WEBVTT

NOTE duration:"01:07:21.6430000"

NOTE language:en-us

NOTE Confidence: 0.8102888

00:00:02.590 --> 00:00:05.012 So, so first it is my honor

NOTE Confidence: 0.8102888

00:00:05.012 --> 00:00:07.469 to today to welcome Doctor.

NOTE Confidence: 0.8102888

00:00:07.470 --> 00:00:09.918 She only as our summer speaker,

NOTE Confidence: 0.8102888

00:00:09.920 --> 00:00:13.168 Xihong Lin is a professor from Harvard,

NOTE Confidence: 0.8102888

00:00:13.170 --> 00:00:15.606 jointly appointed by both as deaths.

NOTE Confidence: 0.8102888

00:00:15.610 --> 00:00:18.298 Annabelle Slash Department and she has

NOTE Confidence: 0.8102888

00:00:18.298 --> 00:00:20.513 received broad recognition and many

NOTE Confidence: 0.8102888

00:00:20.513 --> 00:00:23.012 awards for her great contribution to the

NOTE Confidence: 0.8102888

00:00:23.012 --> 00:00:25.803 field and her research has covered so

NOTE Confidence: 0.8102888

00:00:25.803 --> 00:00:28.228 many different topics ranging from Mr

NOTE Confidence: 0.8102888

00:00:28.228 --> 00:00:30.268 Logical work including hypothesis testing,

NOTE Confidence: 0.8102888

00:00:30.270 --> 00:00:31.491 had dimension statistics

NOTE Confidence: 0.8102888

00:00:31.491 --> 00:00:33.119 and color inference tools,

NOTE Confidence: 0.8102888

00:00:33.120 --> 00:00:34.008 data applications.

NOTE Confidence: 0.8102888

00:00:34.008 --> 00:00:35.784 And the computational statistics

NOTE Confidence: 0.8102888

00:00:35.784 --> 00:00:37.560 such as Statical Genetics.

NOTE Confidence: 0.8102888

00:00:37.560 --> 00:00:38.922 Scalable statical inference

NOTE Confidence: 0.8102888

00:00:38.922 --> 00:00:41.192 as well as applications with

NOTE Confidence: 0.8102888

00:00:41.192 --> 00:00:42.879 epidemiological and health data.

NOTE Confidence: 0.8102888

00:00:42.880 --> 00:00:45.981 So today she will share with us

NOTE Confidence: 0.8102888

00:00:45.981 --> 00:00:48.583 her work on analyzing large scale

NOTE Confidence: 0.8102888

00:00:48.583 --> 00:00:50.115 coordinating databases from both

NOTE Confidence: 0.8102888

00:00:50.115 --> 00:00:53.157 China and the US and provide several

NOTE Confidence: 0.8102888

00:00:53.157 --> 00:00:55.277 takeaways and discuss priorities.

NOTE Confidence: 0.8102888

00:00:55.280 --> 00:00:56.609 It's Insp endemic,

NOTE Confidence: 0.8102888

00:00:56.609 --> 00:01:00.596 so I will not occupy everyones time for more.

NOTE Confidence: 0.8102888

00:01:00.596 --> 00:01:05.198 I will hand it over to see home from here.

NOTE Confidence: 0.8102888

00:01:05.200 --> 00:01:06.520 So should we start

NOTE Confidence: 0.8414724

00:01:06.520 --> 00:01:08.210 alright? Thank you laying so

NOTE Confidence: 0.8414724

00:01:08.210 --> 00:01:10.270 much and for inviting me and

NOTE Confidence: 0.8414724

00:01:10.270 --> 00:01:11.800 for the very nice introduction

NOTE Confidence: 0.8414724

00:01:11.800 --> 00:01:14.109 and so I will share my screen.

NOTE Confidence: 0.8414724

00:01:14.110 --> 00:01:16.420 1st oh, I cannot share the screen.

NOTE Confidence: 0.8414724

00:01:16.420 --> 00:01:17.740 I have just met

NOTE Confidence: 0.8414724

00:01:17.740 --> 00:01:19.726 your Co host so you should

NOTE Confidence: 0.8414724

00:01:19.726 --> 00:01:21.700 be able to get it now.

NOTE Confidence: 0.88025904

00:01:24.620 --> 00:01:26.276 Can you can you share your

NOTE Confidence: 0.88025904

00:01:26.280 --> 00:01:28.500 screen I can do now? Thank you thanks.

NOTE Confidence: 0.92059565

00:01:33.320 --> 00:01:35.486 Alright, can you see my screen?

NOTE Confidence: 0.92059565

00:01:35.490 --> 00:01:38.093 Yes. Cool excellent alright?

NOTE Confidence: 0.92059565

00:01:38.093 --> 00:01:42.261 So I'll share with you some of the

NOTE Confidence: 0.92059565

00:01:42.261 --> 00:01:45.653 work and we have been doing last year

NOTE Confidence: 0.92059565

00:01:45.653 --> 00:01:49.883 on the Covic 19 so this is the data

NOTE Confidence: 0.92059565

00:01:49.883 --> 00:01:52.410 just downloaded earlier this this week.

NOTE Confidence: 0.92059565

00:01:52.410 --> 00:01:56.312 So as you can see that the right now

NOTE Confidence: 0.92059565

00:01:56.312 --> 00:01:58.662 they're over 110,000,000 cases in

NOTE Confidence: 0.92059565

00:01:58.662 --> 00:02:02.386 US and also 2.4 two point 4,000,000

NOTE Confidence: 0.92059565

00:02:02.386 --> 00:02:05.081 deaths were 110,000,000 cases and

NOTE Confidence: 0.92059565

00:02:05.090 --> 00:02:06.582 2.4 million deaths worldwide.

NOTE Confidence: 0.92059565

00:02:06.582 --> 00:02:10.217 So if you look at the curve on the left,

NOTE Confidence: 0.92059565

00:02:10.220 --> 00:02:12.103 that is the case curve and for

NOTE Confidence: 0.92059565

00:02:12.103 --> 00:02:13.560 a few selective countries.

NOTE Confidence: 0.92059565

00:02:13.560 --> 00:02:15.970 So as you can see for both the UK and

NOTE Confidence: 0.92059565

00:02:16.037 --> 00:02:18.361 also United States and the number of

NOTE Confidence: 0.92059565

00:02:18.361 --> 00:02:20.858 cases had been going down in January,

NOTE Confidence: 0.92059565

00:02:20.860 --> 00:02:22.678 so that is a good sign.

NOTE Confidence: 0.92059565

00:02:22.680 --> 00:02:24.724 And also Israel as you know that

NOTE Confidence: 0.92059565

00:02:24.724 --> 00:02:26.901 Israel has been a really leader in

NOTE Confidence: 0.92059565

00:02:26.901 --> 00:02:28.761 a vaccination and so their cases

NOTE Confidence: 0.92059565

00:02:28.825 --> 00:02:30.589 have been going down as well.

NOTE Confidence: 0.92059565

00:02:30.590 --> 00:02:32.942 But if you look at Africa I think

NOTE Confidence: 0.92059565

00:02:32.942 --> 00:02:34.724 the number this particular country

NOTE Confidence: 0.92059565

00:02:34.724 --> 00:02:37.342 you can see the number of cases.

NOTE Confidence: 0.92059565

00:02:37.350 --> 00:02:40.176 Has been going up likely due to the new

NOTE Confidence: 0.92059565

00:02:40.176 --> 00:02:42.325 violence in Africa and on the right.

NOTE Confidence: 0.92059565

00:02:42.330 --> 00:02:45.129 That is the case curve with the desk curve.

NOTE Confidence: 0.92059565

00:02:45.130 --> 00:02:47.300 You can see the patterns pretty similar,

NOTE Confidence: 0.92059565

00:02:47.300 --> 00:02:49.154 especially you can see for this

NOTE Confidence: 0.92059565

00:02:49.154 --> 00:02:50.756 African country and the number

NOTE Confidence: 0.92059565

00:02:50.756 --> 00:02:52.586 of deaths has going up quickly,

NOTE Confidence: 0.92059565

00:02:52.590 --> 00:02:55.060 so that is really worrisome.

NOTE Confidence: 0.92059565

00:02:55.060 --> 00:02:57.400 So here's a talk outline,

NOTE Confidence: 0.92059565

00:02:57.400 --> 00:03:00.830 so I'll start talking about the covid

NOTE Confidence: 0.92059565

00:03:00.830 --> 00:03:03.479 transmission intervention and using the data,

NOTE Confidence: 0.92059565

00:03:03.480 --> 00:03:06.288 and then they turn talk about

NOTE Confidence: 0.92059565

00:03:06.288 --> 00:03:08.160 the USN word data.

NOTE Confidence: 0.92059565

00:03:08.160 --> 00:03:10.500 Then I'll talk about epidemiological

NOTE Confidence: 0.92059565

00:03:10.500 --> 00:03:11.904 characteristics of Mackovic.

NOTE Confidence: 0.92059565

00:03:11.910 --> 00:03:14.238 Then I'll talk about the 221

NOTE Confidence: 0.92059565

00:03:14.238 --> 00:03:16.407 playbooks and also the defining

NOTE Confidence: 0.92059565

00:03:16.407 --> 00:03:18.567 challenges in particular about

NOTE Confidence: 0.92059565

00:03:18.567 --> 00:03:21.267 the vaccine rollout and uptake.

NOTE Confidence: 0.92059565

00:03:21.270 --> 00:03:24.294 Our focus more on the uptake and

NOTE Confidence: 0.92059565

00:03:24.294 --> 00:03:27.898 also how can we do scalable testing?

NOTE Confidence: 0.92059565

00:03:27.900 --> 00:03:29.160 And in particular,

NOTE Confidence: 0.92059565

00:03:29.160 --> 00:03:32.100 I talk about this support design and

NOTE Confidence: 0.92059565

00:03:32.180 --> 00:03:35.155 we call the hypergraph we called hyper.

NOTE Confidence: 0.92059565

00:03:35.160 --> 00:03:39.030 That is based on the hypergraph

NOTE Confidence: 0.92059565

00:03:39.030 --> 00:03:39.675 factorization.

NOTE Confidence: 0.92059565

00:03:39.680 --> 00:03:42.319 So I started working on the Covic

NOTE Confidence: 0.92059565

00:03:42.319 --> 00:03:44.482 19 research mainly by coincidence

NOTE Confidence: 0.92059565

00:03:44.482 --> 00:03:45.916 and last February.

NOTE Confidence: 0.92059565

00:03:45.920 --> 00:03:46.925 So my post,

NOTE Confidence: 0.92059565

00:03:46.925 --> 00:03:48.600 our former postdoc column one

NOTE Confidence: 0.92059565

00:03:48.600 --> 00:03:50.966 he is currently is professor in

NOTE Confidence: 0.92059565

00:03:50.966 --> 00:03:53.402 school public Health at Wild on

NOTE Confidence: 0.92059565

00:03:53.476 --> 00:03:55.900 Science and Technology University,

NOTE Confidence: 0.92059565

00:03:55.900 --> 00:03:57.980 which is located in Wuhan,

NOTE Confidence: 0.92059565

00:03:57.980 --> 00:03:59.644 and so last February,

NOTE Confidence: 0.92059565

00:03:59.644 --> 00:04:01.308 'cause Wuhan was epicenter.

NOTE Confidence: 0.92059565

00:04:01.310 --> 00:04:04.082 So I wrote him a message asking

NOTE Confidence: 0.92059565

00:04:04.082 --> 00:04:07.104 how and he and his family were

NOTE Confidence: 0.92059565

00:04:07.104 --> 00:04:09.708 doing and he told me that.

NOTE Confidence: 0.92059565

00:04:09.710 --> 00:04:11.675 He and his colleagues were

NOTE Confidence: 0.92059565

00:04:11.675 --> 00:04:13.247 analyzing the Wuhan data,

NOTE Confidence: 0.92059565

00:04:13.250 --> 00:04:16.778 then at that time there was already one case,

NOTE Confidence: 0.92059565

00:04:16.780 --> 00:04:19.924 and in Seattle and one case in Boston.

NOTE Confidence: 0.92059565

00:04:19.930 --> 00:04:23.108 So I sense that the the the

NOTE Confidence: 0.92059565

00:04:23.108 --> 00:04:25.270 virus might spread and so.

NOTE Confidence: 0.92059565

00:04:25.270 --> 00:04:28.140 I decided to join them and working

NOTE Confidence: 0.92059565

00:04:28.140 --> 00:04:30.901 on analyzing the Wuhan data so we

NOTE Confidence: 0.92059565

00:04:30.901 --> 00:04:33.628 work the we work for several weeks

NOTE Confidence: 0.92059565

00:04:33.628 --> 00:04:35.998 and in February especially child

NOTE Confidence: 0.92059565

00:04:35.998 --> 00:04:39.274 when his Cody worked really hard and

NOTE Confidence: 0.92059565

00:04:39.274 --> 00:04:42.480 then finish this preprint and we post

NOTE Confidence: 0.92059565

00:04:42.571 --> 00:04:45.611 the preprint on March 6 and so then

NOTE Confidence: 0.92059565

00:04:45.611 --> 00:04:48.494 with the hope that the findings we

NOTE Confidence: 0.92059565

00:04:48.494 --> 00:04:51.404 want we want to share their findings

NOTE Confidence: 0.92059565

00:04:51.404 --> 00:04:54.463 with the US and also other country

NOTE Confidence: 0.92059565

00:04:54.463 --> 00:04:57.507 as soon as possible to help them.

NOTE Confidence: 0.7997775

00:04:57.510 --> 00:04:58.599 The other countries,

NOTE Confidence: 0.7997775

00:04:58.599 --> 00:05:01.663 and so I I did not expect this

NOTE Confidence: 0.7997775

00:05:01.663 --> 00:05:03.873 preprint attract lots of attention

NOTE Confidence: 0.7997775

00:05:03.873 --> 00:05:07.108 that you can see the number of

NOTE Confidence: 0.7997775

00:05:07.108 --> 00:05:08.956 abstract view and download,

NOTE Confidence: 0.7997775

00:05:08.960 --> 00:05:11.080 and also there lots of.

NOTE Confidence: 0.83434194

00:05:13.390 --> 00:05:16.690 A lot of free trade and also the news outlet

NOTE Confidence: 0.83434194

00:05:16.770 --> 00:05:19.998 coverage and also the policy documentation.

NOTE Confidence: 0.83434194

00:05:20.000 --> 00:05:22.905 And after I twittered this paper in

NOTE Confidence: 0.83434194

00:05:22.905 --> 00:05:25.931 the Twitter and so then this paper

NOTE Confidence: 0.83434194

00:05:25.931 --> 00:05:29.325 preprint cover too much stuff and so we

NOTE Confidence: 0.83434194

00:05:29.325 --> 00:05:32.006 decided to split the paper into split

NOTE Confidence: 0.83434194

00:05:32.006 --> 00:05:34.862 the preprint into two paper and one

NOTE Confidence: 0.83434194

00:05:34.862 --> 00:05:37.760 was published in JAMA and last April.

NOTE Confidence: 0.83434194

00:05:37.760 --> 00:05:40.045 Another one was published in

NOTE Confidence: 0.83434194

00:05:40.045 --> 00:05:43.157 Nature last summer and so this work

NOTE Confidence: 0.83434194

00:05:43.157 --> 00:05:45.726 on the JAMA paper was led by.

NOTE Confidence: 0.83434194

00:05:45.730 --> 00:05:47.710 I'm Pan and a towel,

NOTE Confidence: 0.83434194

00:05:47.710 --> 00:05:50.086 and here they both were addressed.

NOTE Confidence: 0.83434194

00:05:50.090 --> 00:05:51.674 pH alarm and country.

NOTE Confidence: 0.83434194

00:05:51.674 --> 00:05:54.050 Who is the Dean of school?

NOTE Confidence: 0.83434194

00:05:54.050 --> 00:05:57.410 Public health as well doing science

NOTE Confidence: 0.83434194

00:05:57.410 --> 00:06:00.173 and technology University and the

NOTE Confidence: 0.83434194

00:06:00.173 --> 00:06:02.759 Nature paper was led by Charlo.

NOTE Confidence: 0.83434194

00:06:02.760 --> 00:06:04.884 And then emerge after the preprint

NOTE Confidence: 0.83434194

00:06:04.884 --> 00:06:06.910 was posted them in Twitter.

NOTE Confidence: 0.83434194

00:06:06.910 --> 00:06:10.294 And then I got quite a few interview request.

NOTE Confidence: 0.83434194

00:06:10.300 --> 00:06:11.708 But as a station,

NOTE Confidence: 0.83434194

00:06:11.708 --> 00:06:13.468 my first reaction was turned

NOTE Confidence: 0.83434194

00:06:13.468 --> 00:06:15.200 down all the interviews,

NOTE Confidence: 0.83434194

00:06:15.200 --> 00:06:17.839 so I turned on all the interviews

NOTE Confidence: 0.83434194

00:06:17.839 --> 00:06:20.074 and in March, and then April,

NOTE Confidence: 0.83434194

00:06:20.074 --> 00:06:23.500 I decided that probably is not a good idea.

NOTE Confidence: 0.83434194

00:06:23.500 --> 00:06:25.544 It's good to talk with the media

NOTE Confidence: 0.83434194

00:06:25.544 --> 00:06:28.004 and then they can understand the

NOTE Confidence: 0.83434194

00:06:28.004 --> 00:06:29.525 scientific funding correctly.

NOTE Confidence: 0.83434194

00:06:29.530 --> 00:06:31.138 Then that will help,

NOTE Confidence: 0.83434194

00:06:31.138 --> 00:06:33.148 and the combat the Covic.

NOTE Confidence: 0.83434194

00:06:33.150 --> 00:06:35.982 And so I decided to accept the interviews

NOTE Confidence: 0.83434194

00:06:35.982 --> 00:06:38.853 and so you can see there's a quite

NOTE Confidence: 0.83434194

00:06:38.853 --> 00:06:41.117 few coverage of the findings and

NOTE Confidence: 0.83434194

00:06:41.117 --> 00:06:44.309 also the interviews and in the US medias.

NOTE Confidence: 0.83434194

00:06:44.310 --> 00:06:46.662 And also in the UK medium and

NOTE Confidence: 0.83434194

00:06:46.662 --> 00:06:48.160 also in scientific journals

NOTE Confidence: 0.83434194

00:06:48.160 --> 00:06:50.260 such as Nature and Science.

NOTE Confidence: 0.83434194

00:06:50.260 --> 00:06:53.018 And the one thing I I learned

NOTE Confidence: 0.83434194

00:06:53.018 --> 00:06:56.149 was that 'cause when as a faculty

NOTE Confidence: 0.83434194

00:06:56.149 --> 00:06:58.005 member in Academic Institute

NOTE Confidence: 0.83434194

00:06:58.005 --> 00:07:00.779 and we were not trained to.

NOTE Confidence: 0.83434194

00:07:00.780 --> 00:07:03.868 Speak to the media and so to the

NOTE Confidence: 0.83434194

00:07:03.868 --> 00:07:05.458 scientific communication on the two.

NOTE Confidence: 0.83434194

00:07:05.460 --> 00:07:07.620 The general public is very important,

NOTE Confidence: 0.83434194

00:07:07.620 --> 00:07:09.744 so it's important to have more

NOTE Confidence: 0.83434194

00:07:09.744 --> 00:07:11.580 training and in this area.

NOTE Confidence: 0.83434194

00:07:11.580 --> 00:07:13.770 Another thing I learned was is

NOTE Confidence: 0.83434194

00:07:13.770 --> 00:07:15.712 important that speak in simple

NOTE Confidence: 0.83434194

00:07:15.712 --> 00:07:18.148 language and without the jargon and

NOTE Confidence: 0.83434194

00:07:18.148 --> 00:07:20.590 so general public could understand.

NOTE Confidence: 0.83434194

00:07:20.590 --> 00:07:23.446 And then I testified the in the

NOTE Confidence: 0.83434194

00:07:23.446 --> 00:07:25.247 science and Technology University

NOTE Confidence: 0.83434194

00:07:25.247 --> 00:07:27.243 $0.10 at Technology Committee

NOTE Confidence: 0.83434194

00:07:27.243 --> 00:07:30.040 of UK Parliament on April 17.

NOTE Confidence: 0.83434194

00:07:30.040 --> 00:07:32.668 And so this sense technology Committee

NOTE Confidence: 0.83434194

00:07:32.668 --> 00:07:35.411 has about 8 to 10 Parliament

NOTE Confidence: 0.83434194

00:07:35.411 --> 00:07:38.135 members like a senators on it.

NOTE Confidence: 0.83434194

00:07:38.140 --> 00:07:40.975 And then they later on they also

NOTE Confidence: 0.83434194

00:07:40.975 --> 00:07:43.090 invited few other witnesses.

NOTE Confidence: 0.83434194

00:07:43.090 --> 00:07:46.434 And then they wrote a letter to the

NOTE Confidence: 0.83434194

00:07:46.434 --> 00:07:49.327 Prime Minister Johnson and they make

NOTE Confidence: 0.83434194

00:07:49.327 --> 00:07:52.285 a 10 recommendations in their letter.

NOTE Confidence: 0.83434194

00:07:52.290 --> 00:07:55.394 Under so so then I I was honored

NOTE Confidence: 0.83434194

00:07:55.394 --> 00:07:57.887 that several of my recommendation

NOTE Confidence: 0.83434194

00:07:57.887 --> 00:08:00.602 we included in their recommendation

NOTE Confidence: 0.83434194

00:08:00.602 --> 00:08:03.987 in the recommendation they made it

NOTE Confidence: 0.83434194

00:08:03.987 --> 00:08:07.299 to the Prime Prime Minister Johnson.

NOTE Confidence: 0.83434194

00:08:07.300 --> 00:08:08.392 And then, uh,

NOTE Confidence: 0.83434194

00:08:08.392 --> 00:08:11.597 this last month and as a one year

NOTE Confidence: 0.83434194

00:08:11.597 --> 00:08:14.981 anniversary of the colic outbreak and

NOTE Confidence: 0.83434194

00:08:14.981 --> 00:08:17.869 nature published their third editorial

NOTE Confidence: 0.83434194

00:08:17.869 --> 00:08:21.187 and focusing on the major findings,

NOTE Confidence: 0.83434194

00:08:21.190 --> 00:08:23.670 a key finding from ideology.

NOTE Confidence: 0.83434194

00:08:23.670 --> 00:08:25.698 And so we will.

NOTE Confidence: 0.83434194

00:08:25.698 --> 00:08:29.484 We will honor that our paper was

NOTE Confidence: 0.83434194

00:08:29.484 --> 00:08:33.234 featured on the in this editorial.

NOTE Confidence: 0.83434194

00:08:33.240 --> 00:08:35.568 So let me first talk about

NOTE Confidence: 0.83434194

00:08:35.568 --> 00:08:36.732 the Wuhan analysis.

NOTE Confidence: 0.83434194

00:08:36.740 --> 00:08:39.276 Then we talk about the US and other

NOTE Confidence: 0.83434194

00:08:39.276 --> 00:08:41.857 countries and the 1st I'll introduce

NOTE Confidence: 0.83434194

00:08:41.857 --> 00:08:43.733 this effective reproductive number.

NOTE Confidence: 0.83434194

00:08:43.740 --> 00:08:44.847 So this concept,

NOTE Confidence: 0.83434194

00:08:44.847 --> 00:08:47.430 our value is right now and everybody

NOTE Confidence: 0.845761500000001

00:08:47.509 --> 00:08:49.975 understand what that is and so

NOTE Confidence: 0.845761500000001

00:08:49.975 --> 00:08:51.619 that measures average number

NOTE Confidence: 0.845761500000001

00:08:51.696 --> 00:08:53.856 of infected people by one case.

NOTE Confidence: 0.845761500000001

00:08:53.860 --> 00:08:56.508 So you can see on the right if

NOTE Confidence: 0.845761500000001

00:08:56.508 --> 00:08:59.005 Artie called before that means one

NOTE Confidence: 0.845761500000001

00:08:59.005 --> 00:09:01.639 person could affect to four people.

NOTE Confidence: 0.845761500000001

00:09:01.640 --> 00:09:03.810 That means the virus spread.

NOTE Confidence: 0.845761500000001

00:09:03.810 --> 00:09:05.110 So therefore, to in order

NOTE Confidence: 0.845761500000001

00:09:05.110 --> 00:09:06.150 to control the pandemic,

NOTE Confidence: 0.845761500000001

00:09:06.150 --> 00:09:09.580 the army to be less than one.

NOTE Confidence: 0.845761500000001

00:09:09.580 --> 00:09:12.625 And so here's a woman analysis under.

NOTE Confidence: 0.845761500000001

00:09:12.630 --> 00:09:16.536 So we found the two major features of Kovik.

NOTE Confidence: 0.845761500000001

00:09:16.540 --> 00:09:19.150 The first feature is the virus

NOTE Confidence: 0.845761500000001

00:09:19.150 --> 00:09:20.455 is highly transmissible,

NOTE Confidence: 0.845761500000001

00:09:20.460 --> 00:09:23.070 and so the before January 23rd,

NOTE Confidence: 0.845761500000001

00:09:23.070 --> 00:09:25.240 and there was no intervention.

NOTE Confidence: 0.845761500000001

00:09:25.240 --> 00:09:26.880 As you can see,

NOTE Confidence: 0.845761500000001

00:09:26.880 --> 00:09:30.459 the number of cases had went up quickly,

NOTE Confidence: 0.845761500000001

00:09:30.460 --> 00:09:30.904 exponentially,

NOTE Confidence: 0.845761500000001

00:09:30.904 --> 00:09:34.012 and so the first case was reported

NOTE Confidence: 0.845761500000001

00:09:34.012 --> 00:09:37.244 on the in this orphan and seafood

NOTE Confidence: 0.845761500000001

00:09:37.244 --> 00:09:39.504 market and this seafood market

NOTE Confidence: 0.845761500000001

00:09:39.587 --> 00:09:41.647 was closed on January 1st.

NOTE Confidence: 0.845761500000001

00:09:41.650 --> 00:09:44.786 Under then on March on January 23rd,

NOTE Confidence: 0.845761500000001

00:09:44.790 --> 00:09:50.370 and that was a lunch of the lock down and so.

NOTE Confidence: 0.845761500000001

00:09:50.370 --> 00:09:53.592 As you can see that before the lock down

NOTE Confidence: 0.845761500000001

00:09:53.592 --> 00:09:56.799 the estimated RTT values is about 3.5,

NOTE Confidence: 0.845761500000001

00:09:56.800 --> 00:10:00.104 so that means each purse case could be.

NOTE Confidence: 0.845761500000001

00:10:00.110 --> 00:10:03.809 Like 3.5 people and so that is not good.

NOTE Confidence: 0.845761500000001

00:10:03.810 --> 00:10:06.393 So that means this is really the

NOTE Confidence: 0.845761500000001

00:10:06.393 --> 00:10:08.009 disease is very transmissible

NOTE Confidence: 0.845761500000001

00:10:08.009 --> 00:10:10.970 and then after the lock down and

NOTE Confidence: 0.845761500000001

00:10:10.970 --> 00:10:13.171 with the social distancing is

NOTE Confidence: 0.845761500000001

00:10:13.171 --> 00:10:16.132 really how the RT value dropped to

NOTE Confidence: 0.845761500000001

00:10:16.140 --> 00:10:18.606 a little over 1.2 and then.

NOTE Confidence: 0.845761500000001

00:10:18.610 --> 00:10:21.658 But it's not good enough and so then

NOTE Confidence: 0.845761500000001

00:10:21.658 --> 00:10:24.871 after February 2nd and that was a lunch

NOTE Confidence: 0.845761500000001

00:10:24.871 --> 00:10:27.649 of the centralized isolation and quarantine.

NOTE Confidence: 0.845761500000001

00:10:27.650 --> 00:10:30.908 So they basically the city build.

NOTE Confidence: 0.845761500000001

00:10:30.910 --> 00:10:33.364 Two new hospital field Hospital and

NOTE Confidence: 0.845761500000001

00:10:33.364 --> 00:10:35.527 also 16 field hospitals converted

NOTE Confidence: 0.845761500000001

00:10:35.527 --> 00:10:37.782 from the stadium and expectation

NOTE Confidence: 0.845761500000001

00:10:37.782 --> 00:10:39.586 Center and after that.

NOTE Confidence: 0.845761500000001

00:10:39.590 --> 00:10:42.710 And then you can see the number of

NOTE Confidence: 0.845761500000001

00:10:42.710 --> 00:10:46.079 cases drop down very quickly and the RT

NOTE Confidence: 0.845761500000001

00:10:46.079 --> 00:10:49.744 values and by March 8th was about .27

NOTE Confidence: 0.845761500000001

00:10:49.744 --> 00:10:52.606 and then the pandemic was controlled.

NOTE Confidence: 0.8317293

00:10:55.180 --> 00:10:57.945 And so to estimate those RT values.

NOTE Confidence: 0.8317293

00:10:57.950 --> 00:11:01.100 So basically the model we use is a person

NOTE Confidence: 0.8317293

00:11:01.100 --> 00:11:02.807 partial differential equation model

NOTE Confidence: 0.8317293

00:11:02.807 --> 00:11:06.240 and so this captured by the left here.

NOTE Confidence: 0.8317293

00:11:06.240 --> 00:11:09.795 Then you can see here is a from them.

NOTE Confidence: 0.8317293

00:11:09.800 --> 00:11:12.313 So here this is the symptom onset

NOTE Confidence: 0.8317293

00:11:12.313 --> 00:11:14.396 and between exposure and symptoms

NOTE Confidence: 0.8317293

00:11:14.396 --> 00:11:16.044 answer discord, incubation period.

NOTE Confidence: 0.8317293

00:11:16.044 --> 00:11:19.411 So generally this is about 5 days and then

NOTE Confidence: 0.8317293

00:11:19.411 --> 00:11:22.039 from the exposure to presymptomatic onsite.

NOTE Confidence: 0.8317293

00:11:22.040 --> 00:11:24.080 This so this part period

NOTE Confidence: 0.8317293

00:11:24.080 --> 00:11:25.304 called latent period.

NOTE Confidence: 0.8317293

00:11:25.310 --> 00:11:28.243 So that means a patient is infected

NOTE Confidence: 0.8317293

00:11:28.243 --> 00:11:31.918 and but the person is not transparent,

NOTE Confidence: 0.8317293

00:11:31.920 --> 00:11:35.358 doesn't transmit the disease, and so.

NOTE Confidence: 0.8317293

00:11:35.360 --> 00:11:37.130 Between the pre symptomatic period

NOTE Confidence: 0.8317293

00:11:37.130 --> 00:11:39.350 2 symptomatic period so this period,

NOTE Confidence: 0.8317293

00:11:39.350 --> 00:11:40.106 the person,

NOTE Confidence: 0.8317293

00:11:40.106 --> 00:11:42.374 even though a person doesn't have

NOTE Confidence: 0.8317293

00:11:42.374 --> 00:11:44.438 a symptom and but very load,

NOTE Confidence: 0.8317293

00:11:44.440 --> 00:11:48.066 is high enough and then the person

NOTE Confidence: 0.8317293

00:11:48.066 --> 00:11:49.102 could become.

NOTE Confidence: 0.8317293

00:11:49.110 --> 00:11:51.042 Infectious and so this period is

NOTE Confidence: 0.8317293

00:11:51.042 --> 00:11:52.852 about two days between presymptomatic

NOTE Confidence: 0.8317293

00:11:52.852 --> 00:11:54.680 two symptomatic and between

NOTE Confidence: 0.8317293

00:11:54.680 --> 00:11:56.965 exposure to pre symptomatic period.

NOTE Confidence: 0.8317293

00:11:56.970 --> 00:11:58.940 This is about 3 days,

NOTE Confidence: 0.8317293

00:11:58.940 --> 00:12:01.558 and so we built in those components

NOTE Confidence: 0.8317293

00:12:01.558 --> 00:12:03.260 and in the model,

NOTE Confidence: 0.8317293

00:12:03.260 --> 00:12:05.220 and so we introduce this

NOTE Confidence: 0.8317293

00:12:05.220 --> 00:12:06.004 presymptomatic compartment,

NOTE Confidence: 0.8317293

00:12:06.010 --> 00:12:08.882 and also because at that time the testing

NOTE Confidence: 0.8317293

00:12:08.882 --> 00:12:11.509 case will not that widely available,

NOTE Confidence: 0.8317293

00:12:11.510 --> 00:12:13.988 and so therefore there were a lot

NOTE Confidence: 0.8317293

00:12:13.988 --> 00:12:16.230 of cases which were uncertain,

NOTE Confidence: 0.8317293

00:12:16.230 --> 00:12:19.520 and so therefore we built in this.

NOTE Confidence: 0.8317293

00:12:19.520 --> 00:12:20.394 Unstained components,

NOTE Confidence: 0.8317293

00:12:20.394 --> 00:12:23.453 the observed data here those are the

NOTE Confidence: 0.8317293

00:12:23.453 --> 00:12:25.520 observed data and then those are.

NOTE Confidence: 0.8317293

00:12:25.520 --> 00:12:27.858 Then we construct all those components and

NOTE Confidence: 0.8317293

00:12:27.858 --> 00:12:30.718 drew the deep partial differential equation.

NOTE Confidence: 0.8317293

00:12:30.720 --> 00:12:33.940 So this is isolation component.

NOTE Confidence: 0.8317293

00:12:33.940 --> 00:12:36.346 And so so here the we

NOTE Confidence: 0.8317293

00:12:36.346 --> 00:12:38.640 after you feed this model,

NOTE Confidence: 0.8317293

00:12:38.640 --> 00:12:40.704 one can construct the

NOTE Confidence: 0.8317293

00:12:40.704 --> 00:12:42.768 reproductive number or value.

NOTE Confidence: 0.8317293

00:12:42.770 --> 00:12:43.498 So basically,

NOTE Confidence: 0.8317293

00:12:43.498 --> 00:12:44.590 as I mentioned,

NOTE Confidence: 0.8317293

00:12:44.590 --> 00:12:47.866 the datas are here and those are the data.

NOTE Confidence: 0.8317293

00:12:47.870 --> 00:12:49.988 The rest part are basically coming

NOTE Confidence: 0.8317293

00:12:49.988 --> 00:12:51.400 from the partial differential

NOTE Confidence: 0.8317293

00:12:51.463 --> 00:12:53.671 equations and then we fit the

NOTE Confidence: 0.8317293

00:12:53.671 --> 00:12:54.775 partial differential equation,

NOTE Confidence: 0.8317293

00:12:54.780 --> 00:12:57.216 Apostle model and using MCMC and

NOTE Confidence: 0.8317293

00:12:57.216 --> 00:12:59.560 the Gulf Coast parameter estimate.

NOTE Confidence: 0.8317293

00:12:59.560 --> 00:13:02.936 And so here you can see that before

NOTE Confidence: 0.8317293

00:13:02.936 --> 00:13:05.088 the intervention on our journey,

NOTE Confidence: 0.8317293

00:13:05.090 --> 00:13:07.634 then if there was suppose there

NOTE Confidence: 0.8317293

00:13:07.634 --> 00:13:08.906 were no intervention,

NOTE Confidence: 0.8317293

00:13:08.910 --> 00:13:11.941 then this will the blue curve will

NOTE Confidence: 0.8317293

00:13:11.941 --> 00:13:14.556 be the predicted number of infected

NOTE Confidence: 0.8317293

00:13:14.556 --> 00:13:18.265 cases and so you can see that 170% of

NOTE Confidence: 0.8317293

00:13:18.265 --> 00:13:20.390 the Wuhan population were infected.

NOTE Confidence: 0.8317293

00:13:20.390 --> 00:13:22.445 That will reach the natural

NOTE Confidence: 0.8317293

00:13:22.445 --> 00:13:25.449 herd immunity and so now has a

NOTE Confidence: 0.8317293

00:13:25.449 --> 00:13:27.185 10 million population size.

NOTE Confidence: 0.8317293

00:13:27.190 --> 00:13:30.046 Then that means 7,000,000 people need.

NOTE Confidence: 0.8317293

00:13:30.050 --> 00:13:32.276 Need to be infected in order to

NOTE Confidence: 0.8317293

00:13:32.276 --> 00:13:34.280 reach the herd immunity and so

NOTE Confidence: 0.8317293

00:13:34.280 --> 00:13:36.555 this is not a good strategy and

NOTE Confidence: 0.8317293

00:13:36.630 --> 00:13:39.248 many old people will die and the

NOTE Confidence: 0.8317293

00:13:39.248 --> 00:13:41.074 sudden after supposed when user,

NOTE Confidence: 0.8317293

00:13:41.074 --> 00:13:42.834 social distancing and lock down

NOTE Confidence: 0.8317293

00:13:42.834 --> 00:13:45.625 and so you can see from Wuhan the

NOTE Confidence: 0.8317293

00:13:45.625 --> 00:13:47.693 number of cases still going up

NOTE Confidence: 0.8317293

00:13:47.693 --> 00:13:50.017 but not as fast as the without

NOTE Confidence: 0.8317293

00:13:50.017 --> 00:13:51.572 intervention but after the.

NOTE Confidence: 0.8317293

00:13:51.572 --> 00:13:53.777 Centralized isolation quality on top

NOTE Confidence: 0.8317293

00:13:53.777 --> 00:13:56.432 of the social distancing and the

NOTE Confidence: 0.8317293

00:13:56.432 --> 00:13:59.365 number of cases went down very quickly.

NOTE Confidence: 0.8317293

00:13:59.370 --> 00:14:02.198 And so this is what what they

NOTE Confidence: 0.8317293

00:14:02.198 --> 00:14:04.020 did in one hand.

NOTE Confidence: 0.8317293

00:14:04.020 --> 00:14:06.750 So if the case subject was tested

NOTE Confidence: 0.8317293

00:14:06.750 --> 00:14:09.352 positive and this person to patient

NOTE Confidence: 0.8317293

00:14:09.352 --> 00:14:12.052 was admitted to the field hospital,

NOTE Confidence: 0.8317293

00:14:12.060 --> 00:14:14.220 and so this is different from

NOTE Confidence: 0.8317293

00:14:14.220 --> 00:14:17.327 the US in the sense that in the

NOTE Confidence: 0.8317293

00:14:17.327 --> 00:14:19.691 last spring and US also build

NOTE Confidence: 0.8435579

00:14:19.777 --> 00:14:21.790 multiple field hospital,

NOTE Confidence: 0.8435579

00:14:21.790 --> 00:14:25.166 but they only admit as a severe diseases,

NOTE Confidence: 0.8435579

00:14:25.170 --> 00:14:27.320 so amount and diseases cases

NOTE Confidence: 0.8435579

00:14:27.320 --> 00:14:29.470 they were isolated at home.

NOTE Confidence: 0.8435579

00:14:29.470 --> 00:14:32.278 And so that these notes are isolation at

NOTE Confidence: 0.8435579

00:14:32.278 --> 00:14:35.259 home could still infect the family members.

NOTE Confidence: 0.8435579

00:14:35.260 --> 00:14:38.275 And but in Wuhan all the mild cases and

NOTE Confidence: 0.8435579

00:14:38.275 --> 00:14:41.048 were admitted to the field hospital,

NOTE Confidence: 0.8435579

00:14:41.050 --> 00:14:42.554 so they were monitored.

NOTE Confidence: 0.8435579

00:14:42.554 --> 00:14:44.810 If anybody became severe and the

NOTE Confidence: 0.8435579

00:14:44.879 --> 00:14:47.225 patient was transferred to the ICU,

NOTE Confidence: 0.8435579

00:14:47.230 --> 00:14:49.498 the regular hospital and for the

NOTE Confidence: 0.8435579

00:14:49.498 --> 00:14:52.627 people who had a symptom and but who?

NOTE Confidence: 0.8435579

00:14:52.630 --> 00:14:54.988 Because at that time there were

NOTE Confidence: 0.8435579

00:14:54.988 --> 00:14:57.320 not enough testing kits and so

NOTE Confidence: 0.8435579

00:14:57.320 --> 00:14:59.378 they were quitting the odds of

NOTE Confidence: 0.8435579

00:14:59.378 --> 00:15:01.638 hotels and will University dorm.

NOTE Confidence: 0.8435579

00:15:01.640 --> 00:15:04.576 If so, all the children and stay with

NOTE Confidence: 0.8435579

00:15:04.576 --> 00:15:07.490 the parents so the family were together.

NOTE Confidence: 0.8435579

00:15:07.490 --> 00:15:09.680 If anybody became a test positive

NOTE Confidence: 0.8435579

00:15:09.680 --> 00:15:12.035 and the person was transferred to

NOTE Confidence: 0.8435579

00:15:12.035 --> 00:15:14.507 the field hospital in two weeks,

NOTE Confidence: 0.8435579

00:15:14.510 --> 00:15:16.808 if a person was tested negative

NOTE Confidence: 0.8435579

00:15:16.808 --> 00:15:18.800 and the person went home,

NOTE Confidence: 0.8435579

00:15:18.800 --> 00:15:21.775 and similarly for close contact and they

NOTE Confidence: 0.8435579

00:15:21.775 --> 00:15:24.257 were quarantined as a hotel as well.

NOTE Confidence: 0.85004455

00:15:24.930 --> 00:15:27.954 I see how can I ask a very basic question.

NOTE Confidence: 0.85004455

00:15:27.954 --> 00:15:30.370 If I look at the Group One Group

NOTE Confidence: 0.85004455

00:15:30.370 --> 00:15:31.880 two Group One is confirmed.

NOTE Confidence: 0.85004455

00:15:31.880 --> 00:15:33.812 I guess if it means if you

NOTE Confidence: 0.85004455

00:15:33.812 --> 00:15:35.521 perform some kind of PCR test

NOTE Confidence: 0.85004455

00:15:35.521 --> 00:15:37.411 you are positive and Group 2 is

NOTE Confidence: 0.85004455

00:15:37.480 --> 00:15:39.430 with symptom but not confirmed.

NOTE Confidence: 0.85004455

00:15:39.430 --> 00:15:41.236 Can it go the other way?

NOTE Confidence: 0.85004455

00:15:41.240 --> 00:15:42.750 Can you first be confirmed

NOTE Confidence: 0.85004455

00:15:42.750 --> 00:15:43.958 but with no symptoms?

NOTE Confidence: 0.75610137

00:15:44.980 --> 00:15:49.404 Oh yeah, I think there were cases.

NOTE Confidence: 0.75610137

00:15:49.410 --> 00:15:51.110 Possible that would have had

NOTE Confidence: 0.75610137

00:15:51.110 --> 00:15:52.810 no symptoms but test positive,

NOTE Confidence: 0.75610137

00:15:52.810 --> 00:15:55.470 but at that time because they were

NOTE Confidence: 0.75610137

00:15:55.470 --> 00:15:57.607 not enough testing kids so many

NOTE Confidence: 0.75610137

00:15:57.607 --> 00:15:59.763 of the cases and who were able

NOTE Confidence: 0.75610137

00:15:59.838 --> 00:16:01.987 to be tested at the same time,

NOTE Confidence: 0.75610137

00:16:01.990 --> 00:16:04.030 so that's why there were lots

NOTE Confidence: 0.75610137

00:16:04.030 --> 00:16:05.050 of undetected cases.

NOTE Confidence: 0.75610137

00:16:05.050 --> 00:16:06.070 I said thanks.

NOTE Confidence: 0.8223038

00:16:09.190 --> 00:16:11.280 And so this strategy worked

NOTE Confidence: 0.8223038

00:16:11.280 --> 00:16:12.952 quite well in Wuhan.

NOTE Confidence: 0.8223038

00:16:12.960 --> 00:16:16.586 So in less than two months they

NOTE Confidence: 0.8223038

00:16:16.586 --> 00:16:19.944 reach 0 confirmed case and then by

NOTE Confidence: 0.8223038

00:16:19.944 --> 00:16:23.650 March 18 and by April 8 and after.

NOTE Confidence: 0.8223038

00:16:23.650 --> 00:16:26.086 To confirm the case for three weeks

NOTE Confidence: 0.8223038

00:16:26.086 --> 00:16:28.509 and then the city was reopened.

NOTE Confidence: 0.8223038

00:16:28.510 --> 00:16:31.072 So it's a whole thing only took

NOTE Confidence: 0.8223038

00:16:31.072 --> 00:16:33.919 in two months and so the first

NOTE Confidence: 0.8223038

00:16:33.919 --> 00:16:35.999 take home take home messages,

NOTE Confidence: 0.8223038

00:16:36.000 --> 00:16:37.905 the social distancing and centralized

NOTE Confidence: 0.8223038

00:16:37.905 --> 00:16:39.429 isolation quarantine were critical

NOTE Confidence: 0.8223038

00:16:39.429 --> 00:16:41.119 for controlling the outbreak,

NOTE Confidence: 0.8223038

00:16:41.120 --> 00:16:43.215 so using the social distancing

NOTE Confidence: 0.8223038

00:16:43.215 --> 00:16:46.221 alone that help but was not good

NOTE Confidence: 0.8223038

00:16:46.221 --> 00:16:48.693 enough so that helped make our

NOTE Confidence: 0.8223038

00:16:48.693 --> 00:16:50.932 reduce around 1:00 and but did

NOTE Confidence: 0.8223038

00:16:50.932 --> 00:16:53.457 not bend the curve and the reason

NOTE Confidence: 0.8223038

00:16:53.457 --> 00:16:57.076 is the there were lots of the.

NOTE Confidence: 0.8223038

00:16:57.080 --> 00:16:58.892 Community transmissions on the

NOTE Confidence: 0.8223038

00:16:58.892 --> 00:17:01.157 social distancing help block the

NOTE Confidence: 0.8223038

00:17:01.157 --> 00:17:03.207 community transmission that is

NOTE Confidence: 0.8223038

00:17:03.207 --> 00:17:05.243 between household transmission but

NOTE Confidence: 0.8223038

00:17:05.243 --> 00:17:07.400 within family transmission and cost.

NOTE Confidence: 0.8223038

00:17:07.400 --> 00:17:09.276 Place transmission with common

NOTE Confidence: 0.8223038

00:17:09.276 --> 00:17:12.090 and so so the social distance.

NOTE Confidence: 0.8223038

00:17:12.090 --> 00:17:15.834 Distancing does not help block that and so,

NOTE Confidence: 0.8223038

00:17:15.840 --> 00:17:19.140 especially with how many families are

NOTE Confidence: 0.8223038

00:17:19.140 --> 00:17:21.803 multi generation families and they

NOTE Confidence: 0.8223038

00:17:21.803 --> 00:17:24.442 live in apartment so it compared to

NOTE Confidence: 0.8223038

00:17:24.442 --> 00:17:27.668 US as even harder under to isolate.

NOTE Confidence: 0.8223038

00:17:27.670 --> 00:17:29.360 At home.

NOTE Confidence: 0.8223038

00:17:29.360 --> 00:17:31.478 And the idea that centralized isolation,

NOTE Confidence: 0.8223038

00:17:31.480 --> 00:17:34.198 creating to social distancing that help

NOTE Confidence: 0.8223038

00:17:34.198 --> 00:17:37.500 bend the curve and stop the pandemic.

NOTE Confidence: 0.8223038

00:17:37.500 --> 00:17:39.612 And so we validate those findings

NOTE Confidence: 0.8223038

00:17:39.612 --> 00:17:41.839 and in other countries last spring.

NOTE Confidence: 0.8223038

00:17:41.840 --> 00:17:45.460 So if you look at the curve on the left,

NOTE Confidence: 0.8223038

00:17:45.460 --> 00:17:47.270 that is a Italy data.

NOTE Confidence: 0.8223038

00:17:47.270 --> 00:17:49.982 So you can see that Italy also did

NOTE Confidence: 0.8223038

00:17:49.982 --> 00:17:52.215 the social distancing that help reduce

NOTE Confidence: 0.8223038

00:17:52.215 --> 00:17:55.234 the R and the R curve lingered around

NOTE Confidence: 0.8223038

00:17:55.234 --> 00:17:58.464 one for over a month and did not bend

NOTE Confidence: 0.8223038

00:17:58.464 --> 00:18:01.136 the curve but and also on the right

NOTE Confidence: 0.8223038

00:18:01.136 --> 00:18:03.557 that Germany data in the spring.

NOTE Confidence: 0.8223038

00:18:03.560 --> 00:18:08.690 The same thing under the curve did not band.

NOTE Confidence: 0.8223038

00:18:08.690 --> 00:18:10.600 And the second feature from

NOTE Confidence: 0.8223038

00:18:10.600 --> 00:18:12.947 analyzing the Wuhan data is the

NOTE Confidence: 0.8223038

00:18:12.947 --> 00:18:15.149 Covic is highly converged on the,

NOTE Confidence: 0.8223038

00:18:15.150 --> 00:18:17.430 so we estimated about 87% of

NOTE Confidence: 0.8223038

00:18:17.430 --> 00:18:18.950 the cases were undetected.

NOTE Confidence: 0.8223038

00:18:18.950 --> 00:18:20.470 So in other words,

NOTE Confidence: 0.8223038

00:18:20.470 --> 00:18:22.370 the detected cases was only

NOTE Confidence: 0.8223038

00:18:22.370 --> 00:18:24.270 the tip of the iceberg,

NOTE Confidence: 0.8223038

00:18:24.270 --> 00:18:27.519 and so you can see that on the on

NOTE Confidence: 0.8223038

00:18:27.519 --> 00:18:30.909 the left and the right bars are

NOTE Confidence: 0.8223038

00:18:30.909 --> 00:18:33.839 the detected cases and then the.

NOTE Confidence: 0.8223038

00:18:33.840 --> 00:18:36.306 Yellow bars also uncertain the cases,

NOTE Confidence: 0.8223038

00:18:36.310 --> 00:18:39.271 so we estimated on the we estimate

NOTE Confidence: 0.8223038

00:18:39.271 --> 00:18:41.728 entertainment rate and so we estimated

NOTE Confidence: 0.8223038

00:18:41.728 --> 00:18:44.530 about 87% of the cases were uncertain,

NOTE Confidence: 0.8223038

00:18:44.530 --> 00:18:47.372 and many of those cases were asymptomatic

NOTE Confidence: 0.8223038

00:18:47.372 --> 00:18:49.050 or mildly symptomatic cases.

NOTE Confidence: 0.8223038

00:18:49.050 --> 00:18:51.605 By adding the yellow and red that

NOTE Confidence: 0.8223038

00:18:51.605 --> 00:18:54.172 can give us a prevalence estimate

NOTE Confidence: 0.8223038

00:18:54.172 --> 00:18:56.966 that is about 2.5% in one hand,

NOTE Confidence: 0.8223038

00:18:56.966 --> 00:18:59.150 and so this is similar to the

NOTE Confidence: 0.8223038

00:18:59.227 --> 00:19:02.197 theological studies based on antibodies,

NOTE Confidence: 0.8223038

00:19:02.200 --> 00:19:04.480 and that was about 3%.

NOTE Confidence: 0.8223038

00:19:04.480 --> 00:19:07.198 And then US result very similar.

NOTE Confidence: 0.8223038

00:19:07.200 --> 00:19:09.798 the CDC did theological study last

NOTE Confidence: 0.8223038

00:19:09.798 --> 00:19:12.569 year and then the estimated about

NOTE Confidence: 0.8223038

00:19:12.569 --> 00:19:15.419 862 twenty times the number of

NOTE Confidence: 0.8223038

00:19:15.419 --> 00:19:18.620 cases were six to twenty time of

NOTE Confidence: 0.8223038

00:19:18.620 --> 00:19:20.785 the cases which were reported.

NOTE Confidence: 0.84831905

00:19:22.980 --> 00:19:24.535 And also those undetected tasted

NOTE Confidence: 0.84831905

00:19:24.535 --> 00:19:26.523 post a high risk of resurgence

NOTE Confidence: 0.84831905

00:19:26.523 --> 00:19:28.368 if one reopened too early,

NOTE Confidence: 0.84831905

00:19:28.370 --> 00:19:30.568 lifting the controls, and so we estimate

NOTE Confidence: 0.84831905

00:19:30.568 --> 00:19:32.419 the probability of the researchers.

NOTE Confidence: 0.84831905

00:19:32.420 --> 00:19:34.292 Think about this is the first

NOTE Confidence: 0.84831905

00:19:34.292 --> 00:19:36.800 day and one has a confirmed case.

NOTE Confidence: 0.84831905

00:19:36.800 --> 00:19:38.480 When has a confirmed case.

NOTE Confidence: 0.84831905

00:19:38.480 --> 00:19:40.382 It doesn't mean there is no

NOTE Confidence: 0.84831905

00:19:40.382 --> 00:19:42.425 case at all because there are

NOTE Confidence: 0.84831905

00:19:42.425 --> 00:19:44.549 still a lot of undetected cases.

NOTE Confidence: 0.84831905

00:19:44.550 --> 00:19:46.636 And suppose when we open in 14

NOTE Confidence: 0.84831905

00:19:46.636 --> 00:19:48.687 days by lifting all the control

NOTE Confidence: 0.84831905

00:19:48.687 --> 00:19:50.865 measures and the first strategy is

NOTE Confidence: 0.84831905

00:19:50.865 --> 00:19:53.109 after the first day observing the.

NOTE Confidence: 0.84831905

00:19:53.110 --> 00:19:55.200 Zero confirmed Case No matter

NOTE Confidence: 0.84831905

00:19:55.200 --> 00:19:58.034 whether the second day has the case

NOTE Confidence: 0.84831905

00:19:58.034 --> 00:20:00.358 or not and when to reopen info.

NOTE Confidence: 0.84831905

00:20:00.360 --> 00:20:03.896 This and the second strategy is one has

NOTE Confidence: 0.84831905

00:20:03.896 --> 00:20:07.559 a confirmed 0 case for 14 consecutive days.

NOTE Confidence: 0.84831905

00:20:07.560 --> 00:20:10.520 That basically means 000 our

NOTE Confidence: 0.84831905

00:20:10.520 --> 00:20:13.480 way through and what is.

NOTE Confidence: 0.84831905

00:20:13.480 --> 00:20:14.890 Research is probability.

NOTE Confidence: 0.84831905

00:20:14.890 --> 00:20:19.060 So that is what we found that if one

NOTE Confidence: 0.84831905

00:20:19.060 --> 00:20:22.196 reopen in 14 days after the first day,

NOTE Confidence: 0.84831905

00:20:22.200 --> 00:20:23.175 observe 0 case.

NOTE Confidence: 0.84831905

00:20:23.175 --> 00:20:26.238 So that means it can be zero and 120

NOTE Confidence: 0.84831905

00:20:26.238 --> 00:20:28.723 again in this type of situation then

NOTE Confidence: 0.84831905

00:20:28.723 --> 00:20:31.367 the researchers probability is 97%

NOTE Confidence: 0.84831905

00:20:31.370 --> 00:20:33.848 and if one observes the zero case

NOTE Confidence: 0.84831905

00:20:33.848 --> 00:20:36.204 for 14 consecutive days and then

NOTE Confidence: 0.84831905

00:20:36.204 --> 00:20:38.244 the resurgence probability is 32%.

NOTE Confidence: 0.84831905

00:20:38.250 --> 00:20:41.140 So what is tell us is we need to be

NOTE Confidence: 0.84831905

00:20:41.222 --> 00:20:44.360 management and don't reopen too early.

NOTE Confidence: 0.84831905

00:20:44.360 --> 00:20:46.460 So this is happened last.

NOTE Confidence: 0.84831905

00:20:46.460 --> 00:20:48.724 May and many of the state in the

NOTE Confidence: 0.84831905

00:20:48.724 --> 00:20:50.877 South do it reopened too early.

NOTE Confidence: 0.84831905

00:20:50.880 --> 00:20:53.386 Then we saw those cases are searched

NOTE Confidence: 0.84831905

00:20:53.386 --> 00:20:56.417 in the in the summer in the South.

NOTE Confidence: 0.84831905

00:20:56.420 --> 00:20:59.138 So what's the take home away?

NOTE Confidence: 0.84831905

00:20:59.140 --> 00:21:01.940 Take a take away message on the

NOTE Confidence: 0.84831905

00:21:01.940 --> 00:21:05.478 number 2 is to control the pandemic.

NOTE Confidence: 0.84831905

00:21:05.480 --> 00:21:07.970 A single control measures not enough

NOTE Confidence: 0.84831905

00:21:07.970 --> 00:21:10.919 money to use multiple control measures,

NOTE Confidence: 0.84831905

00:21:10.920 --> 00:21:12.732 and including the mask,

NOTE Confidence: 0.84831905

00:21:12.732 --> 00:21:14.544 wearing social distancing and

NOTE Confidence: 0.84831905

00:21:14.544 --> 00:21:15.450 massive testing,

NOTE Confidence: 0.84831905

00:21:15.450 --> 00:21:17.700 contact tracing and also supported

NOTE Confidence: 0.84831905

00:21:17.700 --> 00:21:19.950 isolation and quarantines and also

NOTE Confidence: 0.84831905

00:21:20.016 --> 00:21:22.686 effective treatment and also the vaccine.

NOTE Confidence: 0.84831905

00:21:22.690 --> 00:21:25.525 And so the in the JAMA paper

NOTE Confidence: 0.84831905

00:21:25.525 --> 00:21:28.309 we call it multi faceted.

NOTE Confidence: 0.84831905

00:21:28.310 --> 00:21:30.734 Intervention and then later on in

NOTE Confidence: 0.84831905

00:21:30.734 --> 00:21:33.809 the summer and people give it a nice

NOTE Confidence: 0.84831905

00:21:33.809 --> 00:21:36.400 name and called the Swiss cheese model.

NOTE Confidence: 0.84831905

00:21:36.400 --> 00:21:39.586 So that is a nice name and so the

NOTE Confidence: 0.84831905

00:21:39.586 --> 00:21:42.090 challenge is we we know those

NOTE Confidence: 0.84831905

00:21:42.090 --> 00:21:43.326 in control measures,

NOTE Confidence: 0.84831905

00:21:43.330 --> 00:21:45.210 but it's difficult to implement

NOTE Confidence: 0.84831905

00:21:45.210 --> 00:21:47.546 those control measures and also keep

NOTE Confidence: 0.84831905

00:21:47.546 --> 00:21:49.486 high compliance in many countries.

NOTE Confidence: 0.84831905

00:21:49.490 --> 00:21:51.415 So the defining challenges the

NOTE Confidence: 0.84831905

00:21:51.415 --> 00:21:52.570 public house control,

NOTE Confidence: 0.84831905

00:21:52.570 --> 00:21:54.158 measure implementation and then

NOTE Confidence: 0.84831905

00:21:54.158 --> 00:21:56.540 keep up with the compliance and

NOTE Confidence: 0.84831905

00:21:56.605 --> 00:21:58.560 also the vaccine definitely is.

NOTE Confidence: 0.84831905

00:21:58.560 --> 00:22:01.360 Really critical and we.

NOTE Confidence: 0.84831905

00:22:01.360 --> 00:22:03.943 We know that by now there are

NOTE Confidence: 0.84831905

00:22:03.943 --> 00:22:05.510 two successful ovac seen,

NOTE Confidence: 0.84831905

00:22:05.510 --> 00:22:08.518 one in US1 is the face by Pfizer,

NOTE Confidence: 0.84831905

00:22:08.520 --> 00:22:10.782 the other is more donor under

NOTE Confidence: 0.84831905

00:22:10.782 --> 00:22:12.290 the efficacy is 95%.

NOTE Confidence: 0.84831905

00:22:12.290 --> 00:22:13.802 This really really amazing

NOTE Confidence: 0.84831905

00:22:13.802 --> 00:22:14.558 scientific advance.

NOTE Confidence: 0.84831905

00:22:14.560 --> 00:22:19.520 Developing the vaccine in such a short time.

NOTE Confidence: 0.84831905

00:22:19.520 --> 00:22:22.220 Under so we also.

NOTE Confidence: 0.84831905

00:22:22.220 --> 00:22:24.728 Last spring we also developed a

NOTE Confidence: 0.84831905

00:22:24.728 --> 00:22:27.356 website on that help estimate the

NOTE Confidence: 0.84831905

00:22:27.356 --> 00:22:29.960 RT value as a different resolution

NOTE Confidence: 0.84831905

00:22:29.960 --> 00:22:32.849 at the for different countries,

NOTE Confidence: 0.84831905

00:22:32.850 --> 00:22:38.034 States and counties and so you can see that.

NOTE Confidence: 0.84831905

00:22:38.040 --> 00:22:41.897 But we copies are key curve and

NOTE Confidence: 0.84831905

00:22:41.897 --> 00:22:43.550 for a different.

NOTE Confidence: 0.84831905

00:22:43.550 --> 00:22:46.208 Reach reaches and so this work

NOTE Confidence: 0.84831905

00:22:46.208 --> 00:22:49.244 was led by Andy Xu, my student,

NOTE Confidence: 0.84831905

00:22:49.244 --> 00:22:51.866 and she lucky there my poster.

NOTE Confidence: 0.7569009

00:22:51.870 --> 00:22:55.230 And so this website was featured on

NOTE Confidence: 0.7569009

00:22:55.230 --> 00:22:58.739 the in Nature Article last summer.

NOTE Confidence: 0.7569009

00:22:58.740 --> 00:23:01.666 So how do we fit this model?

NOTE Confidence: 0.7569009

00:23:01.670 --> 00:23:05.006 So because there are lots of data points,

NOTE Confidence: 0.7569009

00:23:05.010 --> 00:23:07.962 so we want to estimate the curve so

NOTE Confidence: 0.7569009

00:23:07.962 --> 00:23:10.552 therefore instead of using the partial

NOTE Confidence: 0.7569009

00:23:10.552 --> 00:23:12.777 differential equation model and we

NOTE Confidence: 0.7569009

00:23:12.777 --> 00:23:15.425 extended this epidemic model which was

NOTE Confidence: 0.7569009

00:23:15.425 --> 00:23:17.858 originally proposed by query in 2013,

NOTE Confidence: 0.7569009

00:23:17.858 --> 00:23:20.322 and so the model in this type of

NOTE Confidence: 0.7569009

00:23:20.322 --> 00:23:22.763 epidemic model is quite different

NOTE Confidence: 0.7569009

00:23:22.763 --> 00:23:24.831 from the traditional logistics

NOTE Confidence: 0.7569009

00:23:24.831 --> 00:23:26.330 traditional statistical model.

NOTE Confidence: 0.7569009

00:23:26.330 --> 00:23:29.984 So we need to build in the.

NOTE Confidence: 0.7569009

00:23:29.990 --> 00:23:33.090 If the. An infectious component,

NOTE Confidence: 0.7569009

00:23:33.090 --> 00:23:34.446 so here is supposed.

NOTE Confidence: 0.7569009

00:23:34.446 --> 00:23:37.239 Why is the number of cases so think

NOTE Confidence: 0.7569009

00:23:37.239 --> 00:23:39.612 about the number of cases and for

NOTE Confidence: 0.7569009

00:23:39.612 --> 00:23:42.018 each day in Connecticut and then

NOTE Confidence: 0.7569009

00:23:42.018 --> 00:23:44.374 one first need to calculate this

NOTE Confidence: 0.7569009

00:23:44.374 --> 00:23:47.286 Lambda T and this Lambda T is called.

NOTE Confidence: 0.7569009

00:23:47.290 --> 00:23:48.742 Basically calculates the number

NOTE Confidence: 0.7569009

00:23:48.742 --> 00:23:50.194 of people at risk,

NOTE Confidence: 0.7569009

00:23:50.200 --> 00:23:52.342 so that is calculated using the products

NOTE Confidence: 0.7569009

00:23:52.342 --> 00:23:54.569 of the serial interval distribution.

NOTE Confidence: 0.7569009

00:23:54.570 --> 00:23:57.412 Multiply the number of cases in the

NOTE Confidence: 0.7569009

00:23:57.412 --> 00:23:59.946 previous period said like 7 days and

NOTE Confidence: 0.7569009

00:23:59.946 --> 00:24:02.690 then the Ark is a parameter one moment.

NOTE Confidence: 0.7569009

00:24:02.690 --> 00:24:04.790 Estimate so in the original model,

NOTE Confidence: 0.7569009

00:24:04.790 --> 00:24:07.093 the estimate RT at each time point

NOTE Confidence: 0.7569009

00:24:07.093 --> 00:24:09.338 that estimate a lot of parameters,

NOTE Confidence: 0.7569009

00:24:09.340 --> 00:24:11.275 and then when building this

NOTE Confidence: 0.7569009

00:24:11.275 --> 00:24:13.874 person model and with Lambda T as

NOTE Confidence: 0.7569009

00:24:13.874 --> 00:24:15.638 offset and RT as a parameter.

NOTE Confidence: 0.7569009

00:24:15.640 --> 00:24:17.985 But they asked me lots of parameters

NOTE Confidence: 0.7569009

00:24:17.985 --> 00:24:20.142 and one also account for the

NOTE Confidence: 0.7569009

00:24:20.142 --> 00:24:22.290 reporting deley by using a lag.

NOTE Confidence: 0.7569009

00:24:22.290 --> 00:24:27.080 So we what we did here with we try to.

NOTE Confidence: 0.7569009

00:24:27.080 --> 00:24:28.915 Accommodate on the Covic features

NOTE Confidence: 0.7569009

00:24:28.915 --> 00:24:31.745 and so we estimate us zero interval

NOTE Confidence: 0.7569009

00:24:31.745 --> 00:24:34.050 distribution and from this comma

NOTE Confidence: 0.7569009

00:24:34.050 --> 00:24:36.221 distribution using the paper in

NOTE Confidence: 0.7569009

00:24:36.221 --> 00:24:38.021 publishing in nature method and

NOTE Confidence: 0.7569009

00:24:38.021 --> 00:24:41.095 then in order to estimate RT as many

NOTE Confidence: 0.7569009

00:24:41.095 --> 00:24:43.958 many values and we assume a curve

NOTE Confidence: 0.7569009

00:24:43.958 --> 00:24:46.723 and the estimate by using a spline.

NOTE Confidence: 0.7569009

00:24:46.730 --> 00:24:49.068 So there are few angle in work

NOTE Confidence: 0.7569009

00:24:49.068 --> 00:24:52.460 and so we want to estimate RT as a

NOTE Confidence: 0.7569009

00:24:52.460 --> 00:24:55.553 function but cover it and also the

NOTE Confidence: 0.7569009

00:24:55.553 --> 00:24:58.003 in the traditional epidemic model.

NOTE Confidence: 0.7569009

00:24:58.010 --> 00:24:59.264 One assumed answer.

NOTE Confidence: 0.7569009

00:24:59.264 --> 00:25:01.772 Him and trade is a constant

NOTE Confidence: 0.7569009

00:25:01.772 --> 00:25:03.090 overtime and so the,

NOTE Confidence: 0.7569009

00:25:03.090 --> 00:25:05.045 but in practice the entertainment

NOTE Confidence: 0.7569009

00:25:05.045 --> 00:25:06.609 rate is not constant,

NOTE Confidence: 0.7569009

00:25:06.610 --> 00:25:08.174 especially when the number

NOTE Confidence: 0.7569009

00:25:08.174 --> 00:25:10.129 of tests are goes up.

NOTE Confidence: 0.7569009

00:25:10.130 --> 00:25:12.135 What number of positive test

NOTE Confidence: 0.7569009

00:25:12.135 --> 00:25:14.679 rate goes up and then uncertain

NOTE Confidence: 0.7569009

00:25:14.679 --> 00:25:17.427 manner it will get better and.

NOTE Confidence: 0.7569009

00:25:17.430 --> 00:25:19.974 So we want to answer payment way to

NOTE Confidence: 0.7569009

00:25:19.974 --> 00:25:22.768 be a function of the coverage and

NOTE Confidence: 0.7569009

00:25:22.768 --> 00:25:26.021 also we want to instead of fixing the

NOTE Confidence: 0.7569009

00:25:26.021 --> 00:25:28.932 reporting deal if we want to use the

NOTE Confidence: 0.7569009

00:25:28.932 --> 00:25:30.984 data to model the reporting deley

NOTE Confidence: 0.7569009

00:25:30.984 --> 00:25:33.430 and using all those met component,

NOTE Confidence: 0.7569009

00:25:33.430 --> 00:25:35.290 we can estimate the prevalence.

NOTE Confidence: 0.7569009

00:25:35.290 --> 00:25:39.378 So here are some preliminary result and so.

NOTE Confidence: 0.7569009

00:25:39.380 --> 00:25:42.020 The the code so you this is for the US

NOTE Confidence: 0.7569009

00:25:42.091 --> 00:25:44.699 data you can see right now and many

NOTE Confidence: 0.7569009

00:25:44.699 --> 00:25:47.040 countries a number of cases between

NOTE Confidence: 0.7569009

00:25:47.040 --> 00:25:49.458 being going down really nicely and

NOTE Confidence: 0.7569009

00:25:49.460 --> 00:25:52.148 so the current USRT value is about .78,

NOTE Confidence: 0.7569009

00:25:52.150 --> 00:25:54.486 and so we hear when you can see

NOTE Confidence: 0.7569009

00:25:54.486 --> 00:25:56.652 we have this arty curve that

NOTE Confidence: 0.7569009

00:25:56.652 --> 00:25:58.527 expanded so below 1 now.

NOTE Confidence: 0.7569009

00:25:58.530 --> 00:26:01.284 And also you can see the number of new

NOTE Confidence: 0.7569009

00:26:01.284 --> 00:26:03.743 cases have been going down and also

NOTE Confidence: 0.7569009

00:26:03.743 --> 00:26:06.597 the number of deaths has been going down.

NOTE Confidence: 0.83832216

00:26:06.600 --> 00:26:09.424 But there is a lag between the best.

NOTE Confidence: 0.83832216

00:26:09.430 --> 00:26:13.324 Under the case. And also this is

NOTE Confidence: 0.83832216

00:26:13.324 --> 00:26:15.310 the state level are key value.

NOTE Confidence: 0.83832216

00:26:15.310 --> 00:26:17.718 So just give example like for California

NOTE Confidence: 0.83832216

00:26:17.718 --> 00:26:20.643 you can see that the art in California is

NOTE Confidence: 0.83832216

00:26:20.643 --> 00:26:23.585 about .67 and so does this very nice banded

NOTE Confidence: 0.83832216

00:26:23.585 --> 00:26:28.018 curve for the cases and also for that.

NOTE Confidence: 0.83832216

00:26:28.020 --> 00:26:31.070 So now let me talk about the what are the

NOTE Confidence: 0.83832216

00:26:31.150 --> 00:26:34.130 factors associated with Covic infection.

NOTE Confidence: 0.83832216

00:26:34.130 --> 00:26:37.378 So as we start from the Wuhan data,

NOTE Confidence: 0.83832216

00:26:37.380 --> 00:26:40.229 then I'll move to the US data.

NOTE Confidence: 0.83832216

00:26:40.230 --> 00:26:42.732 So the data we estimated the

NOTE Confidence: 0.83832216

00:26:42.732 --> 00:26:45.109 attack rate on the my age.

NOTE Confidence: 0.83832216

00:26:45.110 --> 00:26:47.546 So you can see that the each

NOTE Confidence: 0.83832216

00:26:47.546 --> 00:26:49.590 of the period separately,

NOTE Confidence: 0.83832216

00:26:49.590 --> 00:26:52.534 and so you can see that for the

NOTE Confidence: 0.83832216

00:26:52.534 --> 00:26:55.290 older people that purple and yellow,

NOTE Confidence: 0.83832216

00:26:55.290 --> 00:26:58.266 and then the tax rate was.

NOTE Confidence: 0.83832216

00:26:58.270 --> 00:27:00.370 Much higher than the younger people,

NOTE Confidence: 0.83832216

00:27:00.370 --> 00:27:02.820 and so this is a good lesson.

NOTE Confidence: 0.83832216

00:27:02.820 --> 00:27:04.920 And in the spring last spring,

NOTE Confidence: 0.83832216

00:27:04.920 --> 00:27:07.020 then later on, as you know,

NOTE Confidence: 0.83832216

00:27:07.020 --> 00:27:11.324 like in US and there were more cases.

NOTE Confidence: 0.83832216

00:27:11.330 --> 00:27:14.116 Elderly cases in the spring and but

NOTE Confidence: 0.83832216

00:27:14.116 --> 00:27:17.109 then the elderly is become very careful

NOTE Confidence: 0.83832216

00:27:17.109 --> 00:27:19.683 and try to protect themselves and

NOTE Confidence: 0.83832216

00:27:19.763 --> 00:27:22.395 most of the cases in the summer and

NOTE Confidence: 0.83832216

00:27:22.395 --> 00:27:25.020 also in the fall were younger people.

NOTE Confidence: 0.83832216

00:27:25.020 --> 00:27:27.996 And then on the right that shows that

NOTE Confidence: 0.83832216

00:27:27.996 --> 00:27:31.059 the male and female that you from one

NOTE Confidence: 0.83832216

00:27:31.059 --> 00:27:34.010 day to the attack rate was similar.

NOTE Confidence: 0.83832216

00:27:34.010 --> 00:27:35.454 But health care worker,

NOTE Confidence: 0.83832216

00:27:35.454 --> 00:27:37.620 the purple bar has much higher

NOTE Confidence: 0.83832216

00:27:37.695 --> 00:27:38.699 infection rate,

NOTE Confidence: 0.83832216

00:27:38.700 --> 00:27:40.348 especially before the intervention,

NOTE Confidence: 0.83832216

00:27:40.348 --> 00:27:41.996 and then after interventions.

NOTE Confidence: 0.83832216

00:27:42.000 --> 00:27:44.550 Acrid among the health care worker,

NOTE Confidence: 0.83832216

00:27:44.550 --> 00:27:47.385 and was better and so that calls

NOTE Confidence: 0.83832216

00:27:47.385 --> 00:27:50.007 for the importance of the PPS

NOTE Confidence: 0.83832216

00:27:50.007 --> 00:27:51.775 and before the intervention.

NOTE Confidence: 0.83832216

00:27:51.780 --> 00:27:54.748 People were not aware of the Covic,

NOTE Confidence: 0.83832216

00:27:54.750 --> 00:27:58.150 and so, therefore, is this not many people,

NOTE Confidence: 0.83832216

00:27:58.150 --> 00:28:00.280 not many health care workers.

NOTE Confidence: 0.83832216

00:28:00.280 --> 00:28:01.612 Hard to pee pees.

NOTE Confidence: 0.83832216

00:28:01.612 --> 00:28:05.620 So I give a talk on the Wuhan finding on

NOTE Confidence: 0.83832216

00:28:05.620 --> 00:28:09.210 the March just before the school public.

NOTE Confidence: 0.83832216

00:28:09.210 --> 00:28:11.562 Just before Harvard started the spring

NOTE Confidence: 0.83832216

00:28:11.562 --> 00:28:14.437 break and throw in one of the slides,

NOTE Confidence: 0.83832216

00:28:14.440 --> 00:28:16.967 I showed that the on the day

NOTE Confidence: 0.83832216

00:28:16.967 --> 00:28:18.560 before the ABC News,

NOTE Confidence: 0.83832216

00:28:18.560 --> 00:28:20.052 there's one picture of

NOTE Confidence: 0.83832216

00:28:20.052 --> 00:28:21.544 the health care workers.

NOTE Confidence: 0.83832216

00:28:21.550 --> 00:28:23.958 And so I showed up there so the

NOTE Confidence: 0.83832216

00:28:23.958 --> 00:28:26.377 the the health care worker will

NOTE Confidence: 0.83832216

00:28:26.377 --> 00:28:28.975 not properly protected in US and

NOTE Confidence: 0.83832216

00:28:29.056 --> 00:28:31.282 so they had no protection suit

NOTE Confidence: 0.83832216

00:28:31.282 --> 00:28:33.644 and no face shell for example.

NOTE Confidence: 0.83832216

00:28:33.644 --> 00:28:35.829 And then the infection could

NOTE Confidence: 0.83832216

00:28:35.829 --> 00:28:37.620 be go through eyes.

NOTE Confidence: 0.83832216

00:28:37.620 --> 00:28:39.818 I did not realize that those three

NOTE Confidence: 0.83832216

00:28:39.818 --> 00:28:42.485 slides on the showing the health care

NOTE Confidence: 0.83832216

00:28:42.485 --> 00:28:44.963 workers not properly protecting US were

NOTE Confidence: 0.83832216

00:28:45.029 --> 00:28:47.519 widely distributed during the weekend.

NOTE Confidence: 0.83832216

00:28:47.520 --> 00:28:50.299 So the March 13 was a Friday.

NOTE Confidence: 0.83832216

00:28:50.300 --> 00:28:53.460 Then on March 16, that was a Monday,

NOTE Confidence: 0.83832216

00:28:53.460 --> 00:28:56.572 and so there was a national campaign on

NOTE Confidence: 0.83832216

00:28:56.572 --> 00:28:59.008 the protection of health care worker,

NOTE Confidence: 0.83832216

00:28:59.010 --> 00:29:00.594 which comprehensive PP is.

NOTE Confidence: 0.83832216

00:29:00.594 --> 00:29:04.218 And so the in short time and there were.

NOTE Confidence: 0.83832216

00:29:04.220 --> 00:29:07.130 Over 1.7 million Xan signatures

NOTE Confidence: 0.83832216

00:29:07.130 --> 00:29:09.458 and sold in this.

NOTE Confidence: 0.83832216

00:29:09.460 --> 00:29:12.025 No, the this picture was taken from my talk.

NOTE Confidence: 0.83832216

00:29:12.030 --> 00:29:14.214 So during that period I got to

NOTE Confidence: 0.83832216

00:29:14.214 --> 00:29:16.724 know a lot of health care workers

NOTE Confidence: 0.83832216

00:29:16.724 --> 00:29:19.621 and many of them and wrote to me

NOTE Confidence: 0.83832216

00:29:19.621 --> 00:29:21.933 and so it's it's kind of like a.

NOTE Confidence: 0.83832216

00:29:21.940 --> 00:29:23.164 Nice to see,

NOTE Confidence: 0.83832216

00:29:23.164 --> 00:29:24.796 like a little statistical

NOTE Confidence: 0.83832216

00:29:24.796 --> 00:29:26.020 analysis and could

NOTE Confidence: 0.89303994

00:29:26.098 --> 00:29:27.460 help the community.

NOTE Confidence: 0.89303994

00:29:27.460 --> 00:29:30.428 And also in the spring on the so

NOTE Confidence: 0.89303994

00:29:30.428 --> 00:29:33.345 I did something that station are

NOTE Confidence: 0.89303994

00:29:33.345 --> 00:29:37.451 supposed to do and so that we spend

NOTE Confidence: 0.89303994

00:29:37.451 --> 00:29:40.594 quite a bit time how working with

NOTE Confidence: 0.89303994

00:29:40.594 --> 00:29:43.390 the state of Massachusetts and also

NOTE Confidence: 0.89303994

00:29:43.390 --> 00:29:46.234 with abroad and so helping shifting

NOTE Confidence: 0.89303994

00:29:46.234 --> 00:29:49.195 the PPE under swap on from China.

NOTE Confidence: 0.89303994

00:29:49.200 --> 00:29:52.854 And so I was on the state, Massachusetts.

NOTE Confidence: 0.89303994

00:29:52.854 --> 00:29:57.120 The task force in the spring and then like.

NOTE Confidence: 0.89303994

00:29:57.120 --> 00:29:59.226 One thing I was really touched

NOTE Confidence: 0.89303994

00:29:59.226 --> 00:30:00.279 last spring was.

NOTE Confidence: 0.89303994

00:30:00.280 --> 00:30:03.072 Many, many peoples and step in to help

NOTE Confidence: 0.89303994

00:30:03.072 --> 00:30:05.230 without asking expecting any credit.

NOTE Confidence: 0.89303994

00:30:05.230 --> 00:30:07.780 So they really a wonderful experience

NOTE Confidence: 0.89303994

00:30:07.780 --> 00:30:10.592 and by working with so many peoples

NOTE Confidence: 0.89303994

00:30:10.592 --> 00:30:13.432 and who stepped in to help and so

NOTE Confidence: 0.89303994

00:30:13.432 --> 00:30:15.580 like in the screen 'cause there

NOTE Confidence: 0.89303994

00:30:15.580 --> 00:30:18.056 were not many flight from China to

NOTE Confidence: 0.89303994

00:30:18.056 --> 00:30:20.588 US so was difficult to shift under

NOTE Confidence: 0.89303994

00:30:20.588 --> 00:30:22.766 those medical supplies and two US

NOTE Confidence: 0.89303994

00:30:22.766 --> 00:30:25.430 and then so was really wonderful.

NOTE Confidence: 0.89303994

00:30:25.430 --> 00:30:28.574 Many people help out and so you can

NOTE Confidence: 0.89303994

00:30:28.574 --> 00:30:31.510 see that there were four flight.

NOTE Confidence: 0.89303994

00:30:31.510 --> 00:30:33.685 Shifting the usapyon swap watered

NOTE Confidence: 0.89303994

00:30:33.685 --> 00:30:35.860 by the state of Massachusetts

NOTE Confidence: 0.89303994

00:30:35.933 --> 00:30:38.171 from Shanghai to Boston under the

NOTE Confidence: 0.89303994

00:30:38.171 --> 00:30:40.859 first was the flight of the first

NOTE Confidence: 0.89303994

00:30:40.859 --> 00:30:42.359 flight leaving could own,

NOTE Confidence: 0.89303994

00:30:42.360 --> 00:30:44.604 and because there were not many

NOTE Confidence: 0.89303994

00:30:44.604 --> 00:30:45.726 commercial flight available

NOTE Confidence: 0.89303994

00:30:45.726 --> 00:30:47.589 and travel flight available,

NOTE Confidence: 0.89303994

00:30:47.590 --> 00:30:50.292 so this flight was converted from the

NOTE Confidence: 0.89303994

00:30:50.292 --> 00:30:53.325 from the Air Canada Flight and the

NOTE Confidence: 0.89303994

00:30:53.325 --> 00:30:56.013 passenger flight to a charter flight

NOTE Confidence: 0.89303994

00:30:56.094 --> 00:30:58.934 and then the picture on the right is

NOTE Confidence: 0.89303994

00:30:58.934 --> 00:31:02.560 the first flight arriving Boston.

NOTE Confidence: 0.89303994

00:31:02.560 --> 00:31:05.675 And also I the innerspring or we

NOTE Confidence: 0.89303994

00:31:05.675 --> 00:31:09.716 launch how we feel up and so this

NOTE Confidence: 0.89303994

00:31:09.716 --> 00:31:12.326 app collects the information about

NOTE Confidence: 0.89303994

00:31:12.427 --> 00:31:15.559 the Covic 19 symptoms and behaviors

NOTE Confidence: 0.89303994

00:31:15.559 --> 00:31:18.153 and also testing a result.

NOTE Confidence: 0.89303994

00:31:18.153 --> 00:31:21.171 And so this was in collaboration

NOTE Confidence: 0.89303994

00:31:21.171 --> 00:31:22.680 with some junk.

NOTE Confidence: 0.89303994

00:31:22.680 --> 00:31:25.592 Many of you probably know fun by

NOTE Confidence: 0.89303994

00:31:25.592 --> 00:31:28.523 his work in CRISPR editing and

NOTE Confidence: 0.89303994

00:31:28.523 --> 00:31:31.697 gene editing and CRISPR and also

NOTE Confidence: 0.89303994

00:31:31.697 --> 00:31:33.839 also banned Superman.

NOTE Confidence: 0.89303994

00:31:33.840 --> 00:31:35.640 Who is the CEO of country?

NOTE Confidence: 0.89303994

00:31:35.640 --> 00:31:39.150 So this is really a great.

NOTE Confidence: 0.89303994

00:31:39.150 --> 00:31:40.464 Collaboration between academia

NOTE Confidence: 0.89303994

00:31:40.464 --> 00:31:43.092 and industry 'cause we are not

NOTE Confidence: 0.89303994

00:31:43.092 --> 00:31:45.059 very good at developing up,

NOTE Confidence: 0.89303994

00:31:45.060 --> 00:31:46.748 but people in industry.

NOTE Confidence: 0.89303994

00:31:46.748 --> 00:31:48.858 They're much better developing app.

NOTE Confidence: 0.89303994

00:31:48.860 --> 00:31:51.158 So so many volunteer helping with

NOTE Confidence: 0.89303994

00:31:51.158 --> 00:31:54.084 this how we feel project and we

NOTE Confidence: 0.89303994

00:31:54.084 --> 00:31:56.269 build a nonprofit organization and

NOTE Confidence: 0.89303994

00:31:56.269 --> 00:31:58.939 with so many volunteers and then

NOTE Confidence: 0.89303994

00:31:58.939 --> 00:32:01.513 this app has over 750,000 users

NOTE Confidence: 0.89303994

00:32:01.520 --> 00:32:03.630 and also 50 million responses.

NOTE Confidence: 0.89303994

00:32:03.630 --> 00:32:06.605 And so I'll present some of those

NOTE Confidence: 0.89303994

00:32:06.605 --> 00:32:09.588 results and this is the first paper.

NOTE Confidence: 0.89303994

00:32:09.590 --> 00:32:10.628 Out of this,

NOTE Confidence: 0.89303994

00:32:10.628 --> 00:32:13.620 how we feel project was published in Nature.

NOTE Confidence: 0.89303994

00:32:13.620 --> 00:32:16.888 Human behavior last summer.

NOTE Confidence: 0.89303994

00:32:16.890 --> 00:32:18.226 So here last spring,

NOTE Confidence: 0.89303994

00:32:18.226 --> 00:32:20.800 who were more likely to be tested?

NOTE Confidence: 0.89303994

00:32:20.800 --> 00:32:22.924 And it turns out that people

NOTE Confidence: 0.89303994

00:32:22.924 --> 00:32:23.986 who had symptoms,

NOTE Confidence: 0.89303994

00:32:23.990 --> 00:32:26.517 CDC symptoms or health care workers and

NOTE Confidence: 0.89303994

00:32:26.517 --> 00:32:28.610 essential workers and people of color,

NOTE Confidence: 0.89303994

00:32:28.610 --> 00:32:31.088 they were more likely to be tested.

NOTE Confidence: 0.89303994

00:32:31.090 --> 00:32:32.466 So that makes sense,

NOTE Confidence: 0.89303994

00:32:32.466 --> 00:32:34.530 because in the spring the testing

NOTE Confidence: 0.89303994

00:32:34.600 --> 00:32:36.766 kids were not as widely available,

NOTE Confidence: 0.89303994

00:32:36.770 --> 00:32:38.545 so the vulnerable group should

NOTE Confidence: 0.89303994

00:32:38.545 --> 00:32:40.320 have priority to be tested.

NOTE Confidence: 0.89303994

00:32:40.320 --> 00:32:42.805 And so this also present analysis challenge,

NOTE Confidence: 0.89303994

00:32:42.810 --> 00:32:44.570 because the people who were

NOTE Confidence: 0.89303994

00:32:44.570 --> 00:32:46.900 tested or likely to be sicker.

NOTE Confidence: 0.89303994

00:32:46.900 --> 00:32:50.347 And so therefore this is not a random sample,

NOTE Confidence: 0.89303994

00:32:50.350 --> 00:32:52.968 so when we studies Association between the

NOTE Confidence: 0.89303994

00:32:52.968 --> 00:32:54.939 factors associated with the infection,

NOTE Confidence: 0.89303994

00:32:54.940 --> 00:32:56.775 we have taken into account

NOTE Confidence: 0.89303994

00:32:56.775 --> 00:32:58.610 that people who were tested

NOTE Confidence: 0.8840181

00:32:58.679 --> 00:33:01.231 was not a random sample and so therefore

NOTE Confidence: 0.8840181

00:33:01.231 --> 00:33:04.183 in the analysis we use the inverse

NOTE Confidence: 0.8840181

00:33:04.183 --> 00:33:05.975 probability weighted procedures and

NOTE Confidence: 0.8840181

00:33:05.975 --> 00:33:08.350 to account for the selection bias.

NOTE Confidence: 0.8840181

00:33:08.350 --> 00:33:10.902 So we found that male with a higher

NOTE Confidence: 0.8840181

00:33:10.902 --> 00:33:13.330 risk of infection than females.

NOTE Confidence: 0.8840181

00:33:13.330 --> 00:33:16.178 And also we found that people of color

NOTE Confidence: 0.8840181

00:33:16.178 --> 00:33:18.909 were at higher risk of infection.

NOTE Confidence: 0.8840181

00:33:18.910 --> 00:33:21.045 And also the essential workers

NOTE Confidence: 0.8840181

00:33:21.045 --> 00:33:23.681 and health care worker and these

NOTE Confidence: 0.8840181

00:33:23.681 --> 00:33:26.189 were at higher risk of infection.

NOTE Confidence: 0.8840181

00:33:26.190 --> 00:33:28.510 Also, we found another household

NOTE Confidence: 0.8840181

00:33:28.510 --> 00:33:30.830 exposures and and also community

NOTE Confidence: 0.8840181

00:33:30.907 --> 00:33:33.087 exposure are significant risk factor

NOTE Confidence: 0.8840181

00:33:33.087 --> 00:33:36.518 for infection and so you can see that

NOTE Confidence: 0.8840181

00:33:36.518 --> 00:33:38.483 for the household exposures after

NOTE Confidence: 0.8840181

00:33:38.483 --> 00:33:41.390 the show is almost 17 for Community

NOTE Confidence: 0.8840181

00:33:41.390 --> 00:33:44.070 exposures as we show almost three.

NOTE Confidence: 0.8840181

00:33:44.070 --> 00:33:47.134 So So what that mean is we need

NOTE Confidence: 0.8840181

00:33:47.134 --> 00:33:49.943 to break the within household

NOTE Confidence: 0.8840181

00:33:49.943 --> 00:33:53.178 and close place transmission and.

NOTE Confidence: 0.8840181

00:33:53.180 --> 00:33:55.064 Cluding, the nursing home,

NOTE Confidence: 0.8840181

00:33:55.064 --> 00:33:56.948 homeless shelters and prisons,

NOTE Confidence: 0.8840181

00:33:56.950 --> 00:33:59.942 and so and also we need to control

NOTE Confidence: 0.8840181

00:33:59.942 --> 00:34:02.344 the community transmission and so

NOTE Confidence: 0.8840181

00:34:02.344 --> 00:34:05.482 this finding was supported by the

NOTE Confidence: 0.8840181

00:34:05.482 --> 00:34:07.592 Massachusetts data that Massachusetts

NOTE Confidence: 0.8840181

00:34:07.592 --> 00:34:10.610 last year reported that almost 90%

NOTE Confidence: 0.8840181

00:34:10.610 --> 00:34:12.960 of covid cluster were household.

NOTE Confidence: 0.8840181

00:34:12.960 --> 00:34:15.570 So what that mean is household

NOTE Confidence: 0.8840181

00:34:15.570 --> 00:34:18.140 transmission is dominant is prevalent.

NOTE Confidence: 0.8840181

00:34:18.140 --> 00:34:20.000 Dominant lots of transmissions.

NOTE Confidence: 0.8840181

00:34:20.000 --> 00:34:23.310 And also we found the most important

NOTE Confidence: 0.8840181

00:34:23.310 --> 00:34:26.341 symptoms and was not the fever and

NOTE Confidence: 0.8840181

00:34:26.341 --> 00:34:29.218 cough was lots of peace and smell.

NOTE Confidence: 0.8840181

00:34:29.220 --> 00:34:31.362 So in particular we found out

NOTE Confidence: 0.8840181

00:34:31.362 --> 00:34:33.720 ratio is almost 33 associated with

NOTE Confidence: 0.8840181

00:34:33.720 --> 00:34:35.845 loss of taste and smell.

NOTE Confidence: 0.8840181

00:34:35.850 --> 00:34:38.580 About 40% of those who were past

NOTE Confidence: 0.8840181

00:34:38.580 --> 00:34:40.920 positive had lost of taste buds,

NOTE Confidence: 0.8840181

00:34:40.920 --> 00:34:42.363 taste and smell.

NOTE Confidence: 0.8840181

00:34:42.363 --> 00:34:45.730 Among those who are not testing about

NOTE Confidence: 0.8840181

00:34:45.823 --> 00:34:48.526 6.6% among those who are test negative.

NOTE Confidence: 0.8840181

00:34:48.530 --> 00:34:50.106 That was about 5%.

NOTE Confidence: 0.8840181

00:34:50.106 --> 00:34:53.524 So this is an important symptom is also

NOTE Confidence: 0.8840181

00:34:53.524 --> 00:34:55.944 distinguished from the flu symptom.

NOTE Confidence: 0.8840181

00:34:55.950 --> 00:34:58.686 Then we also build a prediction

NOTE Confidence: 0.8840181

00:34:58.686 --> 00:35:01.430 model giving there were not enough

NOTE Confidence: 0.8840181

00:35:01.430 --> 00:35:03.920 tests available and then can we

NOTE Confidence: 0.8840181

00:35:03.920 --> 00:35:06.909 use the screening on two and two?

NOTE Confidence: 0.8840181

00:35:06.910 --> 00:35:09.025 Predict whether a person is

NOTE Confidence: 0.8840181

00:35:09.025 --> 00:35:11.550 likely to be infected or not.

NOTE Confidence: 0.8840181

00:35:11.550 --> 00:35:14.076 So by using the CDC symptom,

NOTE Confidence: 0.8840181

00:35:14.080 --> 00:35:16.450 you can see that the RC

NOTE Confidence: 0.8840181

00:35:16.450 --> 00:35:19.150 curve is AOC is about 70%.

NOTE Confidence: 0.8840181

00:35:19.150 --> 00:35:21.676 Using all the variables and it's

NOTE Confidence: 0.8840181

00:35:21.676 --> 00:35:24.630 about 80% if we use a simpler

NOTE Confidence: 0.8840181

00:35:24.630 --> 00:35:26.740 model only used for variable,

NOTE Confidence: 0.8840181

00:35:26.740 --> 00:35:28.396 including the three exposure

NOTE Confidence: 0.8840181

00:35:28.396 --> 00:35:31.390 variable and also the loss of taste,

NOTE Confidence: 0.8840181

00:35:31.390 --> 00:35:31.845 smell,

NOTE Confidence: 0.8840181

00:35:31.845 --> 00:35:34.120 the symptom variables and then

NOTE Confidence: 0.8840181

00:35:34.120 --> 00:35:37.398 you can see the AOC is also 80%.

NOTE Confidence: 0.8840181

00:35:37.400 --> 00:35:39.776 And so this is very simple model but has

NOTE Confidence: 0.8840181

00:35:39.776 --> 00:35:42.099 very good predictability for infection.

NOTE Confidence: 0.8840181

00:35:42.100 --> 00:35:44.788 And when we build this model we use.

NOTE Confidence: 0.8840181

00:35:44.790 --> 00:35:48.342 This actually proves a boost that is a

NOTE Confidence: 0.8840181

00:35:48.342 --> 00:35:50.978 scalable gradient tree boosting method.

NOTE Confidence: 0.8840181

00:35:50.980 --> 00:35:54.193 So now let me talk about the

NOTE Confidence: 0.8840181

00:35:54.193 --> 00:35:56.740 defending challenge on the in 2021.

NOTE Confidence: 0.8840181

00:35:56.740 --> 00:36:00.276 So first is the vaccine rollout and optic,

NOTE Confidence: 0.8840181

00:36:00.280 --> 00:36:02.495 so the science was really

NOTE Confidence: 0.8840181

00:36:02.495 --> 00:36:03.824 wonderful last year,

NOTE Confidence: 0.8840181

00:36:03.830 --> 00:36:06.320 so developing the vaccine such as

NOTE Confidence: 0.8840181

00:36:06.320 --> 00:36:09.139 short time with such high efficacy,

NOTE Confidence: 0.8840181

00:36:09.140 --> 00:36:12.080 that's really amazing and so.

NOTE Confidence: 0.8840181

00:36:12.080 --> 00:36:15.237 So the challenge is the vaccination program.

NOTE Confidence: 0.8840181

00:36:15.240 --> 00:36:16.148 So basically,

NOTE Confidence: 0.8840181

00:36:16.148 --> 00:36:20.200 how can we get the vaccine into people's arm?

NOTE Confidence: 0.8840181

00:36:20.200 --> 00:36:23.350 And so so that basically includes the

NOTE Confidence: 0.8840181

00:36:23.350 --> 00:36:26.230 distribution and also the administration.

NOTE Confidence: 0.8840181

00:36:26.230 --> 00:36:26.704 Also,

NOTE Confidence: 0.8840181

00:36:26.704 --> 00:36:29.074 it's important to have equitable

NOTE Confidence: 0.8840181

00:36:29.074 --> 00:36:30.496 and scalable vaccination,

NOTE Confidence: 0.8840181

00:36:30.500 --> 00:36:32.865 and also is important to

NOTE Confidence: 0.8840181

00:36:32.865 --> 00:36:34.284 overcome vaccine hesitancy.

NOTE Confidence: 0.8840181

00:36:34.290 --> 00:36:38.686 I'm going to focus on this one.

NOTE Confidence: 0.77242935

00:36:38.690 --> 00:36:43.268 And the second defining challenge is

NOTE Confidence: 0.77242935

00:36:43.268 --> 00:36:47.260 the massive scalable testing and so.

NOTE Confidence: 0.77242935

00:36:47.260 --> 00:36:49.918 PCR test yes, a gold standard,

NOTE Confidence: 0.77242935

00:36:49.920 --> 00:36:52.811 but it is expensive and to do

NOTE Confidence: 0.77242935

00:36:52.811 --> 00:36:54.810 the massive regular testing.

NOTE Confidence: 0.77242935

00:36:54.810 --> 00:36:57.612 So I'm going to talk about

NOTE Confidence: 0.77242935

00:36:57.612 --> 00:36:59.480 efficient testing strategy using

NOTE Confidence: 0.77242935

00:36:59.561 --> 00:37:02.549 the pooled testing and also the

NOTE Confidence: 0.77242935

00:37:02.549 --> 00:37:04.541 other strategies rapid testing.

NOTE Confidence: 0.77242935

00:37:04.550 --> 00:37:06.884 And the third component is the

NOTE Confidence: 0.77242935

00:37:06.884 --> 00:37:08.440 implementation and compliance of

NOTE Confidence: 0.77242935

00:37:08.505 --> 00:37:10.417 public health control measures.

NOTE Confidence: 0.77242935

00:37:10.420 --> 00:37:13.268 So if you look at a quick job

NOTE Confidence: 0.77242935

00:37:13.268 --> 00:37:16.203 of the cases in January is not

NOTE Confidence: 0.77242935

00:37:16.203 --> 00:37:19.220 likely to do to the vaccine,

NOTE Confidence: 0.77242935

00:37:19.220 --> 00:37:22.146 because only less than 10% of the

NOTE Confidence: 0.77242935

00:37:22.146 --> 00:37:24.236 US population had been vaccinated.

NOTE Confidence: 0.77242935

00:37:24.240 --> 00:37:26.768 I seem like the last last month and

NOTE Confidence: 0.77242935

00:37:26.768 --> 00:37:29.063 the the implementation and compliance

NOTE Confidence: 0.77242935

00:37:29.063 --> 00:37:31.708 and control measures and became

NOTE Confidence: 0.77242935

00:37:31.708 --> 00:37:34.549 better and people pay more attention

NOTE Confidence: 0.77242935

00:37:34.549 --> 00:37:37.105 to the behavior changes so that.

NOTE Confidence: 0.77242935

00:37:37.110 --> 00:37:40.550 Definitely is an important message.

NOTE Confidence: 0.77242935

00:37:40.550 --> 00:37:44.510 So let's look at the vaccine rate and so.

NOTE Confidence: 0.77242935

00:37:44.510 --> 00:37:47.912 Overlap and this is from the one word data.

NOTE Confidence: 0.77242935

00:37:47.920 --> 00:37:49.111 You can see.

NOTE Confidence: 0.77242935

00:37:49.111 --> 00:37:51.493 Israel is definitely the role model

NOTE Confidence: 0.77242935

00:37:51.493 --> 00:37:54.430 and so the right now they have an

NOTE Confidence: 0.77242935

00:37:54.430 --> 00:37:57.019 average 70 doses and per 100 people.

NOTE Confidence: 0.77242935

00:37:57.020 --> 00:37:59.948 And so after we account that some people

NOTE Confidence: 0.77242935

00:37:59.948 --> 00:38:02.697 have two doses on average about 40%

NOTE Confidence: 0.77242935

00:38:02.700 --> 00:38:04.812 people in Israel had been vaccinated

NOTE Confidence: 0.77242935

00:38:04.812 --> 00:38:07.249 and with so that's really amazing.

NOTE Confidence: 0.77242935

00:38:07.250 --> 00:38:09.896 And you have this less than 10%

NOTE Confidence: 0.77242935

00:38:09.900 --> 00:38:12.436 if on the right you can see we

NOTE Confidence: 0.77242935

00:38:12.436 --> 00:38:14.959 have a serious equity issue.

NOTE Confidence: 0.77242935

00:38:14.960 --> 00:38:16.034 And in particular,

NOTE Confidence: 0.77242935

00:38:16.034 --> 00:38:17.824 you can see basically nobody

NOTE Confidence: 0.77242935

00:38:17.824 --> 00:38:19.858 in Africa has been vaccinated,

NOTE Confidence: 0.77242935

00:38:19.860 --> 00:38:23.490 so that's really not good.

NOTE Confidence: 0.77242935

00:38:23.490 --> 00:38:25.665 So the another defining challenges

NOTE Confidence: 0.77242935

00:38:25.665 --> 00:38:26.535 vaccine hesitation.

NOTE Confidence: 0.77242935

00:38:26.540 --> 00:38:29.150 So in order to achieve the

NOTE Confidence: 0.77242935

00:38:29.150 --> 00:38:30.890 vaccine induced herd immunity,

NOTE Confidence: 0.77242935

00:38:30.890 --> 00:38:33.500 we need to overcome vaccine hesitation.

NOTE Confidence: 0.77242935

00:38:33.500 --> 00:38:36.134 So I'm going to present the

NOTE Confidence: 0.77242935

00:38:36.134 --> 00:38:39.246 findings and from the how we feel

NOTE Confidence: 0.77242935

00:38:39.246 --> 00:38:41.760 data show McCabe is my Postal.

NOTE Confidence: 0.77242935

00:38:41.760 --> 00:38:45.424 He take a lead in this work in

NOTE Confidence: 0.77242935

00:38:45.424 --> 00:38:47.930 collaboration with many colleagues.

NOTE Confidence: 0.77242935

00:38:47.930 --> 00:38:50.728 So here is a way, a lunch,

NOTE Confidence: 0.77242935

00:38:50.728 --> 00:38:52.972 the Maxim question in how we

NOTE Confidence: 0.77242935

00:38:52.972 --> 00:38:55.308 fill up in early December.

NOTE Confidence: 0.77242935

00:38:55.310 --> 00:38:58.366 So with here the result of analyzing the

NOTE Confidence: 0.77242935

00:38:58.366 --> 00:39:01.050 first month data about 30,000 people.

NOTE Confidence: 0.77242935

00:39:01.050 --> 00:39:03.684 So we develop a partnership with

NOTE Confidence: 0.77242935

00:39:03.684 --> 00:39:06.166 Kinetica and last spring and so

NOTE Confidence: 0.77242935

00:39:06.166 --> 00:39:08.750 that's why you can see we have more

NOTE Confidence: 0.77242935

00:39:08.834 --> 00:39:11.299 respondents and in the kinetica,

NOTE Confidence: 0.77242935

00:39:11.300 --> 00:39:13.350 and also because the countries

NOTE Confidence: 0.77242935

00:39:13.350 --> 00:39:14.990 is located in California.

NOTE Confidence: 0.77242935

00:39:14.990 --> 00:39:18.206 So we had more respondent respondent.

NOTE Confidence: 0.77242935

00:39:18.210 --> 00:39:19.132 In California,

NOTE Confidence: 0.77242935

00:39:19.132 --> 00:39:22.820 so if you look at overall vaccine hesitancy,

NOTE Confidence: 0.77242935

00:39:22.820 --> 00:39:23.742 hesitancy read,

NOTE Confidence: 0.77242935

00:39:23.742 --> 00:39:27.430 you can see like thoughts are more hesitant,

NOTE Confidence: 0.77242935

00:39:27.430 --> 00:39:30.178 and so overall the vaccine hasn't

NOTE Confidence: 0.77242935

00:39:30.178 --> 00:39:33.422 hesitancy rate is about 1818% from the

NOTE Confidence: 0.77242935

00:39:33.422 --> 00:39:36.632 hallway field data and 82% on the.

NOTE Confidence: 0.77242935

00:39:36.632 --> 00:39:39.338 What said they are likely were

NOTE Confidence: 0.77242935

00:39:39.338 --> 00:39:42.138 more likely to take the vaccine.

NOTE Confidence: 0.77242935

00:39:42.140 --> 00:39:44.490 So if you look hard, um,

NOTE Confidence: 0.77242935

00:39:44.490 --> 00:39:47.220 vaccine hesitancy rate by race and ethnicity,

NOTE Confidence: 0.77242935

00:39:47.220 --> 00:39:50.028 then you can see that people of color

NOTE Confidence: 0.77242935

00:39:50.028 --> 00:39:53.478 are much more likely to be vaccine hesitant.

NOTE Confidence: 0.77242935

00:39:53.480 --> 00:39:54.551 So in particular,

NOTE Confidence: 0.77242935

00:39:54.551 --> 00:39:57.780 if you look at a black for example,

NOTE Confidence: 0.77242935

00:39:57.780 --> 00:40:00.426 the vaccine hesitancy is is all.

NOTE Confidence: 0.77242935

00:40:00.430 --> 00:40:03.346 46%, almost 50% so so compared

NOTE Confidence: 0.77242935

00:40:03.346 --> 00:40:05.800 to white is about 15%,

NOTE Confidence: 0.77242935

00:40:05.800 --> 00:40:07.752 but compared to Hispanic,

NOTE Confidence: 0.77242935

00:40:07.752 --> 00:40:11.080 about 30% you can see a large

NOTE Confidence: 0.77242935

00:40:11.080 --> 00:40:14.090 fraction of them are undecided group.

NOTE Confidence: 0.77242935

00:40:14.090 --> 00:40:17.716 So what that mean is that a

NOTE Confidence: 0.77242935

00:40:17.716 --> 00:40:19.270 community engagement through

NOTE Confidence: 0.84208

00:40:19.368 --> 00:40:22.980 the education of outreach is important.

NOTE Confidence: 0.84208

00:40:22.980 --> 00:40:24.680 To overcome vaccine hesitancy,

NOTE Confidence: 0.84208

00:40:24.680 --> 00:40:26.805 so here are the results.

NOTE Confidence: 0.84208

00:40:26.810 --> 00:40:29.589 Who are more likely to be vaccine

NOTE Confidence: 0.84208

00:40:29.589 --> 00:40:32.054 hesitant and so we found the

NOTE Confidence: 0.84208

00:40:32.054 --> 00:40:34.436 younger people are more likely to

NOTE Confidence: 0.84208

00:40:34.436 --> 00:40:37.427 be a vaccine hesitant and females,

NOTE Confidence: 0.84208

00:40:37.430 --> 00:40:39.992 and also health care worker essential

NOTE Confidence: 0.84208

00:40:39.992 --> 00:40:42.959 workers and also the people of color.

NOTE Confidence: 0.84208

00:40:42.960 --> 00:40:43.770 In particular,

NOTE Confidence: 0.84208

00:40:43.770 --> 00:40:46.605 black people are 3.5 times more likely

NOTE Confidence: 0.84208

00:40:46.605 --> 00:40:49.326 to be vaccine hesitant than white,

NOTE Confidence: 0.84208

00:40:49.330 --> 00:40:51.920 and people with pre existing

NOTE Confidence: 0.84208

00:40:51.920 --> 00:40:53.992 conditions and low income.

NOTE Confidence: 0.84208

00:40:54.000 --> 00:40:57.423 And also rural areas and also the

NOTE Confidence: 0.84208

00:40:57.423 --> 00:41:01.024 thoughts and also places with high kufic

NOTE Confidence: 0.84208

00:41:01.024 --> 00:41:05.040 burden and also the people who they are.

NOTE Confidence: 0.84208

00:41:05.040 --> 00:41:08.888 So those are more likely to be vaccine

NOTE Confidence: 0.84208

00:41:08.888 --> 00:41:12.004 hesitant people who wear masks and

NOTE Confidence: 0.84208

00:41:12.004 --> 00:41:14.579 also use the protective measures.

NOTE Confidence: 0.84208

00:41:14.580 --> 00:41:19.748 They are less likely to be vaccine hesitant.

NOTE Confidence: 0.84208

00:41:19.750 --> 00:41:21.930 Talk to us in summary.

NOTE Confidence: 0.84208

00:41:21.930 --> 00:41:24.222 So the the vulnerable group are

NOTE Confidence: 0.84208

00:41:24.222 --> 00:41:27.159 more likely to be vaccine hesitant,

NOTE Confidence: 0.84208

00:41:27.160 --> 00:41:29.776 and so they include people of

NOTE Confidence: 0.84208

00:41:29.776 --> 00:41:31.520 color health care worker,

NOTE Confidence: 0.84208

00:41:31.520 --> 00:41:34.537 essential worker and the young people female

NOTE Confidence: 0.84208

00:41:34.537 --> 00:41:37.629 and the regions with high kovik burdens.

NOTE Confidence: 0.84208

00:41:37.630 --> 00:41:39.805 And also the people with

NOTE Confidence: 0.84208

00:41:39.805 --> 00:41:41.110 pre existing conditions,

NOTE Confidence: 0.84208

00:41:41.110 --> 00:41:44.038 parents and low income.

NOTE Confidence: 0.84208

00:41:44.040 --> 00:41:46.375 And also people not using

NOTE Confidence: 0.84208

00:41:46.375 --> 00:41:47.776 the protective measures.

NOTE Confidence: 0.84208

00:41:47.780 --> 00:41:51.056 So an Irish last late last year,

NOTE Confidence: 0.84208

00:41:51.060 --> 00:41:53.868 the lunch, a community engagement alliance.

NOTE Confidence: 0.84208

00:41:53.870 --> 00:41:55.742 And so this is,

NOTE Confidence: 0.84208

00:41:55.742 --> 00:41:56.210 uh,

NOTE Confidence: 0.84208

00:41:56.210 --> 00:41:59.096 involved multiple centers and the one

NOTE Confidence: 0.84208

00:41:59.096 --> 00:42:03.338 of the goal is to do the Community

NOTE Confidence: 0.84208

00:42:03.338 --> 00:42:06.113 engagement to help with participation

NOTE Confidence: 0.84208

00:42:06.113 --> 00:42:08.987 in clinical trial and also.

NOTE Confidence: 0.84208

00:42:08.990 --> 00:42:11.110 Overcome the vaccine hesitancy.

NOTE Confidence: 0.8238236

00:42:13.360 --> 00:42:16.594 So what this tells us is community

NOTE Confidence: 0.8238236

00:42:16.594 --> 00:42:17.980 engagement for vaccination,

NOTE Confidence: 0.8238236

00:42:17.980 --> 00:42:20.746 of which an education is important,

NOTE Confidence: 0.8238236

00:42:20.750 --> 00:42:24.446 so that Pic home number 5 is important,

NOTE Confidence: 0.8238236

00:42:24.450 --> 00:42:27.117 remained bigil and to scale up scale

NOTE Confidence: 0.8238236

00:42:27.117 --> 00:42:29.999 up the control measure and vaccination

NOTE Confidence: 0.8238236

00:42:29.999 --> 00:42:32.759 by protecting the vulnerable group,

NOTE Confidence: 0.8238236

00:42:32.760 --> 00:42:35.070 including the health care workers

NOTE Confidence: 0.8238236

00:42:35.070 --> 00:42:37.380 and essential workers and elderly.

NOTE Confidence: 0.8238236

00:42:37.380 --> 00:42:39.228 And also it's important

NOTE Confidence: 0.8238236

00:42:39.228 --> 00:42:41.538 to reach the zero kovik.

NOTE Confidence: 0.8238236

00:42:41.540 --> 00:42:43.940 So what that mean is.

NOTE Confidence: 0.8238236

00:42:43.940 --> 00:42:46.404 We need to be careful and reopen

NOTE Confidence: 0.8238236

00:42:46.404 --> 00:42:49.175 slowly when the number of cases are

NOTE Confidence: 0.8238236

00:42:49.175 --> 00:42:51.225 sufficiently small and also with

NOTE Confidence: 0.8238236

00:42:51.225 --> 00:42:53.962 the control measures are so if when

NOTE Confidence: 0.8238236

00:42:53.962 --> 00:42:56.657 we opened too early and we slipped

NOTE Confidence: 0.8238236

00:42:56.657 --> 00:42:59.051 in the control measure like what

NOTE Confidence: 0.8238236

00:42:59.051 --> 00:43:01.600 happened last summer and in the South,

NOTE Confidence: 0.8238236

00:43:01.600 --> 00:43:04.071 and is likely to see the researchers

NOTE Confidence: 0.8238236

00:43:04.071 --> 00:43:06.449 and also is important to pay

NOTE Confidence: 0.8238236

00:43:06.449 --> 00:43:08.519 attention to the long color,

NOTE Confidence: 0.8238236

00:43:08.520 --> 00:43:11.656 the long term effect especially among the

NOTE Confidence: 0.8238236

00:43:11.656 --> 00:43:15.017 young people and then also the to a build.

NOTE Confidence: 0.8238236

00:43:15.020 --> 00:43:17.948 I've seen uptick and it's important

NOTE Confidence: 0.8238236

00:43:17.948 --> 00:43:20.440 to have community engagement and

NOTE Confidence: 0.8238236

00:43:20.440 --> 00:43:22.730 outreach and build public trust.

NOTE Confidence: 0.8238236

00:43:22.730 --> 00:43:26.678 So basically, how can we implement the?

NOTE Confidence: 0.8238236

00:43:26.680 --> 00:43:29.910 Control measures and also implement

NOTE Confidence: 0.8238236

00:43:29.910 --> 00:43:33.140 vaccination and ensure high compliance

NOTE Confidence: 0.8238236

00:43:33.234 --> 00:43:36.378 is the defining challenge this year.

NOTE Confidence: 0.8238236

00:43:36.380 --> 00:43:37.637 And the truth,

NOTE Confidence: 0.8238236

00:43:37.637 --> 00:43:41.052 the other component is for this year is

NOTE Confidence: 0.8238236

00:43:41.052 --> 00:43:43.810 how can we boost the testing capacity

NOTE Confidence: 0.8238236

00:43:43.810 --> 00:43:46.909 and buy a cover by doing more test.

NOTE Confidence: 0.8238236

00:43:46.910 --> 00:43:49.654 And so because it's uh if one needs

NOTE Confidence: 0.8238236

00:43:49.654 --> 00:43:52.691 to do the test frequently and to do

NOTE Confidence: 0.8238236

00:43:52.691 --> 00:43:56.192 the PCR test is difficult to to do

NOTE Confidence: 0.8238236

00:43:56.192 --> 00:43:58.577 that for many institution because

NOTE Confidence: 0.8238236

00:43:58.577 --> 00:44:01.490 it's costly and so they put the

NOTE Confidence: 0.8238236

00:44:01.490 --> 00:44:03.110 testing provide an alternative.

NOTE Confidence: 0.8238236

00:44:03.110 --> 00:44:05.994 So I'm going to talk about this

NOTE Confidence: 0.8238236

00:44:05.994 --> 00:44:07.230 efficient put testing.

NOTE Confidence: 0.8238236

00:44:07.230 --> 00:44:09.390 A design using the hyper

NOTE Confidence: 0.8238236

00:44:09.390 --> 00:44:10.686 graph factorization first.

NOTE Confidence: 0.8238236

00:44:10.690 --> 00:44:12.282 What is the protesting?

NOTE Confidence: 0.8238236

00:44:12.282 --> 00:44:15.548 The goal is that would put testing is

NOTE Confidence: 0.8238236

00:44:15.548 --> 00:44:18.732 to screen a large population with a few

NOTE Confidence: 0.8238236

00:44:18.814 --> 00:44:21.916 tests and giving the limited resources.

NOTE Confidence: 0.8238236

00:44:21.920 --> 00:44:24.902 So this will help reopen the school

NOTE Confidence: 0.8238236

00:44:24.902 --> 00:44:27.970 safely and the simple idea is used.

NOTE Confidence: 0.8238236

00:44:27.970 --> 00:44:30.130 This uh document design sofa.

NOTE Confidence: 0.8238236

00:44:30.130 --> 00:44:33.000 Suppose we have 100 people and we

NOTE Confidence: 0.8238236

00:44:33.000 --> 00:44:36.830 do 20 tests and then so we pulled

NOTE Confidence: 0.8238236

00:44:36.830 --> 00:44:39.335 the people sample into different.

NOTE Confidence: 0.8238236

00:44:39.340 --> 00:44:41.545 Pools and suppose there's only one case,

NOTE Confidence: 0.8238236

00:44:41.550 --> 00:44:43.748 and then we test each pool support.

NOTE Confidence: 0.8238236

00:44:43.750 --> 00:44:46.390 Each pool has a 10 people.

NOTE Confidence: 0.8238236

00:44:46.390 --> 00:44:49.477 And then we tested each put do 10 pull

NOTE Confidence: 0.8238236

00:44:49.477 --> 00:44:52.937 test and how we found this cool is costing.

NOTE Confidence: 0.8238236

00:44:52.940 --> 00:44:54.760 Then we test every individual

NOTE Confidence: 0.8238236

00:44:54.760 --> 00:44:56.580 in this pool so in.

NOTE Confidence: 0.8238236

00:44:56.580 --> 00:44:58.460 Therefore instead of doing 100

NOTE Confidence: 0.8238236

00:44:58.460 --> 00:45:01.096 test you only do 20 tests and

NOTE Confidence: 0.8238236

00:45:01.096 --> 00:45:03.124 so this is the basic idea.

NOTE Confidence: 0.8238236

00:45:03.130 --> 00:45:03.944 Put testing.

NOTE Confidence: 0.8238236

00:45:03.944 --> 00:45:06.793 So what is the limitation of this

NOTE Confidence: 0.8238236

00:45:06.793 --> 00:45:08.888 simple of protesting design?

NOTE Confidence: 0.8238236

00:45:08.890 --> 00:45:11.130 And so this document design

NOTE Confidence: 0.8238236

00:45:11.130 --> 00:45:13.370 allow one individual go to

NOTE Confidence: 0.8238236

00:45:13.458 --> 00:45:15.946 one pool that is Q equal to 1,

NOTE Confidence: 0.8238236

00:45:15.950 --> 00:45:18.302 then cycle through the pool until

NOTE Confidence: 0.8238236

00:45:18.302 --> 00:45:19.870 all individuals are assigned.

NOTE Confidence: 0.8238236

00:45:19.870 --> 00:45:22.649 So if you look at this example

NOTE Confidence: 0.8238236

00:45:22.649 --> 00:45:24.958 with eight subjects and six pool,

NOTE Confidence: 0.8238236

00:45:24.960 --> 00:45:27.466 then you can see that we assign

NOTE Confidence: 0.8238236

00:45:27.466 --> 00:45:30.155 the face first six subject to the

NOTE Confidence: 0.8238236

00:45:30.155 --> 00:45:32.447 6 four ABCDEF and then recycle

NOTE Confidence: 0.8238236

00:45:32.529 --> 00:45:34.869 the segments and each subject.

NOTE Confidence: 0.8238236

00:45:34.870 --> 00:45:37.957 And do the pull A&B so only one person

NOTE Confidence: 0.8238236

00:45:37.957 --> 00:45:40.570 per pool, so this is not optimal,

NOTE Confidence: 0.8238236

00:45:40.570 --> 00:45:41.521 only one pool,

NOTE Confidence: 0.8238236

00:45:41.521 --> 00:45:43.740 only one pool per person and this

NOTE Confidence: 0.81509376

00:45:43.809 --> 00:45:45.831 could lead to a non redundancy

NOTE Confidence: 0.81509376

00:45:45.831 --> 00:45:48.040 that also reduce the sensitivity.

NOTE Confidence: 0.81509376

00:45:48.040 --> 00:45:50.888 So the question is can we do better?

NOTE Confidence: 0.81509376

00:45:50.890 --> 00:45:52.670 Can we assign each individual

NOTE Confidence: 0.81509376

00:45:52.670 --> 00:45:54.450 to more than one pool?

NOTE Confidence: 0.81509376

00:45:54.450 --> 00:45:57.298 That basically makes a Q equal to two.

NOTE Confidence: 0.81509376

00:45:57.300 --> 00:45:59.060 So let's start from something

NOTE Confidence: 0.81509376

00:45:59.060 --> 00:46:01.240 like if there's a safe assign

NOTE Confidence: 0.81509376

00:46:01.240 --> 00:46:02.990 one person to two pools.

NOTE Confidence: 0.81509376

00:46:02.990 --> 00:46:04.810 So for example I assigned

NOTE Confidence: 0.81509376

00:46:04.810 --> 00:46:06.266 the first person to.

NOTE Confidence: 0.81509376

00:46:06.270 --> 00:46:09.213 2A B second person to put a C and

NOTE Confidence: 0.81509376

00:46:09.213 --> 00:46:12.208 third person to pull busy and so on

NOTE Confidence: 0.81509376

00:46:12.208 --> 00:46:14.909 and then cycle through the order.

NOTE Confidence: 0.81509376

00:46:14.910 --> 00:46:16.605 So that basically this idea

NOTE Confidence: 0.81509376

00:46:16.605 --> 00:46:18.750 assign each person to two pools.

NOTE Confidence: 0.81509376

00:46:18.750 --> 00:46:20.070 What is the problem?

NOTE Confidence: 0.81509376

00:46:20.070 --> 00:46:22.484 The problem is by doing this simple

NOTE Confidence: 0.81509376

00:46:22.484 --> 00:46:24.674 way the design is not balanced.

NOTE Confidence: 0.81509376

00:46:24.680 --> 00:46:27.067 You can see that pull it has

NOTE Confidence: 0.81509376

00:46:27.067 --> 00:46:29.217 five subjects and puppy has four

NOTE Confidence: 0.81509376

00:46:29.217 --> 00:46:31.660 and pull up as only one subject.

NOTE Confidence: 0.81509376

00:46:31.660 --> 00:46:33.868 Because when when does them the

NOTE Confidence: 0.81509376

00:46:33.868 --> 00:46:35.714 pulling and by assigning one

NOTE Confidence: 0.81509376

00:46:35.714 --> 00:46:37.526 person to more than one pool

NOTE Confidence: 0.81509376

00:46:37.526 --> 00:46:39.690 while need to dilute the sample.

NOTE Confidence: 0.81509376

00:46:39.690 --> 00:46:42.738 So if one has a different solution for

NOTE Confidence: 0.81509376

00:46:42.738 --> 00:46:45.060 different pools that will affect the.

NOTE Confidence: 0.81509376

00:46:45.060 --> 00:46:47.010 Accuracy under then the sensitivity.

NOTE Confidence: 0.81509376

00:46:47.010 --> 00:46:49.618 So can we do better so that is

NOTE Confidence: 0.81509376

00:46:49.618 --> 00:46:52.420 a basic idea of a more balanced

NOTE Confidence: 0.81509376

00:46:52.420 --> 00:46:55.170 design we call the hyper design.

NOTE Confidence: 0.81509376

00:46:55.170 --> 00:46:57.900 So this using the hyper graph factorization.

NOTE Confidence: 0.81509376

00:46:57.900 --> 00:47:00.620 So the basic idea is we want to

NOTE Confidence: 0.81509376

00:47:00.620 --> 00:47:03.337 make the spell is that possible?

NOTE Confidence: 0.81509376

00:47:03.340 --> 00:47:06.772 So for example like here you can see

NOTE Confidence: 0.81509376

00:47:06.772 --> 00:47:09.774 that assigned person A to pull a BE

NOTE Confidence: 0.81509376

00:47:09.774 --> 00:47:12.365 person B person to pull CD person

NOTE Confidence: 0.81509376

00:47:12.365 --> 00:47:15.402 3 two pull ENF person four to pull.

NOTE Confidence: 0.81509376

00:47:15.402 --> 00:47:18.930 PNC Person 5 to pull the D&F and so

NOTE Confidence: 0.81509376

00:47:19.026 --> 00:47:22.370 on and so this. This idea is after you.

NOTE Confidence: 0.81509376

00:47:22.370 --> 00:47:24.590 Each pool has four samples and

NOTE Confidence: 0.81509376

00:47:24.590 --> 00:47:27.696 so you can see for the 1st pool

NOTE Confidence: 0.81509376

00:47:27.696 --> 00:47:29.616 and the test is negative.

NOTE Confidence: 0.81509376

00:47:29.620 --> 00:47:32.294 The second pull the test is positive.

NOTE Confidence: 0.81509376

00:47:32.300 --> 00:47:34.967 3rd pool passes positive and so on.

NOTE Confidence: 0.81509376

00:47:34.970 --> 00:47:37.763 Then afterwards we do the pool testing

NOTE Confidence: 0.81509376

00:47:37.763 --> 00:47:40.960 and then we can decode to see that

NOTE Confidence: 0.81509376

00:47:40.960 --> 00:47:43.759 which person is likely to be a case.

NOTE Confidence: 0.81509376

00:47:43.760 --> 00:47:46.388 And here you can see that.

NOTE Confidence: 0.81509376

00:47:46.390 --> 00:47:49.330 After do the decoding person 3, four,

NOTE Confidence: 0.81509376

00:47:49.330 --> 00:47:52.690 and seven are likely to be a positive,

NOTE Confidence: 0.81509376

00:47:52.690 --> 00:47:55.497 and then we test each of them

NOTE Confidence: 0.81509376

00:47:55.497 --> 00:47:57.729 individually and find out persons.

NOTE Confidence: 0.81509376

00:47:57.730 --> 00:48:00.474 1 Seven are the cases and so why

NOTE Confidence: 0.81509376

00:48:00.474 --> 00:48:03.610 it is called hyper graph design.

NOTE Confidence: 0.81509376

00:48:03.610 --> 00:48:06.130 And that because this is related

NOTE Confidence: 0.81509376

00:48:06.130 --> 00:48:07.390 to the hypergraph,

NOTE Confidence: 0.81509376

00:48:07.390 --> 00:48:09.815 and in complete awe metrics

NOTE Confidence: 0.81509376

00:48:09.815 --> 00:48:13.243 and so you can think about this

NOTE Confidence: 0.81509376

00:48:13.243 --> 00:48:16.386 as the six pools are the six.

NOTE Confidence: 0.81509376

00:48:16.390 --> 00:48:18.938 Vertex is under the edges are the

NOTE Confidence: 0.81509376

00:48:18.938 --> 00:48:21.748 people and soap example like a person.

NOTE Confidence: 0.81509376

00:48:21.750 --> 00:48:23.346 One will assign this.

NOTE Confidence: 0.81509376

00:48:23.346 --> 00:48:26.231 This is edge person one and so

NOTE Confidence: 0.81509376

00:48:26.231 --> 00:48:28.673 that's assigned the pool at A&B

NOTE Confidence: 0.81509376

00:48:28.673 --> 00:48:30.958 and then person two assigned to

NOTE Confidence: 0.81509376

00:48:30.958 --> 00:48:33.623 C&D and so so this is so that's

NOTE Confidence: 0.81509376

00:48:33.623 --> 00:48:35.538 why it's called a hypergraph.

NOTE Confidence: 0.81509376

00:48:35.540 --> 00:48:37.899 So basically what we do is we

NOTE Confidence: 0.81509376

00:48:37.899 --> 00:48:39.813 need to assign the individuals

NOTE Confidence: 0.81509376

00:48:39.813 --> 00:48:42.704 and in the right sequence to make

NOTE Confidence: 0.81509376

00:48:42.704 --> 00:48:45.115 them as balanced as possible and

NOTE Confidence: 0.81509376

00:48:45.115 --> 00:48:47.467 not overlap as much as possible.

NOTE Confidence: 0.81509376

00:48:47.467 --> 00:48:50.089 And so by doing this design,

NOTE Confidence: 0.81509376

00:48:50.090 --> 00:48:53.065 when we kill equal to 216 pool,

NOTE Confidence: 0.81509376

00:48:53.070 --> 00:48:54.955 we have 5 factorizations and

NOTE Confidence: 0.81509376

00:48:54.955 --> 00:48:56.840 so you can see for

NOTE Confidence: 0.8389234

00:48:56.921 --> 00:48:59.999 each factorization there's no overlap and

NOTE Confidence: 0.8389234

00:48:59.999 --> 00:49:03.420 and also between every two consecutive.

NOTE Confidence: 0.8389234

00:49:03.420 --> 00:49:05.332 Assignment under then there

NOTE Confidence: 0.8389234

00:49:05.332 --> 00:49:07.722 is no overlap as well.

NOTE Confidence: 0.8389234

00:49:07.730 --> 00:49:10.250 And by doing this hypergraph designs

NOTE Confidence: 0.8389234

00:49:10.250 --> 00:49:13.495 and so you can see that we can

NOTE Confidence: 0.8389234

00:49:13.495 --> 00:49:16.233 have a balanced pool and also is

NOTE Confidence: 0.8389234

00:49:16.233 --> 00:49:19.229 very easy to implement and so this

NOTE Confidence: 0.8389234

00:49:19.229 --> 00:49:22.235 Calculator and so and also very easy

NOTE Confidence: 0.8389234

00:49:22.235 --> 00:49:26.199 to decode and so this is based on

NOTE Confidence: 0.8389234

00:49:26.199 --> 00:49:29.064 the company company Atomic Comics.

NOTE Confidence: 0.8389234

00:49:29.070 --> 00:49:31.562 Population so we can do this calculations

NOTE Confidence: 0.8389234

00:49:31.562 --> 00:49:34.099 and for Q equal two and three,

NOTE Confidence: 0.8389234

00:49:34.100 --> 00:49:36.606 but for Q equals greater than three,

NOTE Confidence: 0.8389234

00:49:36.610 --> 00:49:39.360 the calculations much more challenging.

NOTE Confidence: 0.8389234

00:49:39.360 --> 00:49:42.540 And so by doing that then you can see that.

NOTE Confidence: 0.8389234

00:49:42.540 --> 00:49:45.576 And here we plot out the.

NOTE Confidence: 0.8389234

00:49:45.580 --> 00:49:47.120 Efficiency against the prevalence,

NOTE Confidence: 0.8389234

00:49:47.120 --> 00:49:49.430 so only if the prevalence is

NOTE Confidence: 0.8389234

00:49:49.500 --> 00:49:50.970 low is worthwhile to do.

NOTE Confidence: 0.8389234

00:49:50.970 --> 00:49:53.476 Put testing if the prevalence is high,

NOTE Confidence: 0.8389234

00:49:53.480 --> 00:49:57.050 there's no need to do put testing so you can

NOTE Confidence: 0.8389234

00:49:57.132 --> 00:50:00.534 see that doing the hyper design and it is.

NOTE Confidence: 0.8389234

00:50:00.540 --> 00:50:03.006 Efficient and then the efficiency is

NOTE Confidence: 0.8389234

00:50:03.006 --> 00:50:05.588 almost 6 compared to individual design

NOTE Confidence: 0.8389234

00:50:05.588 --> 00:50:08.612 and also expect her than a redesign.

NOTE Confidence: 0.8389234

00:50:08.620 --> 00:50:11.840 That efficiency is 4.6 and when the

NOTE Confidence: 0.8389234

00:50:11.840 --> 00:50:14.457 preference become higher and then you

NOTE Confidence: 0.8389234

00:50:14.457 --> 00:50:17.145 can see that the efficiency goes down

NOTE Confidence: 0.8389234

00:50:17.222 --> 00:50:19.706 and then also comparing the hyper

NOTE Confidence: 0.8389234

00:50:19.706 --> 00:50:22.288 design with a radius and efficient,

NOTE Confidence: 0.8389234

00:50:22.288 --> 00:50:25.042 the sensitivity is pretty similar and

NOTE Confidence: 0.8389234

00:50:25.042 --> 00:50:28.035 also when we have 384 subject per batch

NOTE Confidence: 0.8389234

00:50:28.035 --> 00:50:31.352 and you can see that the hyper design

NOTE Confidence: 0.8389234

00:50:31.352 --> 00:50:33.737 still outperformed the other design.

NOTE Confidence: 0.8389234

00:50:33.740 --> 00:50:36.446 And for the Pytest peoples design.

NOTE Confidence: 0.8389234

00:50:36.450 --> 00:50:38.850 And so it.

NOTE Confidence: 0.8389234

00:50:38.850 --> 00:50:40.795 Especially when the prevalence become

NOTE Confidence: 0.8389234

00:50:40.795 --> 00:50:43.578 higher and then you can see that uh,

NOTE Confidence: 0.8389234

00:50:43.580 --> 00:50:46.460 sensitivity almost reach to 0.

NOTE Confidence: 0.8389234

00:50:46.460 --> 00:50:49.322 And so this also thought we look at a

NOTE Confidence: 0.8389234

00:50:49.322 --> 00:50:51.747 different design in different scenarios,

NOTE Confidence: 0.8389234

00:50:51.750 --> 00:50:54.396 and we showed that is hyper design

NOTE Confidence: 0.8389234

00:50:54.396 --> 00:50:57.211 is optimal and in terms of allocating

NOTE Confidence: 0.8389234

00:50:57.211 --> 00:51:00.035 resources and so here we plot out

NOTE Confidence: 0.8389234

00:51:00.035 --> 00:51:02.408 the X axis is the total number

NOTE Confidence: 0.8389234

00:51:02.408 --> 00:51:04.224 of sample collect each day.

NOTE Confidence: 0.8389234

00:51:04.224 --> 00:51:06.870 Suppose each day we collect 3000 samples.

NOTE Confidence: 0.8389234

00:51:06.870 --> 00:51:09.048 Suppose we only have the resources

NOTE Confidence: 0.8389234

00:51:09.048 --> 00:51:11.030 to do 12 foot tests.

NOTE Confidence: 0.8389234

00:51:11.030 --> 00:51:14.117 Then you can see that efficiency screening

NOTE Confidence: 0.8389234

00:51:14.117 --> 00:51:17.080 capacity using this Q equal to two is 122.

NOTE Confidence: 0.8389234

00:51:17.080 --> 00:51:18.298 That is much.

NOTE Confidence: 0.8389234

00:51:18.298 --> 00:51:21.140 A better and so so then also

NOTE Confidence: 0.8389234

00:51:21.239 --> 00:51:24.135 if one has a Q equal to three,

NOTE Confidence: 0.8389234

00:51:24.140 --> 00:51:26.426 that means a law allowing assigning

NOTE Confidence: 0.8389234

00:51:26.426 --> 00:51:28.440 one person to three pools.

NOTE Confidence: 0.8389234

00:51:28.440 --> 00:51:32.129 Then in that situation we need to

NOTE Confidence: 0.8389234

00:51:32.129 --> 00:51:35.129 use the hypergraph and with the.

NOTE Confidence: 0.8389234

00:51:35.130 --> 00:51:40.618 Those kind of. 20 different hyperedges.

NOTE Confidence: 0.81931335

00:51:43.190 --> 00:51:44.456 So in summary,

NOTE Confidence: 0.81931335

00:51:44.456 --> 00:51:46.566 to scale up widespread testing,

NOTE Confidence: 0.81931335

00:51:46.570 --> 00:51:49.108 hyper this is based on hypergraph

NOTE Confidence: 0.81931335

00:51:49.108 --> 00:51:50.800 factor factorization design provide

NOTE Confidence: 0.81931335

00:51:50.866 --> 00:51:52.946 efficient pool design to maximize

NOTE Confidence: 0.81931335

00:51:52.946 --> 00:51:54.610 the balance and efficiency,

NOTE Confidence: 0.81931335

00:51:54.610 --> 00:51:57.354 and the protesting is useful when the

NOTE Confidence: 0.81931335

00:51:57.354 --> 00:52:00.528 prevalence is low when the preferences highs,

NOTE Confidence: 0.81931335

00:52:00.530 --> 00:52:02.650 there's no need for protesting,

NOTE Confidence: 0.81931335

00:52:02.650 --> 00:52:06.210 just do the individual testing and we build

NOTE Confidence: 0.81931335

00:52:06.210 --> 00:52:09.097 a website that allows the investigator

NOTE Confidence: 0.81931335

00:52:09.097 --> 00:52:12.560 and the two design their own study.

NOTE Confidence: 0.81931335

00:52:12.560 --> 00:52:15.297 And so to combat kovik and so

NOTE Confidence: 0.81931335

00:52:15.297 --> 00:52:18.108 we are really in this together.

NOTE Confidence: 0.81931335

00:52:18.110 --> 00:52:21.099 And so we have to be together

NOTE Confidence: 0.81931335

00:52:21.099 --> 00:52:22.380 and be stronger.

NOTE Confidence: 0.81931335

00:52:22.380 --> 00:52:25.566 And so it's important to let the data speak

NOTE Confidence: 0.81931335

00:52:25.566 --> 00:52:28.790 and also develop evidence based strategy.

NOTE Confidence: 0.81931335

00:52:28.790 --> 00:52:31.220 And we show that there are

NOTE Confidence: 0.81931335

00:52:31.220 --> 00:52:33.480 two feature of the Covic.

NOTE Confidence: 0.81931335

00:52:33.480 --> 00:52:35.620 One is is highly transmissible,

NOTE Confidence: 0.81931335

00:52:35.620 --> 00:52:37.188 second is highly convert.

NOTE Confidence: 0.81931335

00:52:37.188 --> 00:52:40.100 And also it's important to remain vigilant

NOTE Confidence: 0.81931335

00:52:40.100 --> 00:52:43.010 and to use the multifaceted interventions.

NOTE Confidence: 0.81931335

00:52:43.010 --> 00:52:44.434 And to combat Covid,

NOTE Confidence: 0.81931335

00:52:44.434 --> 00:52:46.570 and so the there are multiple

NOTE Confidence: 0.81931335

00:52:46.649 --> 00:52:48.789 defining challenges this year.

NOTE Confidence: 0.81931335

00:52:48.790 --> 00:52:51.268 One is a Black Max magazine,

NOTE Confidence: 0.81931335

00:52:51.270 --> 00:52:52.922 distribution, uptake and education.

NOTE Confidence: 0.81931335

00:52:52.922 --> 00:52:55.400 The other is a scalable testing,

NOTE Confidence: 0.81931335

00:52:55.400 --> 00:52:58.088 so we talk about the put testing and

NOTE Confidence: 0.81931335

00:52:58.088 --> 00:53:01.716 so I want to thank the many of the

NOTE Confidence: 0.81931335

00:53:01.716 --> 00:53:04.480 collaborators and so who made many

NOTE Confidence: 0.81931335

00:53:04.480 --> 00:53:07.378 contributions to help with the project.

NOTE Confidence: 0.81931335

00:53:07.380 --> 00:53:09.900 And also there's a quick announcement

NOTE Confidence: 0.81931335

00:53:09.900 --> 00:53:12.749 and the cops and less at lunch.

NOTE Confidence: 0.81931335

00:53:12.750 --> 00:53:14.418 This Covic 19 data.

NOTE Confidence: 0.81931335

00:53:14.418 --> 00:53:16.503 Lisa Weaponer last December and

NOTE Confidence: 0.81931335

00:53:16.503 --> 00:53:19.321 so this is every two weeks and

NOTE Confidence: 0.81931335

00:53:19.321 --> 00:53:21.569 on Thursday from 12:00 to 1:00.

NOTE Confidence: 0.81931335

00:53:21.570 --> 00:53:24.160 And so these are we have the

NOTE Confidence: 0.81931335

00:53:24.160 --> 00:53:26.694 last few two month. Last month.

NOTE Confidence: 0.81931335

00:53:26.694 --> 00:53:28.654 We have a wonderful speaker.

NOTE Confidence: 0.81931335

00:53:28.660 --> 00:53:29.662 Great turn out.

NOTE Confidence: 0.81931335

00:53:29.662 --> 00:53:32.000 So those are the speaker in the

NOTE Confidence: 0.81931335

00:53:32.077 --> 00:53:34.172 coming weeks and from Denmark

NOTE Confidence: 0.81931335

00:53:34.172 --> 00:53:36.775 Mukherjee who will talk about Covic

NOTE Confidence: 0.81931335

00:53:36.775 --> 00:53:38.910 in Indian and Harvey Fineberg.

NOTE Confidence: 0.81931335

00:53:38.910 --> 00:53:41.668 Many of you know and he's a

NOTE Confidence: 0.81931335

00:53:41.668 --> 00:53:43.465 former president of National

NOTE Confidence: 0.81931335

00:53:43.465 --> 00:53:46.120 Academy of Medicine and also.

NOTE Confidence: 0.81931335

00:53:46.120 --> 00:53:48.164 Jim Young Kim is a former president

NOTE Confidence: 0.81931335

00:53:48.164 --> 00:53:50.532 of World Bank and so they're going to

NOTE Confidence: 0.81931335

00:53:50.532 --> 00:53:52.859 give the next week talks and thank you.

NOTE Confidence: 0.8027339

00:53:55.330 --> 00:53:56.890 Thanks young for this

NOTE Confidence: 0.8027339

00:53:56.890 --> 00:53:58.840 wonderful talk is very useful.

NOTE Confidence: 0.8027339

00:53:58.840 --> 00:54:01.804 I want to weather the audience

NOTE Confidence: 0.8027339

00:54:01.804 --> 00:54:04.720 have any questions for she home.

NOTE Confidence: 0.8027339

00:54:04.720 --> 00:54:06.573 Yeah I have a question.

NOTE Confidence: 0.8027339

00:54:06.573 --> 00:54:07.690 Yes, please song.

NOTE Confidence: 0.8027339

00:54:07.690 --> 00:54:08.800 So I'm wondering,

NOTE Confidence: 0.8170914

00:54:08.800 --> 00:54:11.026 will people who are willing to

NOTE Confidence: 0.8170914

00:54:11.026 --> 00:54:13.994 respond to the how we feel study be

NOTE Confidence: 0.8170914

00:54:13.994 --> 00:54:16.220 more likely to have lower hesitancy?

NOTE Confidence: 0.06819177

00:54:19.890 --> 00:54:24.255 Um? I would think the how we feel.

NOTE Confidence: 0.06819177

00:54:24.260 --> 00:54:27.448 We study people probably.

NOTE Confidence: 0.06819177

00:54:27.450 --> 00:54:29.330 I would think that

NOTE Confidence: 0.06819177

00:54:29.330 --> 00:54:31.680 probably likely to be true,

NOTE Confidence: 0.06819177

00:54:31.680 --> 00:54:34.865 and so the how we feel samples

NOTE Confidence: 0.06819177

00:54:34.865 --> 00:54:38.257 the because of people use the app,

NOTE Confidence: 0.06819177

00:54:38.260 --> 00:54:41.172 so at least that they are coping

NOTE Confidence: 0.06819177

00:54:41.172 --> 00:54:44.361 aware and they think a quickly is

NOTE Confidence: 0.06819177

00:54:44.361 --> 00:54:47.127 problem and so it's possible that

NOTE Confidence: 0.06819177

00:54:47.217 --> 00:54:50.815 in the national samples when we have

NOTE Confidence: 0.06819177

00:54:50.815 --> 00:54:53.300 a more representative samples and

NOTE Confidence: 0.06819177

00:54:53.300 --> 00:54:56.120 the hesitancy rate may be higher.

NOTE Confidence: 0.79592234

00:55:00.920 --> 00:55:02.736 Donna has a question.

NOTE Confidence: 0.79592234

00:55:02.736 --> 00:55:05.445 Yeah, I see her name was

NOTE Confidence: 0.79592234

00:55:05.445 --> 00:55:07.262 incredible work you've done.

NOTE Confidence: 0.79592234

00:55:07.262 --> 00:55:08.618 It's just absolutely

NOTE Confidence: 0.79592234

00:55:08.620 --> 00:55:09.979 phenomenal and breathtaking.

NOTE Confidence: 0.79592234

00:55:09.980 --> 00:55:11.339 How you've addressed

NOTE Confidence: 0.79592234

00:55:11.340 --> 00:55:14.504 each issue arising in the kobid epidemic,

NOTE Confidence: 0.79592234

00:55:14.510 --> 00:55:19.529 one by one and come up with such clarity.

NOTE Confidence: 0.79592234

00:55:19.530 --> 00:55:21.500 To guide us. So my question

NOTE Confidence: 0.79592234

00:55:21.500 --> 00:55:23.140 is about the hyper designs.

NOTE Confidence: 0.851154

00:55:23.140 --> 00:55:25.108 I've been aware of pool testing,

NOTE Confidence: 0.851154

00:55:25.110 --> 00:55:26.420 which I you know.

NOTE Confidence: 0.851154

00:55:26.420 --> 00:55:29.036 We all know it's been around for awhile,

NOTE Confidence: 0.851154

00:55:29.040 --> 00:55:31.010 but I'm just wondering, you know,

NOTE Confidence: 0.851154

00:55:31.010 --> 00:55:33.631 is there like a rule of thumb like

NOTE Confidence: 0.851154

00:55:33.631 --> 00:55:35.928 safe the prevalence rate is like 5%?

NOTE Confidence: 0.851154

00:55:35.928 --> 00:55:36.906 How many digit

NOTE Confidence: 0.851154

00:55:36.910 --> 00:55:39.534 in your graph like how many fewer tests

NOTE Confidence: 0.851154

00:55:39.540 --> 00:55:42.055 would you have to use using a hyper

NOTE Confidence: 0.851154

00:55:42.055 --> 00:55:44.130 design versus like the standard approach

NOTE Confidence: 0.851154

00:55:44.130 --> 00:55:46.746 that you know people would tend to use

NOTE Confidence: 0.851154

00:55:46.750 --> 00:55:49.218 which is to just test everybody. Yeah,

NOTE Confidence: 0.851154

00:55:49.218 --> 00:55:53.342 so that is if you can see that from here.

NOTE Confidence: 0.851154

00:55:53.342 --> 00:55:55.519 Yeah, it's a little hard to

NOTE Confidence: 0.851154

00:55:55.519 --> 00:55:57.334 see it's a little small.

NOTE Confidence: 0.851154

00:55:57.340 --> 00:55:59.724 Oh this hyper yeah I can the the

NOTE Confidence: 0.851154

00:55:59.724 --> 00:56:02.102 so you can see the efficiency

NOTE Confidence: 0.851154

00:56:02.102 --> 00:56:04.227 that is about hyper design.

NOTE Confidence: 0.851154

00:56:04.230 --> 00:56:06.894 Yes almost six so that means that we

NOTE Confidence: 0.851154

00:56:06.894 --> 00:56:09.861 can each task and have 6 people and

NOTE Confidence: 0.851154

00:56:09.861 --> 00:56:12.533 by individual design so you can see

NOTE Confidence: 0.851154

00:56:12.533 --> 00:56:14.753 that suppose you have 100 people.

NOTE Confidence: 0.851154

00:56:14.760 --> 00:56:18.660 This is 96 so 96 / 6 and then then

NOTE Confidence: 0.851154

00:56:18.660 --> 00:56:23.110 you can see that that is. How many?

NOTE Confidence: 0.851154

00:56:23.110 --> 00:56:25.926 How many fewer tasks it less than 20?

NOTE Confidence: 0.851154

00:56:25.926 --> 00:56:27.686 Yes, I think about it.

NOTE Confidence: 0.851154

00:56:27.690 --> 00:56:32.090 If you do individual test that is 100.

NOTE Confidence: 0.851154

00:56:32.090 --> 00:56:32.990 What is the?

NOTE Confidence: 0.851154

00:56:32.990 --> 00:56:33.894 What is the?

NOTE Confidence: 0.851154

00:56:33.894 --> 00:56:35.400 I didn't understand really what

NOTE Confidence: 0.851154

00:56:35.400 --> 00:56:36.910 the 96 and the 3:50.

NOTE Confidence: 0.820734000000001

00:56:39.700 --> 00:56:42.247 Yeah batch, so there are 96 so in the

NOTE Confidence: 0.820734000000001

00:56:42.247 --> 00:56:44.731 so if you think about when you win

NOTE Confidence: 0.820734000000001

00:56:44.731 --> 00:56:47.163 you do test and then basically you

NOTE Confidence: 0.820734000000001

00:56:47.163 --> 00:56:49.948 need to layout the sample in a batch.

NOTE Confidence: 0.820734000000001

00:56:49.948 --> 00:56:51.802 If you think about it already

NOTE Confidence: 0.820734000000001

00:56:51.802 --> 00:56:53.180 then think about that.

NOTE Confidence: 0.820734000000001

00:56:53.180 --> 00:56:54.464 Basically they have eight.

NOTE Confidence: 0.820734000000001

00:56:54.464 --> 00:56:56.069 You have to think about.

NOTE Confidence: 0.820734000000001

00:56:56.070 --> 00:56:58.317 The Matrix is 8 by 12 matrix.

NOTE Confidence: 0.820734000000001

00:56:58.320 --> 00:57:00.168 You put all the samples and

NOTE Confidence: 0.820734000000001

00:57:00.168 --> 00:57:02.169 in this 8 by 12 array.

NOTE Confidence: 0.89508015

00:57:05.050 --> 00:57:08.310 OK, thank you yeah.

NOTE Confidence: 0.89508015

00:57:08.310 --> 00:57:10.582 And also if you look at the capacity

NOTE Confidence: 0.89508015

00:57:10.582 --> 00:57:12.669 here you can see the capacity is

NOTE Confidence: 0.89508015

00:57:12.669 --> 00:57:14.759 much better so you can see that.

NOTE Confidence: 0.89508015

00:57:14.760 --> 00:57:18.747 Suppose I need to test 3000 people a day.

NOTE Confidence: 0.89508015

00:57:18.750 --> 00:57:21.725 Execution can only afford half 12 tests

NOTE Confidence: 0.89508015

00:57:21.725 --> 00:57:24.968 and then you can see the efficiency.

NOTE Confidence: 0.89508015

00:57:24.970 --> 00:57:27.190 Screening capacity is almost 120.

NOTE Confidence: 0.91202694

00:57:29.530 --> 00:57:31.470 So that is really good.

NOTE Confidence: 0.91202694

00:57:31.470 --> 00:57:33.410 That's very, very good, yeah?

NOTE Confidence: 0.90568674

00:57:38.970 --> 00:57:41.139 So I also have.

NOTE Confidence: 0.8481457

00:57:42.540 --> 00:57:44.300 You still have a question

NOTE Confidence: 0.8481457

00:57:44.300 --> 00:57:46.510 or say thank you very much.

NOTE Confidence: 0.8481457

00:57:46.510 --> 00:57:49.660 OK, so I also have a related question.

NOTE Confidence: 0.8481457

00:57:49.660 --> 00:57:53.090 So she how you mentioned that before.

NOTE Confidence: 0.8481457

00:57:53.090 --> 00:57:57.025 A future work you want to perform a

NOTE Confidence: 0.8481457

00:57:57.025 --> 00:57:58.981 regarding the reproduction number

NOTE Confidence: 0.8481457

00:57:58.981 --> 00:58:01.065 estimation and this intervention

NOTE Confidence: 0.8481457

00:58:01.065 --> 00:58:03.585 work is to consider different

NOTE Confidence: 0.8481457

00:58:03.585 --> 00:58:06.072 other covariates when you are

NOTE Confidence: 0.8481457

00:58:06.072 --> 00:58:07.936 modeling the reproduction rate.

NOTE Confidence: 0.8481457

00:58:07.940 --> 00:58:09.140 So I wonder,

NOTE Confidence: 0.8481457

00:58:09.140 --> 00:58:11.540 have you also considered like trying

NOTE Confidence: 0.8481457

00:58:11.540 --> 00:58:14.018 to take into consideration different

NOTE Confidence: 0.8481457

00:58:14.018 --> 00:58:17.018 type of various the mutation of

NOTE Confidence: 0.8481457

00:58:17.096 --> 00:58:20.510 different various and then maybe certain

NOTE Confidence: 0.8481457

00:58:20.510 --> 00:58:23.226 various various high reproduction rate?

NOTE Confidence: 0.8481457

00:58:23.226 --> 00:58:24.534 And perhaps others.

NOTE Confidence: 0.8481457

00:58:24.534 --> 00:58:25.406 This process?

NOTE Confidence: 0.8481457

00:58:25.410 --> 00:58:26.220 Yeah, that

NOTE Confidence: 0.82796884

00:58:26.220 --> 00:58:29.090 is excellent suggestions on the so yeah,

NOTE Confidence: 0.82796884

00:58:29.090 --> 00:58:32.276 if we could have those data will be great

NOTE Confidence: 0.82796884

00:58:32.276 --> 00:58:35.784 that we could include those in the model

NOTE Confidence: 0.82796884

00:58:35.784 --> 00:58:38.488 besides the different type of variance.

NOTE Confidence: 0.82796884

00:58:38.490 --> 00:58:40.950 And also like the vaccination rate.

NOTE Confidence: 0.82796884

00:58:40.950 --> 00:58:44.214 That would be a very good variable included.

NOTE Confidence: 0.82796884

00:58:44.220 --> 00:58:47.892 And so the challenge for us right now is,

NOTE Confidence: 0.82796884

00:58:47.900 --> 00:58:50.441 as you know UK has been doing

NOTE Confidence: 0.82796884

00:58:50.441 --> 00:58:53.220 a great job in the sequencing,

NOTE Confidence: 0.82796884

00:58:53.220 --> 00:58:56.076 viral sequencing and so in other words the

NOTE Confidence: 0.82796884

00:58:56.076 --> 00:58:58.310 surveillance and sequencing surveillance.

NOTE Confidence: 0.82796884

00:58:58.310 --> 00:59:02.107 But not US, and so we have not doing a great

NOTE Confidence: 0.82796884

00:59:02.107 --> 00:59:05.555 job in sequencing and so so therefore the

NOTE Confidence: 0.82796884

00:59:05.555 --> 00:59:09.269 UK could monitor the new virus and well,

NOTE Confidence: 0.82796884

00:59:09.270 --> 00:59:12.204 but I think with the one of the things

NOTE Confidence: 0.82796884

00:59:12.204 --> 00:59:15.606 we need to do this year is to increase

NOTE Confidence: 0.82796884

00:59:15.606 --> 00:59:17.938 the various viral sequencing capacity

NOTE Confidence: 0.82796884

00:59:17.938 --> 00:59:21.445 so we could monitor the new variants.

NOTE Confidence: 0.82796884

00:59:21.450 --> 00:59:24.915 So then also make the data available and to

NOTE Confidence: 0.82796884

00:59:24.915 --> 00:59:28.417 the public and then that can be included.

NOTE Confidence: 0.82796884

00:59:28.420 --> 00:59:29.554 In the analysis.

NOTE Confidence: 0.82796884

00:59:29.554 --> 00:59:32.684 So what I've found that last year and

NOTE Confidence: 0.82796884

00:59:32.684 --> 00:59:35.491 during the Covic people were much more

NOTE Confidence: 0.82796884

00:59:35.491 --> 00:59:38.718 willing to share the data computer for an,

NOTE Confidence: 0.82796884

00:59:38.720 --> 00:59:40.236 though this is really,

NOTE Confidence: 0.82796884

00:59:40.236 --> 00:59:42.510 really wonderful and also the much

NOTE Confidence: 0.82796884

00:59:42.585 --> 00:59:45.045 more preprint and compared to before,

NOTE Confidence: 0.82796884

00:59:45.050 --> 00:59:47.426 and that were posted in about

NOTE Confidence: 0.82796884

00:59:47.426 --> 00:59:49.010 archive and made archive,

NOTE Confidence: 0.82796884

00:59:49.010 --> 00:59:51.040 and people were really willing

NOTE Confidence: 0.82796884

00:59:51.040 --> 00:59:53.516 and to share their findings to

NOTE Confidence: 0.82796884

00:59:53.516 --> 00:59:55.736 the Community as soon as possible.

NOTE Confidence: 0.82796884

00:59:55.740 --> 00:59:57.805 So these are really wonderful

NOTE Confidence: 0.82796884

00:59:57.805 --> 00:59:59.870 spirit about open science and.

NOTE Confidence: 0.82796884

00:59:59.870 --> 01:00:00.696 And is.

NOTE Confidence: 0.82796884

01:00:00.696 --> 01:00:04.000 Fired on the by many researchers last year.

NOTE Confidence: 0.8469001

01:00:05.490 --> 01:00:07.770 Thanks, that's really informed him.

NOTE Confidence: 0.8360991

01:00:10.270 --> 01:00:11.450 Sorry, go ahead who is

NOTE Confidence: 0.8360991

01:00:11.450 --> 01:00:13.780 trying to ask a question.

NOTE Confidence: 0.78519773

01:00:13.780 --> 01:00:19.290 Me, I mean yeah, I see who I have a

NOTE Confidence: 0.78519773

01:00:19.290 --> 01:00:22.600 question regarding to this pulling pulling

NOTE Confidence: 0.78519773

01:00:22.600 --> 01:00:26.453 test. You said the pulling test and

NOTE Confidence: 0.78519773

01:00:26.453 --> 01:00:29.211 compare with the individual test.

NOTE Confidence: 0.78519773

01:00:29.211 --> 01:00:31.415 The sensitivities are similar

NOTE Confidence: 0.78519773

01:00:31.415 --> 01:00:34.170 and right now I'm thinking

NOTE Confidence: 0.78519773

01:00:34.170 --> 01:00:37.470 if each individual does sensitivity they

NOTE Confidence: 0.78519773

01:00:37.470 --> 01:00:41.880 can be test by individual test one this

NOTE Confidence: 0.78519773

01:00:41.880 --> 01:00:45.320 individual mix with five other. Cure

NOTE Confidence: 0.7797129

01:00:45.320 --> 01:00:47.054 lung disease samples.

NOTE Confidence: 0.7797129

01:00:47.054 --> 01:00:49.938 Basically, the concentration is diluted,

NOTE Confidence: 0.7797129

01:00:49.938 --> 01:00:53.990 so how does sensitivity will be keep

NOTE Confidence: 0.7797129

01:00:53.990 --> 01:00:58.610 the same and how the next ways how

NOTE Confidence: 0.7797129

01:00:58.610 --> 01:01:02.080 to compare if there's one positive

NOTE Confidence: 0.7797129

01:01:02.080 --> 01:01:04.968 case with five individual their

NOTE Confidence: 0.7797129

01:01:04.968 --> 01:01:08.438 normal cases an A normal situation

NOTE Confidence: 0.7797129

01:01:08.438 --> 01:01:11.906 controls and compare with all six.

NOTE Confidence: 0.7797129

01:01:11.910 --> 01:01:14.222 There just get exposure

NOTE Confidence: 0.7797129

01:01:14.222 --> 01:01:16.250 with low concentration.

NOTE Confidence: 0.7797129

01:01:16.250 --> 01:01:19.410 So there will be probably have

NOTE Confidence: 0.8333051

01:01:19.410 --> 01:01:21.522 some sensitivity issue if

NOTE Confidence: 0.8333051

01:01:21.522 --> 01:01:23.630 pulling together compared to

NOTE Confidence: 0.8333051

01:01:23.630 --> 01:01:26.792 individual tests, then the error for

NOTE Confidence: 0.8333051

01:01:26.792 --> 01:01:29.424 measurement error testing error for

NOTE Confidence: 0.8333051

01:01:29.424 --> 01:01:32.586 the two different types of tests.

NOTE Confidence: 0.8333051

01:01:32.586 --> 01:01:35.748 How did you consider them additional

NOTE Confidence: 0.8333051

01:01:35.750 --> 01:01:38.378 to the hyper structured testing?

NOTE Confidence: 0.8514964

01:01:39.020 --> 01:01:41.620 Yes, I think this is a great question.

NOTE Confidence: 0.8514964

01:01:41.620 --> 01:01:43.895 Sorry I did not make that clear.

NOTE Confidence: 0.8514964

01:01:43.900 --> 01:01:46.537 What I meant was that hyper design and are

NOTE Confidence: 0.8514964

01:01:46.537 --> 01:01:49.100 ready that they had a similar sensitivity,

NOTE Confidence: 0.8514964

01:01:49.100 --> 01:01:50.720 but the sensitivity is lower

NOTE Confidence: 0.8514964

01:01:50.720 --> 01:01:52.016 than the individual tests.

NOTE Confidence: 0.8514964

01:01:52.020 --> 01:01:56.820 If you look at the curve in about I see.

NOTE Confidence: 0.8514964

01:01:56.820 --> 01:01:59.116 At the green and red they have

NOTE Confidence: 0.8514964

01:01:59.116 --> 01:02:00.869 a similar sensitivity by the

NOTE Confidence: 0.8514964

01:02:00.869 --> 01:02:02.624 compared to the individual test.

NOTE Confidence: 0.8514964

01:02:02.630 --> 01:02:05.446 That is, this black line and it has

NOTE Confidence: 0.8514964

01:02:05.446 --> 01:02:07.504 higher sensitivity and so then they

NOTE Confidence: 0.8514964

01:02:07.504 --> 01:02:09.831 as you are definitely right when one

NOTE Confidence: 0.8514964

01:02:09.831 --> 01:02:12.204 do one month does the pooled testing

NOTE Confidence: 0.8514964

01:02:12.204 --> 01:02:14.600 because the sample needs to be diluted,

NOTE Confidence: 0.8514964

01:02:14.600 --> 01:02:17.344 so therefore we need to pay a price

NOTE Confidence: 0.8514964

01:02:17.344 --> 01:02:20.139 and then sensitivity will be lower.

NOTE Confidence: 0.8514964

01:02:20.140 --> 01:02:23.510 Yeah, so the overall one the population.

NOTE Confidence: 0.80750877

01:02:25.080 --> 01:02:27.004 Pilots large scale testing.

NOTE Confidence: 0.80750877

01:02:27.004 --> 01:02:29.890 We may have more undetectable test.

NOTE Confidence: 0.80750877

01:02:29.890 --> 01:02:33.262 Think about if six samples always happen

NOTE Confidence: 0.80750877

01:02:33.262 --> 01:02:37.110 is 1 sample has a positive positive case,

NOTE Confidence: 0.80750877

01:02:37.110 --> 01:02:40.470 so we may have some testing error

NOTE Confidence: 0.852674794

01:02:40.470 --> 01:02:43.330 here. Yeah yeah, so yes.

NOTE Confidence: 0.852674794

01:02:43.330 --> 01:02:44.305 Yes, I'm sorry.

NOTE Confidence: 0.852674794

01:02:44.305 --> 01:02:47.240 Can I just jump in for a second?

NOTE Confidence: 0.852674794

01:02:47.240 --> 01:02:49.718 So 'cause I think the comparison as

NOTE Confidence: 0.852674794

01:02:49.718 --> 01:02:51.854 you could compare this hyper design

NOTE Confidence: 0.852674794

01:02:51.854 --> 01:02:53.980 to just testing everybody or the

NOTE Confidence: 0.852674794

01:02:53.980 --> 01:02:56.055 hyper design to the traditional

NOTE Confidence: 0.852674794

01:02:56.055 --> 01:02:58.130 pool testing approach where you

NOTE Confidence: 0.852674794

01:02:58.205 --> 01:03:00.144 just divide 100 people in each one

NOTE Confidence: 0.852674794

01:03:00.144 --> 01:03:02.860 is in a single batch and I think

NOTE Confidence: 0.852674794

01:03:02.860 --> 01:03:05.343 she hung what you're saying and it

NOTE Confidence: 0.852674794

01:03:05.343 --> 01:03:07.825 makes sense to me intuitively is by

NOTE Confidence: 0.852674794

01:03:07.825 --> 01:03:09.600 repeating people in multiple batches

NOTE Confidence: 0.852674794

01:03:09.600 --> 01:03:11.730 were increasing the chances of having

NOTE Confidence: 0.852674794

01:03:11.730 --> 01:03:14.362 doubles and triples in the same batch.

NOTE Confidence: 0.852674794

01:03:14.362 --> 01:03:17.344 And then lowering the chance of having

NOTE Confidence: 0.852674794

01:03:17.344 --> 01:03:20.035 false negatives as opposed to the

NOTE Confidence: 0.852674794

01:03:20.035 --> 01:03:22.925 traditional design where you take the

NOTE Confidence: 0.852674794

01:03:22.925 --> 01:03:26.698 100 people and they're only in one match.

NOTE Confidence: 0.852674794

01:03:26.700 --> 01:03:27.804 Is that right?

NOTE Confidence: 0.852674794

01:03:27.804 --> 01:03:29.644 Yeah, that's so that's right.

NOTE Confidence: 0.852674794

01:03:29.650 --> 01:03:32.212 So you don't want to put a

NOTE Confidence: 0.852674794

01:03:32.212 --> 01:03:34.448 hundred 100 people in one batch,

NOTE Confidence: 0.852674794

01:03:34.450 --> 01:03:36.290 because if you do that,

NOTE Confidence: 0.852674794

01:03:36.290 --> 01:03:39.080 then the sample need to diluted a lot and

NOTE Confidence: 0.852674794

01:03:39.080 --> 01:03:41.830 then you will sacrifice the sensitivity.

NOTE Confidence: 0.852674794

01:03:41.830 --> 01:03:44.044 So that's why when want to

NOTE Confidence: 0.852674794

01:03:44.044 --> 01:03:45.520 do the optimal design,

NOTE Confidence: 0.852674794

01:03:45.520 --> 01:03:47.860 want to account for both the

NOTE Confidence: 0.852674794

01:03:47.860 --> 01:03:49.823 balance and also sensitivity and

NOTE Confidence: 0.852674794

01:03:49.823 --> 01:03:52.154 including both of them and so then.

NOTE Confidence: 0.852674794

01:03:52.160 --> 01:03:54.824 So that's why when we build this when we

NOTE Confidence: 0.852674794

01:03:54.824 --> 01:03:57.330 define this efficient screening capacity,

NOTE Confidence: 0.852674794

01:03:57.330 --> 01:03:58.256 this calculation.

NOTE Confidence: 0.852674794

01:03:58.256 --> 01:03:59.645 That incorporated sensitivity

NOTE Confidence: 0.852674794

01:03:59.645 --> 01:04:01.960 in the calculation as well.

NOTE Confidence: 0.8556556

01:04:02.610 --> 01:04:03.958 I see thanks yeah.

NOTE Confidence: 0.8346741

01:04:04.700 --> 01:04:06.640 So the the pool design.

NOTE Confidence: 0.8346741

01:04:06.640 --> 01:04:09.736 So if you look at the traditional design,

NOTE Confidence: 0.8346741

01:04:09.740 --> 01:04:12.844 so here you can see that each person,

NOTE Confidence: 0.8346741

01:04:12.850 --> 01:04:14.071 the traditional design.

NOTE Confidence: 0.8346741

01:04:14.071 --> 01:04:16.106 Basically each person is assigned

NOTE Confidence: 0.8346741

01:04:16.106 --> 01:04:18.798 to a single pool and so this

NOTE Confidence: 0.8346741

01:04:18.798 --> 01:04:20.603 is this called document design,

NOTE Confidence: 0.8346741

01:04:20.610 --> 01:04:23.886 and so this design so you can

NOTE Confidence: 0.8346741

01:04:23.886 --> 01:04:27.529 see that the six for six people.

NOTE Confidence: 0.8346741

01:04:27.530 --> 01:04:32.100 In this example, like the person, one and.

NOTE Confidence: 0.8346741

01:04:32.100 --> 01:04:35.076 Assigned to a person to assign to P,

NOTE Confidence: 0.8346741

01:04:35.080 --> 01:04:37.698 and so this is not efficient design.

NOTE Confidence: 0.8346741

01:04:37.700 --> 01:04:40.276 And so if we assign each person to

NOTE Confidence: 0.8346741

01:04:40.276 --> 01:04:42.270 multiple pools and after decoding

NOTE Confidence: 0.8346741

01:04:42.270 --> 01:04:44.405 that will improve the efficiency.

NOTE Confidence: 0.80364835

01:04:46.760 --> 01:04:48.375 So generally the cute does

NOTE Confidence: 0.80364835

01:04:48.375 --> 01:04:49.990 should not be too big.

NOTE Confidence: 0.80364835

01:04:49.990 --> 01:04:52.566 So here you can secure equal to 1.

NOTE Confidence: 0.80364835

01:04:52.570 --> 01:04:54.260 That means one person assigned

NOTE Confidence: 0.80364835

01:04:54.260 --> 01:04:56.837 to one pool to equal to 2 means

NOTE Confidence: 0.80364835

01:04:56.837 --> 01:04:58.741 a person sent to two pools and

NOTE Confidence: 0.80364835

01:04:58.809 --> 01:05:00.879 just think about this is very

NOTE Confidence: 0.80364835

01:05:00.879 --> 01:05:03.133 interesting and so you can see the

NOTE Confidence: 0.80364835

01:05:03.133 --> 01:05:04.879 basically using using the graph and

NOTE Confidence: 0.80364835

01:05:04.879 --> 01:05:06.973 the ABCD basically means the pool

NOTE Confidence: 0.80364835

01:05:06.973 --> 01:05:08.713 and each edge indicated person.

NOTE Confidence: 0.80364835

01:05:08.720 --> 01:05:10.820 So you can see this person one

NOTE Confidence: 0.80364835

01:05:10.820 --> 01:05:13.147 is assigned to pull A&B and then

NOTE Confidence: 0.80364835

01:05:13.147 --> 01:05:15.187 says that's why there's edge here

NOTE Confidence: 0.80364835

01:05:15.253 --> 01:05:17.119 and person to assign to C&D.

NOTE Confidence: 0.80364835

01:05:17.120 --> 01:05:18.620 So this person too.

NOTE Confidence: 0.80364835

01:05:18.620 --> 01:05:20.120 And then so on.

NOTE Confidence: 0.78496486

01:05:23.850 --> 01:05:25.740 Thanks young, I have one.

NOTE Confidence: 0.78496486

01:05:25.740 --> 01:05:27.620 I have one last question.

NOTE Confidence: 0.78496486

01:05:27.620 --> 01:05:29.606 If other people do not have

NOTE Confidence: 0.78496486

01:05:29.606 --> 01:05:31.869 more question so I wonder is

NOTE Confidence: 0.78496486

01:05:31.869 --> 01:05:34.029 also related to the sensitivity.

NOTE Confidence: 0.78496486

01:05:34.030 --> 01:05:36.284 I wonder how we considered too instead

NOTE Confidence: 0.78496486

01:05:36.284 --> 01:05:39.017 of using on the testing directly but

NOTE Confidence: 0.78496486

01:05:39.017 --> 01:05:41.567 construct some posterior for each person.

NOTE Confidence: 0.78496486

01:05:41.570 --> 01:05:43.078 Use other covariates including

NOTE Confidence: 0.78496486

01:05:43.078 --> 01:05:44.209 your past history.

NOTE Confidence: 0.78496486

01:05:44.210 --> 01:05:48.056 Whether you have higher risk an.

NOTE Confidence: 0.78496486

01:05:48.060 --> 01:05:50.424 I wonder if we use such

NOTE Confidence: 0.78496486

01:05:50.424 --> 01:05:51.606 personalized information combined

NOTE Confidence: 0.78496486

01:05:51.606 --> 01:05:53.400 with this testing results,

NOTE Confidence: 0.78496486

01:05:53.400 --> 01:05:55.460 can we have better sensitivity?

NOTE Confidence: 0.8241894

01:05:56.990 --> 01:05:58.592 Very good question.

NOTE Confidence: 0.8241894

01:05:58.592 --> 01:06:01.796 Yeah, I can see the potential.

NOTE Confidence: 0.8241894

01:06:01.800 --> 01:06:05.440 I can see the potential for doing that.

NOTE Confidence: 0.8241894

01:06:05.440 --> 01:06:09.717 Yeah, I think they're right now in

NOTE Confidence: 0.8241894

01:06:09.717 --> 01:06:12.868 the screening program and the no.

NOTE Confidence: 0.8241894

01:06:12.870 --> 01:06:14.930 Demographic information is collected,

NOTE Confidence: 0.8241894

01:06:14.930 --> 01:06:18.020 and so only the sample collected.

NOTE Confidence: 0.8241894

01:06:18.020 --> 01:06:22.076 So for example, like abroad they.

NOTE Confidence: 0.8241894

01:06:22.080 --> 01:06:25.040 But bro, the dead on.

NOTE Confidence: 0.8241894

01:06:25.040 --> 01:06:28.112 The spring when we first started

NOTE Confidence: 0.8241894

01:06:28.112 --> 01:06:31.525 it was about maybe a 3000 of

NOTE Confidence: 0.8241894

01:06:31.525 --> 01:06:34.472 sample per day and so right now.

NOTE Confidence: 0.8241894

01:06:34.480 --> 01:06:35.893 As you know,

NOTE Confidence: 0.8241894

01:06:35.893 --> 01:06:39.223 broad cover almost 9025% of the testing,

NOTE Confidence: 0.8241894

01:06:39.223 --> 01:06:42.590 and in the New England areas almost

NOTE Confidence: 0.8241894

01:06:42.689 --> 01:06:45.923 cover like 3,000,000 and test and so

NOTE Confidence: 0.8241894

01:06:45.923 --> 01:06:49.579 the event of data were lots of data.

NOTE Confidence: 0.8241894

01:06:49.580 --> 01:06:52.720 Sand were collected and.

NOTE Confidence: 0.8241894

01:06:52.720 --> 01:06:53.368 In the testing,

NOTE Confidence: 0.8241894

01:06:53.368 --> 01:06:55.330 but those data cannot be used for research.

NOTE Confidence: 0.82315105

01:06:59.530 --> 01:07:02.236 Thanks, I don't know if the

NOTE Confidence: 0.82315105

01:07:02.236 --> 01:07:04.040 audience have further question.

NOTE Confidence: 0.82315105

01:07:04.040 --> 01:07:07.648 Maybe you can also email see how afterwards.

NOTE Confidence: 0.82315105

01:07:07.650 --> 01:07:10.807 So we're running a little bit overtime,

NOTE Confidence: 0.82315105

01:07:10.810 --> 01:07:13.510 but it's very. This wonderful talk.

NOTE Confidence: 0.82315105

01:07:13.510 --> 01:07:16.216 Can we have learned so much

NOTE Confidence: 0.82315105

01:07:16.216 --> 01:07:18.020 from Seahawks services talk?

NOTE Confidence: 0.82315105

01:07:18.020 --> 01:07:19.828 Thank you again. Thank

NOTE Confidence: 0.82315105

01:07:19.830 --> 01:07:21.642 you very much.