the offline, in the, in the coming days.

Zeynep Tufekci: I would love for Dr. Oshitani to address the close contact question a little more, because I think that's the part of the puzzle that's not very well understood in the United States. We just kind of talked about it, but there was a lot of debate to try to get airborne transmission, you know, aerosol transmission accepted as a method of transmission.

And CDC has acknowledged it, but there's some question on, like, how prominent is this method of transmission, and how does this connect with contact tracing? So if you could address how, like, what Japan's epidemiologists see as the primary mode of transmission or secondary mode of transmission, if you have any data on how much of which one you're seeing, and how that links to how you define 'close contact,' what role ventilation plays, and how that links to the kind of cluster busting you do, I think that would be very illuminating for our audience.

Dr. Hitoshi Oshitani: Thank you very much for the question. And we still do not know the exact, the proportion of the different mode of transmissions. But from the beginning we were considering the possibility of the aerosol transmission, especially the short-distance aerosol transmission. Because from early findings, we saw many clusters, from the pre-symptomatic individual[s]. And, so they did not, of course, have any cough or sneezing, but still the transmission occurred in these clusters. And so--and also, we had many clusters in close contact setting, just having conversation[s] between the people. In these settings, many transmission were occurring. And so the, I think the the the--at least the short-distance aerosol transmission is probably the, the, one of the important mode of transmission. But we still do not know how the the, it's a proportion of such transmission and that, that we are considering they to implement some control measures, that we are considering this possibility, and we are using the supercomputer to simulate the different settings and, like the theater, the live music places and so on. And we in these simulation, we are considering the, the, at least the short distance aerosol transmission.

And we also highly recommend the good ventilation, because the many clusters--most of clusters are occurring in the closed environment. So the ventilation is probably very important. And that also suggests the importance of the aerosol transmission, in these settings. Thank you.

Dr. Margaret Bourdeaux: So, fantastic. I, you know, I feel badly we have to wrap up. I feel like we could go on for another couple of hours on, you know, on the issues,

everything from how do you set up your, your data, you know, and are there any tools that we can use to help investigators put information together in a way that is more effective or faster, all the way to the, to the issues around building trust with communities and thinking about privacy and protections once you're doing this type of really deep dives into how people interact with one another.

So I had lots of--my mind is all of a sudden full of ideas for follow up seminars, but we'll stop here, and just a huge thank-you to all of the folks that spoke today and to the folks that tuned in.